Appendix D

Plans

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Appendix D.1

Construction Spill Prevention, Control, and Countermeasures Plan

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Vancouver Energy
Construction Spill Prevention, Control, and Countermeasures Plan

Plan No. C.10 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 30 April 2015

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Vancouver Energy

Construction Spill Prevention, Control, and Countermeasures Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	30 April 2015	Submittal for Application Review

Vancouver Energy
Construction Spill Prevention, Control, and Countermeasures Plan

Table of Contents

Section

1. Introduction 3
1.1 Purpose of Plan 3
1.2 Regulatory Requirements 3
1.3 Related Plans and Documents 6
2. Petroleum Products and Hazardous Substances Handled On Site 6
3. Past Site Remediation 6
4. Spill Prevention Best Management Practices 7
4.1 Storage Location 7
4.2 Spill Prevention 7
4.2.1 Storage Requirements 7
4.2.2 Transfer Protection 9
4.2.3 Monitoring of Transfers 9
4.2.4 Area Protection 9
4.2.5 Inspection 9
4.3 Construction within Identified Cap Areas 10
5. Spill Response and Notification 10
5.1 Response 10
5.2 Notification 11
6. Spill Response Training 11
7. List of Acronyms and Abbreviations 12

List of Tables

Table 1. Project Specific Federal, State, and Local Agencies to Be Notified in the Event of a Spill 11

List of Figures

Figure 1. Vicinity Map 4
Figure 2. Site Plan 5
Figure 3. Contaminated Areas 8

List of Appendices

Appendix A. Spill or Incident Report Form

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1. Introduction

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1 and Figure 2.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility will operate 24 hours per day, 7 days per week.

1.1 Purpose of Plan

This construction spill prevention control and countermeasures plan (cSPCCP) is a site-specific document that describes prevention and response actions for oil, hazardous substance, and hazardous waste releases resulting from construction activities. This plan forms the basis of all construction contractor spill control and pollution prevention activities at the Facility. All contractors and their employees are advised of those mandatory requirements as specified in this plan. Compliance is mandatory.

1.2 Regulatory Requirements

This Plan is prepared in accordance with WAC 463-60-205, Spillage Prevention and Control, which states:

"The application shall describe all spillage prevention and control measures to be employed regarding accidental and/or unauthorized discharges or emissions, relating such information to specific facilities, including but not limited to locations, amounts, storage duration, mode of handling, and transport. The application shall describe in general detail the content of a Construction Phase and an Operational Phase Spill Prevention, Control, and Countermeasure Plan (chapter 40 C.F.R. Part 112 and Hazardous Waste Management Plan) that will be required prior to commencement of construction."

It is noted that 40 CFR 112 only applies to facilities that have an aggregate aboveground storage capacity of 1,320 gallons of oil or more ("oil" is broadly defined to include fuels, other petroleum oil products, and non-petroleum oils) in non-motive power containers. Construction activities at the Facility are not anticipated to have an aggregate aboveground storage capacity of 1,320 gallons or more. However, this plan addresses the relevant requirements of 40 CFR 112 in the context of storage of petroleum products and other hazardous substances in association with construction activities. This plan is prepared to be consistent with the requirements of BMP C153, Material Delivery, Storage, and Containment, as found in Volume II of the Stormwater Management Manual for Western Washington.

Provisions regarding handling and storage of construction wastes that classify as hazardous are also addressed in Section 24 of the Construction Safety and Health Manual.

Figure 1 - Vicinity Map

LEGEND

- Project Boundary
- Vancouver_WA
- Portland,_Oregon

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

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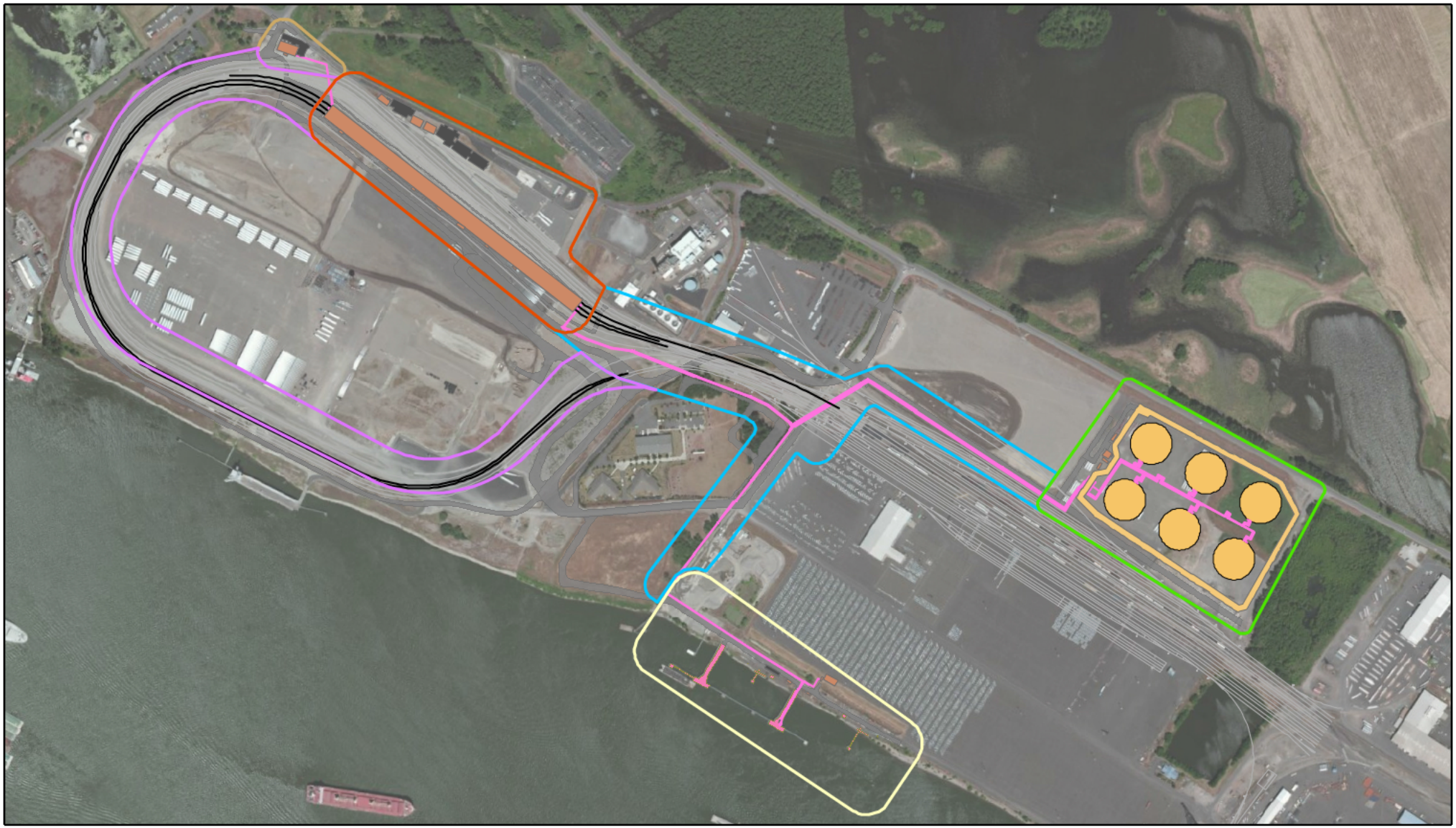

Figure 2 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000 Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

1.3 Related Plans and Documents

Other plans prepared for Facility construction that address components related to spill prevention and response include the following.

- Construction Stormwater Pollution Prevention Plan (cSWPPP) – This plan describes the construction activities and all temporary and permanent erosion and sediment control measures, pollution prevention measures, inspection/monitoring activities, and recordkeeping that will be implemented during construction.
- Water Quality Protection and Monitoring Plan (WQPMP) – This plan includes visual monitoring of surface water quality conditions; these monitoring activities include provisions for construction-related in-water work activities that could adversely impact water quality.
- Contaminated Media Management Plan (CMMP) – This plan outlines general procedures for handling and disposal of contaminated soil and groundwater encountered during ground-disturbing construction activities.
- Construction Safety and Health Manual (CSHM) – This plan includes additional provisions for Hazardous Material/Waste Handling and Disposal.

2. Petroleum Products and Hazardous Substances Handled On Site

Petroleum products, such as hydraulic oils and fuels, will be used in construction equipment and vehicles. The following construction activities are those which are most likely to be involved in oil, fuel, or chemical spills.

- Mobile equipment refueling
- Bulk fuel/oil delivery to the construction project
- Construction equipment service/maintenance work
- Construction equipment accident involving fuel/oil leakage or other fluid (e.g., transformer or lubricating oils, antifreeze)
- Solvent and paint thinner storage and use
- Paint storage and use
- Antifreeze storage and use
- Coatings and sealants storage and use
- Battery storage and use
- Contaminated soil (addressed in the CMMP)
- Accumulation and storage of paint, used oil, spent solvent, used antifreeze, coatings and sealant wastes and spent batteries.

Mobile equipment fueling and bulk delivery to the construction site typically involves mobile fuel trucks with an approximate 4,500-gallon capacity. The fuel trucks come on site, fuel construction equipment fuel tanks as needed, and then depart the site. Service and maintenance of construction equipment typically generates/involves approximately 10 gallons of fuel or oil per servicing/maintenance event. The storage and use of other materials listed above typically involves quantities of 10 gallons or less.

3. Past Site Remediation

Terminal 5 is the former location of the Evergreen/ALCOA smelter, which operated until the early 2000s. Industrial and solid wastes from the construction and operation of the aluminum smelter were stored in waste piles and consolidated in landfills on site over the years. Hazardous contaminants in these wastes include petroleum hydrocarbons, polychlorinated biphenyls, cyanide, fluoride, trichloroethylene, low-level organic chemicals, and metals. Evergreen and ALCOA completed site remediation and facility

decommissioning under Consent Decree No. 09-2-00247-2 and Enforcement Order 4931 with the Washington State Department of Ecology (Ecology). Efforts included removing structures and foundations to a depth of approximately 4 feet along with site soil and sediment with concentrations of chemicals of concern above the cleanup levels established by the consent decree.

Five cap locations subject to environmental restrictive covenants are located within the boundary of the Facility. The Terminal 5 area also includes a groundwater restrictive covenant. For detailed descriptions of the landfill areas, caps, and contaminates of concern, see the CMMP, which has been prepared under a separate cover. These areas are shown in Figure 3.

Construction of the Facility would make minor modifications to the Vanexco/Rod Mill Site Cap. The remaining construction activities located within the Facility lease boundaries have been designed to avoid impacts and work within the landfill areas. Work within the restrictive covenant areas is limited to work outside of the landfill limits or above the cap. Detailed descriptions of this work follow in Section 4.3 Construction of the rail improvements will require minor modifications to the North/North 2 Landfill, Spent Pot Liner Storage Area, and the Ingot Cap similar to those completed as part of the current West Vancouver Freight Access (WVFA) project.

4. Spill Prevention Best Management Practices

Contractors responsible for construction activities implement the following measures to prevent releases of petroleum products, hazardous materials, or hazardous wastes.

4.1 Storage Location

- Petroleum products, hazardous materials, and hazardous wastes are stored in designated areas within the approved Facility construction boundary. Because of the changing nature of activities at a construction site, such locations may not be permanent; contractors coordinate with the Vancouver Energy site superintendent and safety, health, environmental, and quality (SHE&Q) manager to select appropriate storage locations.
- Storage locations are situated away from surface waters and stormwater facilities.
- Storage areas are located away from vehicular traffic, and as near as possible to the construction entrance.

4.2 Spill Prevention

4.2.1 Storage Requirements

- Storage locations are equipped with a secondary means of containment (dikes, berms, cabinets, etc.) sized to hold the 110 percent of the capacity of the single largest container, or 10 percent of the total enclosed container volume, whichever is greater, with sufficient freeboard for precipitation.
- To the extent practicable storage containers of 55 gallons or less nominal volume are used.
- Oil, hazardous substances, and hazardous wastes are stored only in approved containers. Containers must be inspected to ensure proper integrity prior to the transfer of material and periodically when used.
- All containers are properly secured when not in use or during transportation, e.g., with covers or caps on, strapped down when necessary, etc.
- All containers of oil, hazardous substance and hazardous wastes are stored in clean, orderly, approved (e.g., National Fire Protection Association) lockers and/or secure facilities.
- Where applicable, large portable equipment (such as generators or pumps) are also placed in containment.
- Sufficient separation is provided between stored containers to allow for spill cleanup and emergency response.

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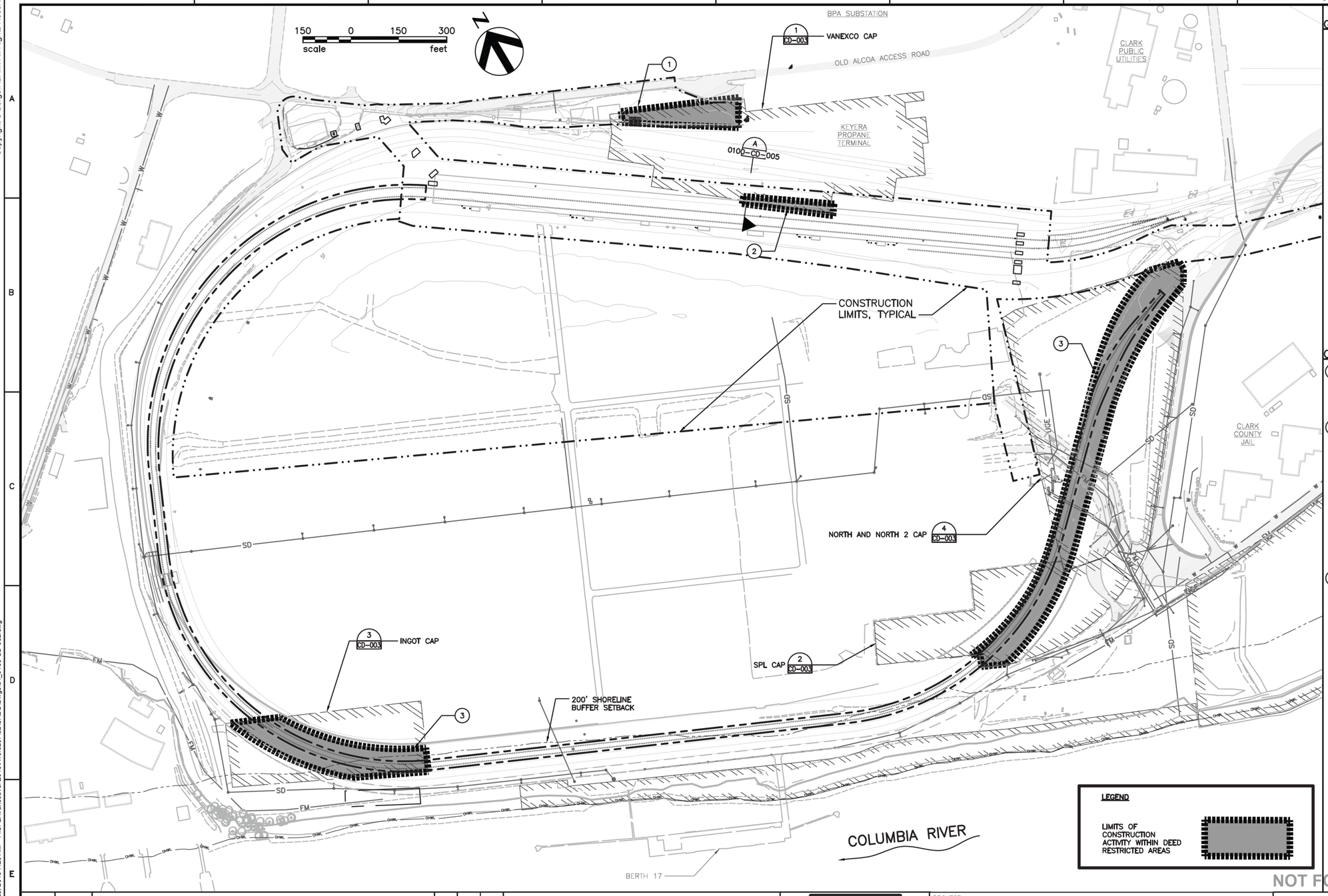

GENERAL NOTES:

1. CONTRACTOR'S ACTIVITY SHALL STRICTLY COMPLY WITH ALL PERMITTED CONDITIONS OF APPROVAL.
2. EXCAVATIONS AND GROUND DISTURBING ACTIVITIES WITHIN DEED RESTRICTED AREAS REQUIRES NOTIFICATION TO THE WASHINGTON STATE ENERGY FACILITY SITE EVALUATION COUNCIL (EFSEC) AND COMPLIANCE WITH THE APPROVED CONTAMINATED MEDIA MANAGEMENT PLAN, APPLICABLE PORT PROTOCOLS AND ADDITIONAL REQUIREMENTS PROVIDED BY EFSEC.
3. SPECIFIC LIMITS FOR THE EAST LANDFILL LIMITS ARE PROVIDED BASED UPON PRIOR SURVEY'S CONDUCTED BY HDJ DESIGN GROUP. WORK LIMIT SHALL ENCROACH UPON THE BOUNDARY OF THE EAST LANDFILL.
4. WHERE KNOWN, ADDITIONAL AREAS OF CONCERN AND POSSIBLE CONTAMINATED MEDIA LOCATIONS HAVE BEEN GENERALLY DEPICTED. CONTRACTOR SHALL COORDINATE FULLY WITH PORT OF VANCOUVER ENVIRONMENTAL STAFF AND INSPECTORS FOR MONITORING AND TESTING OF EXCAVATED MEDIA FOR POSSIBLE CONTAMINATES. PORTIONS OF AREA 200 AND AREA 500 ARE SPECIFICALLY IDENTIFIED WHERE CONTAMINATION IS LIKELY TO BE ENCOUNTERED DURING EXCAVATIONS.
5. IF MEDIA INCLUDING SOILS, OR GROUNDWATER ARE ENCOUNTERED THAT INDICATE POSSIBLE CONTAMINATION, CONTRACTOR SHALL NOTIFY VANCOUVER ENERGY SITE MANAGER, PORT OF VANCOUVER AND EFSEC IMMEDIATELY PRIOR TO PROCEEDING. SIGNS OF CONTAMINATION INCLUDE UNUSUALLY DARK SOIL AND ODORS.
6. IN AREAS OF CONCERN EXCAVATED MATERIAL SHALL BE PLACED IN SEALED WATER-TIGHT CONTAINERS OR LINED STAGING AREAS IMMEDIATELY ADJACENT TO THE WORK AREA FOR TESTING AND CLASSIFICATION OF MATERIAL PRIOR TO HAUL OFF.

CONTAMINATED MEDIA NOTES:

(1) CONSTRUCTION ACTIVITIES WITHIN THIS PORTION OF THE VANEXCO CAP WILL BE LIMITED TO GROUND DISTURBANCES ABOVE THE EXISTING CONCRETE CAP. SOME MINOR EXPOSURE OF THE CONCRETE SURFACE MAY OCCUR IN LOCALIZED AREAS. NO WORK WITHIN THIS AREA WILL REMOVE OR PENETRATE PORTIONS OF THE CAP.

(2) CONSTRUCTION ACTIVITIES WITHIN THIS PORTION OF THE VANEXCO CAP WILL RESULT IN MODIFICATION OF THE UNDERDRAIN SYSTEM AND HDPE LINER. DISCHARGES FROM THE UNDERDRAIN SYSTEM WILL BE RE-ROUTED TO AVOID CONFLICTS WITH THE PROPOSED RAIL UNLOADING BUILDING FOUNDATIONS AND CONTAINMENT TRENCHES, SEE DWG 0100-CD-006 FOR LINER PENETRATION DETAIL, AND SHEET 0100-CD-007 FOR NEW STORMWATER DETAILS. LINER WILL BE EXTENDED TO AND TIED INTO THE GRADE BEAMS OF THE RAIL UNLOADING BUILDING FOUNDATION SEE DWG 0100-CD-006 FOR DETAILS. FOUNDATIONS OF THE RAIL UNLOADING BUILDING WITHIN THE EXISTING CAP AREA WILL BE LIMITED TO SHALLOW SPREAD FOOTINGS TO LIMIT EXCAVATION ACTIVITIES. CONSTRUCTION OF RAIL UNLOADING BUILDING CONSISTS OF FULLY IMPERVIOUS ROOF WITH CAST-IN-PLACE CONCRETE SURFACING WITH FLOOR DRAINS. ALL RAINWATER WILL BE COLLECTED AND DIVERTED, THEREBY EXCLUDING SURFACE WATER FROM ENTERING CAP AREA.

(3) CONSTRUCTION WITHIN THE INGOT CAP, SPL CAP, AND NORTH AND NORTH 2 CAP AREAS ARE LIMITED TO RAIL IMPROVEMENTS ONLY. RAIL LINES TO BE UNDER TSJV CONTROL ARE PERMITTED UNDER EFSEC APPLICATION. CONSTRUCTION DRAWINGS, DETAILS, AND CONSTRUCTION ADMINISTRATION FOR ADDITIONAL 2 RAIL LOOPS WILL BE COMPLETED BY THE PORT OF VANCOUVER AS DISCUSSED IN THE LEASE AGREEMENT.

LEGEND

LIMITS OF CONSTRUCTION ACTIVITY WITHIN DEED RESTRICTED AREAS

SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: CONTAMINATED MEDIA LOCATIONS – 1

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-002	1/1	

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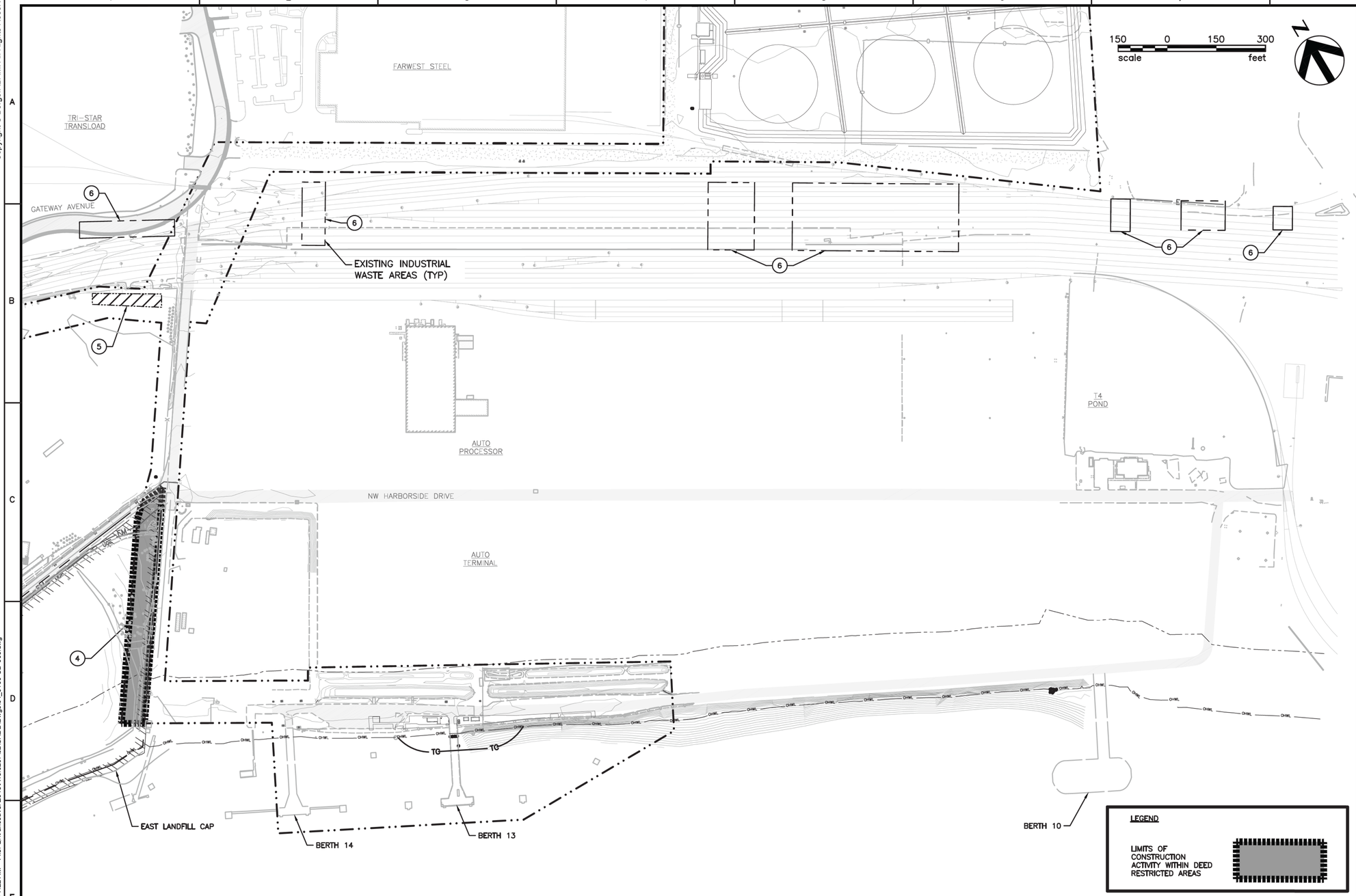

GENERAL NOTES:

1. CONTRACTOR'S ACTIVITY SHALL STRICTLY COMPLY WITH ALL PERMITTED CONDITIONS OF APPROVAL.
2. EXCAVATIONS AND GROUND DISTURBING ACTIVITIES WITHIN DEED RESTRICTED AREAS REQUIRES NOTIFICATION TO THE WASHINGTON STATE ENERGY FACILITY SITE EVALUATION COUNCIL (EFSEC) AND COMPLIANCE WITH THE APPROVED CONTAMINATED MEDIA MANAGEMENT PLAN, APPLICABLE PORT PROTOCOLS AND ADDITIONAL REQUIREMENTS PROVIDED BY EFSEC.
3. SPECIFIC LIMITS FOR THE EAST LANDFILL LIMITS ARE PROVIDED BASED UPON PRIOR SURVEY'S CONDUCTED BY HDJ DESIGN GROUP. WORK LIMIT SHALL ENCROACH UPON THE BOUNDARY OF THE EAST LANDFILL.
4. WHERE KNOWN, ADDITIONAL AREAS OF CONCERN AND POSSIBLE CONTAMINATED MEDIA LOCATIONS HAVE BEEN GENERALLY DEPICTED. CONTRACTOR SHALL COORDINATE FULLY WITH PORT OF VANCOUVER ENVIRONMENTAL STAFF AND INSPECTORS FOR MONITORING AND TESTING OF EXCAVATED MEDIA FOR POSSIBLE CONTAMINATES. PORTIONS OF AREA 200 AND AREA 500 ARE SPECIFICALLY IDENTIFIED WHERE CONTAMINATION IS LIKELY TO BE ENCOUNTERED DURING EXCAVATIONS.
5. IF MEDIA INCLUDING SOILS, OR GROUNDWATER ARE ENCOUNTERED THAT INDICATE POSSIBLE CONTAMINATION, CONTRACTOR SHALL NOTIFY VANCOUVER ENERGY SITE MANAGER, PORT OF VANCOUVER AND EFSEC IMMEDIATELY PRIOR TO PROCEEDING. SIGNS OF CONTAMINATION INCLUDE UNUSUALLY DARK SOIL AND ODORS.
6. IN AREAS OF CONCERN EXCAVATED MATERIAL SHALL BE PLACED IN SEALED WATER-TIGHT CONTAINERS OR LINED STAGING AREAS IMMEDIATELY ADJACENT TO THE WORK AREA FOR TESTING AND CLASSIFICATION OF MATERIAL PRIOR TO HAUL OFF.

CONTAMINATED MEDIA NOTES:

(4) CONSTRUCTION WITHIN THE EAST LANDFILL CAP AREA CONSISTS OF GRADING A SUITABLE LEVEL BENCH WITHIN THE DEED RESTRICTED AREA TO CONSTRUCT FOUNDATIONS FOR THE CRUDE OIL PIPELINE. CONSTRUCTION ACTIVITIES SHALL NOT ENCROACH UPON THE LANDFILL AREA ITSELF AND SHALL REMAIN EAST OF THE HIGH VISIBILITY FENCING DELINEATED ON THE EROSION CONTROL PLANS.

(5) PORT OF VANCOUVER IDENTIFIED POCKETS OF CONTAMINATED GROUNDWATER AND SOIL WITHIN THIS AREA. CONTRACTOR SHALL BE ADVISED THAT WORK ADJACENT TO THIS AREA WILL REQUIRE TESTING OF EXCAVATED MATERIAL PRIOR TO DISPOSAL.

(6) NO CONSTRUCTION ACTIVITY IS PROPOSED IN THESE AREAS OF INDUSTRIAL WASTE. PORT HAS COMPLETED CLEANUP OF THESE SITES DURING RAIL CONSTRUCTION WHERE FEASIBLE.

LEGEND

LIMITS OF CONSTRUCTION ACTIVITY WITHIN DEED RESTRICTED AREAS

PRELIMINARY

SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: CONTAMINATED MEDIA LOCATIONS – 2

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-003	1 / 1	

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4.2.2 Transfer Protection

- Valves, hoses, and system alignment is checked by knowledgeable personnel before the start of any fueling or product transfer operations.
- Equipment and transfer connections are monitored during the fueling/transfer operation to minimize the potential for environmental release of any oil, hazardous substance, or hazardous waste.
- Fueling and transfer operations are monitored to prevent overfilling of receiving containers and the potential for overflow.
- Sufficient freeboard is maintained at the top of containers to allow for product expansion.
- Fuel is dispensed from hose nozzles or approved, properly-labeled safety cans equipped with self-closing valves or caps.
- Oil is dispensed from containers equipped with self-closing valves or caps.
- Fueling of equipment and dispensing of oil is done only in areas designated for such activity upland areas away from the shoreline. Approved fuelling equipment locations are designated in the cSWPPP.
- Mobile refuelers will carry a spill response kit for use in the event of drips, leaks, or spills during transfer operations.

4.2.3 Monitoring of Transfers

- Where the transfer is either located out of the direct line of sight of the receiving unit, not easily accessible, or poorly lit, a buddy system is used to observe the transfer.
- Receiving and discharging units are monitored during the transfer operation.
- If multiple personnel are needed to monitor a transfer, they are to communicate with each other.
- Transfers of storage containers are monitored by personnel.

4.2.4 Area Protection

- No oil, hazardous substance or hazardous waste will be disposed of into the sanitary sewer system, storm drainage system, waterway, or trash container/dumpster.
- Prior to transfer operations, storm drain catch basins, sanitary sewer manholes, floor drains, and other access holes within 50 feet of the discharging/receiving units will be covered with a mat, plug, or other suitable device. Cover devices will not be removed until transfer operations are completed.
- Waste oil receptacles are provided in the same general areas used for fuel dispensing.
- A spill response kit appropriate to the oil, hazardous substance, or hazardous waste being transferred is placed at or near the operation. At a minimum, each spill kit includes the following.
  - One Water Resistant Nylon Bag
  - Three Oil Absorbent Socks 3 inches by 4 feet
  - 2 Oil Absorbent Socks 3 inches by 10 feet
  - 12 Oil Absorbent Pads 17 feet by 19 inches
  - 1 Pair Splash Resistant Googles
  - 3 Pair Nitrile Gloves
  - 10 Disposable Bags with Ties
  - Instructions

4.2.5 Inspection

All storage and transfer areas are inspected, maintained, and repaired, as needed, to assure continued performance of their intended function. Site inspections are conducted by a person who is knowledgeable in spill prevention and response. Storage areas and secondary containment are inspected weekly at a minimum[1] and maintained free of accumulated rainwater and spills. Stormwater collected in containment

[1] Inspections may be conducted in association with other construction site environmental compliance activities, cSWPPP inspections for example.

is inspected for sheens or other indications of contamination prior to discharge. If contamination is suspected, stormwater collected in containment is not discharged to ground or surface water, and appropriately collected, handled, and disposed.

4.3 Construction within Identified Cap Areas

This section is intended to provide detailed descriptions of surface area disruptions within the Deed Restrictive Areas (Figure 3). Detailed construction drawings indicating existing cap sections and restoration details are included in construction Stormwater Pollution Prevention Plan (cSWPPP) provided under separate cover. Procedures for pollution prevention for work in these areas are described in the Contaminated Media Management Plan (CMMP).

5. Spill Response and Notification

5.1 Response

1. Immediate action is taken to contain and cleanup spills. Such immediate action includes the following.
    - Use of spill response kit materials stored on site.
    - Recontainment of spilled material.
    - Removal to an approved disposal site any soil or sorbent material contaminated or saturated in conjunction with the spill.
2. Reporting the spill to the nearest supervisor and in turn reported promptly to the Vancouver Energy site superintendent and SHE&Q manager. As necessary, the SHE&Q manager reports the spill as shown on Table 1.
3. Immediate removal or control of the source of the spill (e.g., oil drum set upright, shut valve off, plug hole, etc.)
4. The supervisor or his designee makes certain that the flow of spilled fluid is contained by use of berming or damming methods appropriate to the size and conditions of the release
5. Prompt actions to recover spilled materials are implemented. Specific actions depend on the size and nature of the release and may include, but not be limited to: application of sorbent materials, removal by handheld or mobile equipment, or pumping.
6. After the spill source is removed or controlled and all spilled fluid is removed, then all contaminated soil and material is removed to a temporary holding point and stored appropriately to prevent further release to the environment.
7. Recovered materials are disposed of at a landfill facility licensed to handle wastes resulting from the response activities.

5.2 Notification

All spills involving oil, hazardous substances, or hazardous wastes are verbally reported to the SHE&Q manager immediately. The SHE&Q manager is responsible for providing appropriate notifications per Table 1. A spill report or incident report form (Appendix A) is completed.

Table 1. Project Specific Federal, State, and Local Agencies to Be Notified in the Event of a Spill

Agency	Spill Size	Verbal Report	Written Report
National Response Center (NRC) (USCG, EPA, and DOT notified)	Immediately for all spills that impact or threaten navigable water or adjoining shoreline Any size on land if threatening surface waters	Call NRC Immediately (Within 1 hour): 800-424-8802	None
EPA Region 10	If spill is 1000 gal or more (on land), or >42 gallons in each of 2 discharges within 12 month period	No	Yes (within 60 days)
Energy Facility Site Evaluation Council	• TBD by Site Certificate	TBD by Site Certificate	TBD by Site Certificate
Port of Vancouver	• Any amount on land or water requiring notification outside of Facility Management	Immediately Security 360-992-1120	As may be requested by the agency
Department of Ecology – Spills Program	• Any amount into or threatening state waters – inland, marine, or groundwater. • Any amount into a storm drain or ditch • Any amount onto snow • Any amount onto state highways and freeways. • Any amount onto land which could threaten waters of the state (including groundwater)	Immediately (within 30 minutes) WA Emergency Management Division: 800-258-5990	As may be requested by the agency
Department of Ecology – Dangerous Waste Program	• Any amount released to the environment which poses a threat to human health or the environment • Any amount released to containment which is not "promptly" cleaned up.	Immediately (within 60 minutes): Ecology Southwest Regional Office: 360-407-6300	As may be requested by the agency
Washington Department of Natural Resources	• Any amount which may impact state-owned aquatic lands	Immediately: WA Emergency Management Division: 800-258-5990 Rivers DNR Aquatic District: 360-577-2025	As may be requested by the agency

6. Spill Response Training

All Facility personnel (including refueling personnel and subcontractors) are trained in spill prevention, containment, and response and the location of spill response kits. Vancouver Energy will implement an environmental awareness training program to inform personnel at all levels of responsibility, including subcontractors, of the components of this plan. The purpose of the training program is to ensure that the necessary information is given to all workers responsible for the plan's implementation.

The training program will address each component of the cSPCCP, including how and why tasks are to be implemented. The training covers items such as prohibited discharges, inspections, spill prevention and response, implementation of BMPs, reporting, and record keeping.

All employees will have responsibility for spill prevention and cSPCCP implementation. As discussed under Section 4, if an employee or subcontractor employee notices a spill or leak, they must immediately notify the nearest supervisor and the SHE&Q manager. The SHE&Q manager will assess the spill and implement response measures as necessary.

7. List of Acronyms and Abbreviations

bbl: barrel and barrels

BMPs: best management practices

CFR: Code of Federal Regulations

CMMP: contaminated media management plan

CSHM: construction safety and health manual

Ecology: Washington State Department of Ecology

EFSEC: Energy Facility Site Evaluation Council

EPA: U.S. Environmental Protection Agency

Facility: Vancouver Energy Terminal

HDPE: high-density polyethylene

Port: Port of Vancouver USA

SHE&Q: safety, health, environmental, and quality

SPL: spent pot liner

SWPPP: stormwater pollution prevention plan

TCE: trichloroethylene

WAC: Washington Administrative Code

WVFA: West Vancouver Freight Access

Vancouver Energy
Construction Spill Prevention, Control, and Countermeasures Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix A
Spill or Incident Report Form

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SPILL OR INCIDENT REPORT FORM

Instructions: Complete for any type of oil or hazardous materials/waste spill or incident. Provide a copy of this report to management.

1. Personnel Involved in Spill Reporting:

   Name, Title, and Phone Number: _____

   Name, Title, and Phone Number: _____

2. Contractor:

   Name and Title of Person Responsible for Spill Response: _____

   Phone Number: _____

3. General Spill Information:

   Common Name of Spilled Substance: _____

   Quantity Spilled (Estimate): _____

   Describe Concentration of Material (Estimate): _____

   Date of Spill: ___/_____/_____

   Time Spill Started: ___AM _____PM Time Spill Ended: _____AM _____PM

4. Spill Location and Conditions:

   Project Title:_____

   Street Address and/or Milepost, City: _____

   Weather Conditions: _____

   If Spill to Water: Name of Water Body (if ditch or culvert, identify the water body that the structure discharges to): _____

   Identify the Discharge Point: _____

   Estimate the Depth and Width of the Water Body: _____

   Estimate Flow Rate (i.e., slow, moderate, or fast): _____

   Describe Environmental Damage (i.e., fish kill?): _____

5. Actions Taken:

   To Contain Spill or Impact of Incident: _____

   To Cleanup Spill or Recover from Incident: _____

   To Remove Cleanup Material: _____

   To Document Disposal: _____

   To Prevent Reoccurrence: _____

6. Reporting the Spill:

Spills to water: Immediately call the National Response Center (1-800-424-8802), Emergency Management (1-800-258-5990), and the Ecology Southwest Regional Office (1-800-407-6300).

Spills to soil that may be an immediate threat to health or the environment (i.e., explosive, flammable, toxic vapors, shallow groundwater, nearby creek, etc.)**:** Call the Ecology Southwest Regional Office (1-800-407-6300) immediately. If not immediately threatening, but may be a threat to human health.

List all agencies contacted; include names, dates, and phone numbers for people you spoke with (Port requires notification of any size spill even if below reportable quantities.):

_____

_____

_____

_____

Record ERTS Nos., if issued by Ecology: _____

7. Person Responsible for Managing Termination/Closure of Incident or Spill:

Name and Phone: _____

Address and Fax: _____

8. Additional Notes/Information (if necessary):

Appendix D.2

Operations Spill Prevention, Control, and Countermeasures Plan

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Vancouver Energy
Operations Spill Prevention, Control, and Countermeasures Plan

Plan No. OP.03 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 26 June 2015

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Vancouver Energy

Operations Spill Prevention, Control, and Countermeasures Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
26 June 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

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Vancouver Energy
Operations Spill Prevention, Control, and Countermeasures Plan

Table of Contents

Forward

Certification by Licensed Professional Engineer v
Management Approval and Commitment vi
Five-Year Management Review vii
Revision Summary viii
Certificate of Substantial Harm Determination ix
1. Plan Purpose and Scope 1-1
1.1 Introduction 1-1
1.2 Facility Description 1-1
1.3 Conformance with State Rules and Other Requirements 1-2
1.4 Relationship to Other Plans 1-2
1.4.1 Oil Spill Contingency Plan 1-2
1.4.2 Oil Handling Manual 1-3
1.4.3 Other Local, State, and Federal Spill Plans 1-3
1.5 Plan Review and Update Procedures 1-3
1.6 Plan Distribution Procedures 1-3
1.7 Emergency Plan 1-4
2. Facility Operations and Physical Layout 2-1
2.1 Facility Layout 2-1
2.1.1 Area 200 – Unloading and Office 2-1
2.1.2 Area 300 – Storage Area 2-2
2.1.3 Area 400 – Marine Terminal 2-3
2.1.4 Area 500 – Transfer Pipelines 2-3
2.1.5 Area 600 – Boiler Building 2-4
2.1.6 Rail Infrastructure 2-4
2.2 Type of Oil and Storage Capacity 2-5
2.2.1 Bulk Oil Storage 2-5
2.2.2 Other Storage Facilities 2-5
2.2.3 Mobile and Portable Containers 2-5
2.2.4 Buried Tanks 2-5
2.2.5 Partially Buried Tanks 2-5
2.3 Equipment Failure Considerations 2-5
3. Spill Prevention Training 3-1
3.1 Person Accountable for Discharge Prevention at this Facility 3-1
3.2 Initial Training 3-1
3.3 Discharge Prevention Briefings 3-1

3.4 Alcohol and Drug Use Awareness and Treatment Program 3-1
3.4.1 Alcohol and Drug Use Policy 3-2
3.4.2 Alcohol and Drug Use Policy Procedures 3-2
4. Maintenance, Testing, and Inspections 4-1
4.1 Daily Inspections and Product Inventory Control Documentation 4-1
4.2 Weekly Procedures 4-1
4.3 Monthly Procedures 4-1
4.4 Quarterly Procedures and Preventative Maintenance 4-1
4.5 Annual Procedures 4-1
4.6 Quarterly Pump and Motor Inspection and Maintenance Checks 4-2
4.7 Testing and Inspection of Aboveground Tanks 4-2
4.8 Aboveground Pipeline Inspection 4-3
4.9 Maintenance, Inspection, and Testing Records 4-4
5. Spill Prevention Procedures Technologies 5-1
5.1 Operational Prevention Procedures 5-1
5.1.1 Visible Discharges 5-1
5.1.2 Buried Pipeline Inspections 5-1
5.1.3 Relief Valves 5-1
5.1.4 Routine Handling Discharge Prevention Measures 5-1
5.1.5 Countermeasures for Discharge Discovery, Response, and Cleanup 5-2
5.1.6 Methods of Disposal of Recovered Materials 5-3
5.1.7 Vehicles Entering Facility 5-3
5.1.8 Diesel Fuel Delivery 5-3
5.1.9 Inspection for Brittle Fracture or Other Catastrophe 5-3
5.1.10 Emergency Shutdown System 5-3
5.2 Railcar Unloading Facility 5-4
5.2.1 Rail Unloading Rack 5-5
5.2.2 Prevention of Early Departure 5-5
5.2.3 Prevent Discharges at Departure 5-5
5.2.4 Railcar Unloading Secondary Containment 5-5
5.3 Bulk Storage Facilities 5-6
5.3.1 Design and Construction 5-6
5.3.2 Bulk Storage Secondary Containment 5-6
5.4 Diesel Storage Tanks 5-7
5.5 Oil Transfer Facilities 5-7
5.6 Marine Terminal 5-8
5.7 Other Controls 5-9
5.8 Facility Drainage 5-9
5.8.1 Diked Storage Area Drainage 5-9
5.8.2 Drainage Facilities for Undiked Areas 5-9
5.8.3 Drainage Treatment Facility – Pumping Systems 5-9
6. Facility Security 6-1
7. Industry Standards 7-1
8. List of Acronyms and Abbreviations 8-1

List of Tables

Table 1.1. Facility Information Summary 1-2
Table 1.2. Emergency Plan 1-4

List of Appendices

Appendix A. Figures
Appendix B. Tables
Appendix C: Cross Reference Summaries

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Certification by Licensed Professional Engineer[1]

By means of this certification, I attest that I am familiar with the requirements of 40 CFR 112; that I, or my agent, have visited and examined Vancouver Energy (Facility); that this operations spill prevention, control, and countermeasures plan (SPCCP) has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and with the requirements of this part; that procedures for required inspections and testing have been established; and that the SPCCP is adequate for this Facility.

My certification of this SPCCP in no way relieves the owner/operator of the Facility of their duty to prepare and fully implement the SPCCP in accordance with the requirements of 40 CFR Part 112. I in no way assume any liability of whatsoever kind or nature by my certification.

The owner/operator, by "Management Approval" contained on the following page, acknowledges this certification and the compliance measures described herein.

This SPCCP is valid only to the extent that the Facility owner or operator maintains, tests, and inspects equipment, containment, and other devices as prescribed in this SPCCP and completed any implementation requirements.

Signature _____

Printed Name _____

Date _____

Registration _____

[1] 40 CFR 112 requires that a final SPCCP be reviewed and certified by a licensed professional engineer for the SPCCP for it to be effective to satisfy the applicable requirements. The statement is indicative of the certification that will be provided as part of the final SPCCP.

Management Approval and Commitment

Owner/Operator Responsible for Facility:	Tesoro Savage Terminal LLC (Applicant/Company) 901 West Legacy Center Way Midvale, Utah 84047
Facility Name:	Vancouver Energy
Facility Address:	5501 Northwest Old Lower River Road Vancouver, WA 98660

- By signature below, the Facility Manager approves this SPCCP and acknowledges that the elements identified within this SPCCP have been implemented, and further approves the identified person to be designated as accountable for oil spill prevention at the Facility.
- This page may be used for the initial Management Approval or for subsequent change of management and/or change of designated person accountable.
- I hereby certify that this SPCCP will be implemented by the Applicant/Company.

Designated Person Accountable for Oil Spill Prevention at the Facility:

Name: TBD

Title: TBD

Signature: _____

Date: _____

Management Approval:

Name: TBD

Title: Facility Manager

Signature: _____

Date: _____

Five-Year Management Review

Five-year SPCCP reviews and plan amendments resulting from change in the facility design, construction, operation, or maintenance that materially affects its potential for a discharge as described in §112.1(b) will be documented below with the date of review and signature of individual performing the review.

All revisions that occur as a result of this review will be documented on the "Revision Summary" that follows this page.

Acknowledgment of Five-Year SPCCP Review Completion

- As required by 40 CFR Part 112.5(b), management will review this SPCCP at least every five years and will document completion of the review in the form below.
- Changes to the SPCCP are documented on the "Revision Summary" that follows this page.
- These reviews include an evaluation of more effective prevention and control technology that would significantly reduce the likelihood of a spill event at the Facility.
- By signature below, signee confirms that management has completed the review and evaluation of this SPCCP.
- As a result of this review and evaluation, technical changes in Facility design, construction, operation, or maintenance that would materially affect the Facility's potential for discharge into the navigable waters of the United States or adjoining shorelines will be recertified by a registered professional engineer.
- If no amendment is required, the box "will not" will be indicated in the appropriate space below with date and signature.

_____ _____

(Signature) (Date)

(☐ will, ☐ will not) amend the SPCCP as a result.

_____ _____

(Signature) (Date)

(☐ will, ☐ will not) amend the SPCCP as a result.

_____ _____

(Signature) (Date)

(☐ will, ☐ will not) amend the SPCCP as a result.

_____ _____

(Signature) (Date)

(☐ will, ☐ will not) amend the SPCCP as a result.

Revision Summary

No.	Date	Section Amended	Amended By	Description
00	26 June 2015	N/A	N/A	Submittal for Application Review

Certificate of Substantial Harm Determination

Facility Name	Vancouver Energy
Facility Address	5501 Northwest Old Lower River Road Vancouver, WA 98660

A facility could, because of its location, reasonably be expected to cause substantial harm to the environment by discharging oil into or on the navigable waters or adjoining shorelines pursuant to 40 CFR 112.20(e), 40 CFR 112.20(f)(1).

		Yes	**No**
1.	Does the Facility transfer oil over water to or from vessels and have a total oil storage capacity greater than or equal to 42,000 gallons?	☒	☐
2.	The Facility's total oil storage capacity is greater than or equal to 1 million gallons and does not have secondary containment for each aboveground storage area sufficiently large to contain the capacity of the largest aboveground oil storage tank within each storage area plus sufficient freeboard to allow for precipitation?	☐	☒
3.	Does the Facility have a total oil storage capacity greater than or equal to 1 million gallons and is located at a distance (as calculated using the appropriate formula or a comparable formula) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments?	☒	☐
4.	The Facility's total oil storage capacity is greater than or equal to 1 million gallons and is located at a distance (as calculated using the appropriate formula or a comparable formula) such that a discharge from the facility would shut down a public drinking water intake?	☐	☒
5.	The Facility's total oil storage capacity is greater than or equal to 1 million gallons and has had a reportable oil discharge in an amount greater than or equal to 10,000 gallons within the last five years?	☐	☒

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Signature Title

Printed Name Date

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1. Plan Purpose and Scope

1.1 Introduction

This document is a PRELIMINARY version of the spill prevention, control, and countermeasures plan (SPCCP) that will be prepared and implemented in accordance with applicable laws and regulations prior to the beginning of operations of Vancouver Energy (Facility). This preliminary version was developed based on Facility design completed at the time of writing. This preliminary SPCCP is intended to be indicative of the planning and response strategies to be implemented by Tesoro Savage Petroleum Terminal LLC (Applicant) at the Facility.

SPCCPs are typically finalized after all approvals have been received to construct a facility, and are based on final facility design. SPCCPs are usually written in the present tense, reflecting actual facility configurations and documented operation procedures. This preliminary version has been written in the present tense to reflect this approach; use of the present tense does not intend to convey approval of the plan contents at present by any regulatory agency that will be involved in the review of this plan at a future time.

The final SPCCP will be updated based on additional consultation conducted during the permitting effort for the Facility and the final Facility design.

This SPCCP has been developed in accordance with the regulatory requirements of 40 CFR Part 112 and the State of Washington Administrative Code (WAC) 173-180 Part F. Cross reference summaries to these requirements are provided in Appendix C.

1.2 Facility Description

Facility provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at the Port of Vancouver USA (Port) within the City of Vancouver in Clark County, Washington. The Port is located on the north bank of the Columbia River at approximately River Mile 103.5 (RM 103.5). State Route 501 (SR 501) (Lower River Road) is located immediately to the north of the site. Interstate 5 is located approximately 2.5 miles east of the Facility. Rail access to the site is available from the east. A vicinity map is included as Figure 1 in Appendix A.

The Facility sites within the Port cover approximately 47.4 acres and include elements within the following “area” groupings. The areas are illustrated in Figures 2.1 through 2.4 in Appendix A. A more detailed discussion of the operations with the Facility areas is included in Section 2.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 380,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to storage tanks in Area 300, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move oil directly from Area 200 to Area 400. The Facility operates 24 hours per day, 7 days per week.

Facility Information is summarized in Table 1.1 below.

Table 1.1. Facility Information Summary

Facility	Vancouver Energy 5501 Northwest Lower River Road Vancouver, Clark County, Washington 98660
Facility Phone Number	TBD
Type of Facility	Oil Transloading
Types of Oil Handled	Crude Oil
Facility Owner	Tesoro Savage Petroleum Terminal LLC 901 West Legacy Center Way Midvale, Utah 84047
Owner Phone Number	801-944-6600
Qualified Individual	TBD
Qualified Individual Title	Facility Manager
Date of Facility Start-up	TBD

1.3 Conformance with State Rules and Other Requirements

The Facility is in compliance with the regulations set forth in the Oil Pollution Act of 1990 and conforms with the following applicable requirements and other effective discharge prevention and containment procedures listed in 40 CFR 112 or any applicable more stringent state rules, regulations, and guidelines:

The Washington State Energy Facility Site Evaluation Council's (EFSEC) Site Certification Agreement for the Facility, which addresses compliance with the following local, state and federal requirements:

- City of Vancouver Water Resources Protection Ordinance, VMC Chapter 14.26
- Washington Department of Ecology, WAC 173-180 Facility Oil Handling Standards
- Washington Department of Ecology, WAC 173-182 Oil Spill Contingency Plan
- 33 CFR 154, Facilities Transferring Oil or Other Hazardous Materials in Bulk
- 33 CFR 154, Subpart F – Response Plans for Oil Facilities
- 33 CFR 156, Oil and Hazardous Material Transfer Operations

1.4 Relationship to Other Plans

The focus of this SPCCP is on spill prevention, control, and countermeasures designed and implanted to reduce the potential for oil spill spills and environmental exposure. It is recognized that this plan is not a standalone document, and that it relies on the concurrent implementation of numerous other documented procedures and operations manuals, as discussed in the following sub-sections. The plans described below, in part, fulfill the requirements of WAC 173-180 that are not covered by this Plan.

1.4.1 Oil Spill Contingency Plan

In the event an actual spill occurs, the Facility will implement its "Operations Facility Oil Spill Contingency Plan" (Contingency Plan), which has been prepared in accordance with the Oil Pollution Act of 1990 and WAC 173-182. The Contingency Plan is a separately maintained document which provides details and information for responding to a spill event. The Facility's Contingency Plan meets the requirements of a Response Plan as required by WAC 173-182 and 33 CFR 154, Subpart F.

For the purpose of SPCCPs, the Environmental Protection Agency (EPA) considers a release (or spill) to be a "discharge of oil into or upon the navigable waters of United States or adjoining shorelines, or into or upon the waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf

Lands Act or the Deepwater Port Act of 1974, or that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States.

Any discharge (spill), as defined above, which also meets the following criteria, must be reported to the EPA Region 10 Administrator.

- If the volume a single spill discharge of oil is more than 1,000 gallons, or
- If discharges of more than 42 gallons of oil in each of two discharges occur within any 12-month period.

The reporting procedures to be used are documented in the Oil Spill Contingency Plan.

1.4.2 Oil Handling Manual

The Facility also maintains and implements an "Oil Handling Manual" (OHM), prepared in accordance with 33 CFR 154 and 156. The OHM is a separately maintained document that provides details pertaining to Facility operations, including incident response actions.

1.4.3 Other Local, State, and Federal Spill Plans

This SPCCP has been prepared in accordance and used in conjunction with the Lower Columbia River, Washington Geographic Response Plan and the Washington statewide master oil and hazardous substance spill contingency plan.

1.5 Plan Review and Update Procedures

The "Designated Person Accountable for Oil Spill Prevention" (identified on the Management Approval page in the forward to the plan), with support from the Facility Manager will coordinate the following SPCCP review and update procedures.

- **Technical Amendments.** This SPCCP will be revised when there are changes in the Facility's design, construction, operation, or maintenance that materially affects the Facility's potential for the discharge of oil into or upon the navigable waters of the United States or adjoining shorelines. Such amendments will be completed and implemented as soon as possible, but not longer than six months after such a change occurs.
- **Non-Technical Amendments.** Non-technical amendments include changes that do not materially impact the Facility's potential for the discharge of oil, as described above, and may include changes, such as phone numbers, personnel changes, and similar non-technical changes.
- **Plan Review.** At least once every five years, the Facility will complete a review and evaluation of this SPCCP. The review will include, at a minimum, a review of more effective prevention and control technology, which may significantly reduce the likelihood of a discharge event from the Facility, if such technology has been field-proven at the time of the review. Based on the results of the review, the Facility will make any necessary amendments within six months of the review and implement the amendments, as soon as possible, but not longer than six months following preparation of the amendment.
- **Revision Record.** Technical amendments to the SPCCP and documentation of a Plan Review are documented in the "Revision Summary" included in the Forward to the SPCCP. Non-technical amendments are not included in the "Revision Summary."
- **Plan Certification.** Technical amendments are certified by a registered professional engineer (PE) and are documented in the "Revision Summary" located in the Forward to this SPCCP. Amendments are detailed with a stand-alone technical PE certification page behind the initial "Certification by Licensed Professional Engineer." Non-technical amendments do not require a PE certification.

1.6 Plan Distribution Procedures

Distribution of the SPCCP will be coordinated by Facility Management, and will include identification of a copy of number assigned to each designated plan holder. A Distribution List is included in the Forward to this document.

A complete copy of the SPCCP is maintained at the Facility, and it will be available to the EPA Regional Administrator for on-site review, as requested.

1.7 Emergency Plan

In the event of any natural or man-made emergency, including, but not limited to, earthquakes, floods, tank rupture, fire, unintended Facility release, water pollution caused by an accident, etc., the notification delineated by the Facility Oil Spill Contingency Plan and the Emergency Response Plan shall be executed, including the notifications to the Applicant's personnel listed in the SPCCP. The following supplements the notifications in the Facility Oil Spill Contingency Plan.

Table 1.2. Emergency Plan

General Emergencies	If an oil spill or release occurs, the Operations Facility Oil Spill Contingency Plan should be used to make necessary notifications and for direction on necessary response actions and implementation of an Emergency Response Plan.	
	For adjacent property owners:	Phone Number
	• Port of Vancouver	360-992-1120
	• NGL Supply	360-694-2844
	• Clark Public Utilities	360-992-3000
	• Clark County Jail Work Center	360-397-2138
	• Tidewater Terminal Company	360-693-1491
	• Farwest Steel	360-735-8744
	• Subaru of America	360-737-7630
	• CalPortland	360-694-1627
	• Tristar Transload	360-823-1000
	• Kelly Pipe	360-737-1848
	• Waste Connections Columbia Resource Center	360-737-1727
	For Facility security:	
	• Port of Vancouver	360-992-1120
	• Vancouver Police Department	911
Employee Evacuation	The first step to be taken in the event of a major disaster involving the facility will be to evacuate the property. All product transfers should be secured. The emergency shutdown should be activated. Evacuation locations are found in the Facility Oil Spill Contingency Plan.	
Safeguarding Records	Protecting and safeguarding records will be the responsibility of the Facility Manager. That person will be determined at a later date.	
Equipment	Safeguarding the equipment at the Facility will be the responsibility of the Facility Manager. That person will be determined at a later date.	
Press and Visitors	All contacts with the press and the handling of visitors during the emergency is the responsibility of the Facility Manager. That person will be designated at a later date.	

End of Section 1.0

2. Facility Operations and Physical Layout

2.1 Facility Layout

The function of the Facility is to receive a range of 15 to 45 API unload pipeline quality from railcars, provide temporary aboveground storage of crude oil, and transfer crude oil to marine vessels for shipment. Facility plans, provided in Appendix A, identify the locations for operations within different "areas" of the overall facility, with each area serving different functions as follows.

Area 200 – Unloading and Office: The proposed administration office is located at 5501 NW Lower River Road. Immediately south of the administration office is the rail unloading facility. The primary function of the rail unloading facility is to unload crude oil from railcars.

Area 300 – Storage Area: Six aboveground storage tanks (ASTs) will be used for the storage of crude oil. Each AST has 380,000 bbl capacity. The storage area is located approximately 1 mile east of the rail unloading facility.

Area 400 – Marine Terminal: Vessel loading operations are conducted at berths 13 and 14. The equipment and operations from the first valve inside onshore secondary containment and continuing out over the water are not included in this SPCCP. Piping running from the first valve inside onshore secondary containment to the tank farm is within the EPA jurisdiction and the scope of this SPCCP.[2]

Area 500 – Transfer Pipelines: Transfer pipelines are used to transfer crude oil from the rail unloading facility to the storage area, from the storage area to the marine terminal, and from the rail unloading area to the marine terminal.

Area 600 – West Boiler: The west boiler building generates and delivers steam to the rail unloading facility to heat crude oil up to 150 degrees to ensure a steady transfer to the storage area. The building is located west of the administration building.

Rail Infrastructure: A series of loop tracks are used to move railcars through the rail unloading facility.

2.1.1 Area 200 – Unloading and Office

Area 200 is located at 5501 NW Old Lower River Road in Vancouver, and includes the administrative and support buildings, parking, rail access to the rail unloading facility, and the rail unloading facility. Area 200 is accessible from an unnamed private road owned and maintained by the Port. Area 200 facilities cover an area approximately 7.6 acres in size.

The rail unloading facility is a covered structure through which the trains are pulled and secured for unloading. The structure is approximately 1,850 feet long by 91 feet wide with a maximum height of approximately 50 feet. The building structure is open on the north, west, and east sides, and the southern wall is partially enclosed with built segments along the wall acting as a weather break.

Each of three tracks includes 30 unloading stations for handling crude oil. Each station uses a completely closed loop of piping to prevent any atmospheric contact with the product during unloading. The entire 1,850 feet of the rail unloading facility includes full coverage rail collection pans, and the interior ground surfaces are constructed of concrete to contain any accident releases, as well as provide catchments for all stormwater that drips from railcars or is blown into the rail unloading facility by the wind.

All mechanical piping is located in concrete secondary containment trenches, and the pump basins used to transfer crude oil from the rail unloading facility to Area 300 storage area are in belowgrade concrete basins. The collection piping from the rail drip pans and rail unloading facility floor drains is mostly located

[2] Applicant has also prepared a preliminary oil spill contingency plan that addresses potential releases from marine loading activities.

in these concrete trenches with discharge pumps located in the pump basins. Water collected from within the rail unloading facility is collected in these systems and pumped to two containment tanks located in the area of the administrative/support buildings. Other than from office buildings, there is no hydraulic connection to storm or sanitary sewers from within the rail unloading footprint.

Several accessory structures and equipment pads are located adjacent to the rail unloading facility, including electrical house (E-houses) control rooms, fire pump and foam building, electrical equipment pads, and mechanical equipment pads.

The administrative/support buildings are located north of the rail unloading facility adjacent to Old Lower River Road. This area consists of three proposed modular structures, parking, and associated landscaping. In addition, the containment tanks for discharges from the rail unloading facility are located near the parking lot. A pedestrian bridge connects the administrative/support buildings to the rail unloading facility.

2.1.2 Area 300 – Storage Area

Area 300 contains storage tanks and associated containment areas, and includes a single pump basin used to transfer crude oil from the storage tanks to the marine terminal and associated support buildings and equipment pads.

The storage area includes six double-bottom, internal floating-roof ASTs for storing crude oil. The tanks are approximately 50 feet in height and 240 feet in diameter. Each tank has a capacity to store 380,000 bbl of crude oil; the maximum volume of oil to be stored is 380,000 bbl.

The containment area includes an earthen perimeter berm approximately 6 feet in height, which is tall sized to contain the release of 110 percent of one entire tank volume and a 100-year rainfall event. Intermediate berms approximately 2 feet tall are positioned between each tank to segregate the containment area. This capacity reflects the most stringent of Washington spill prevention and control and National Fire Protection Association (NFPA) requirements.

Each tank has a fixed roof to keep precipitation from reaching the inside of the tank and an internal floating roof (with dual seals) to control vapor emissions from the tank to the atmosphere. The floating roof is designed to avoid tipping during operations.

The double-bottomed tanks include a leak detection system between the tank floors and are equipped with cathodic protection to prevent corrosion. The entire tank containment area is lined with an impervious membrane to prevent any potential spills from leaving the containment area via infiltration into the ground.

Stormwater flows to a control structure, which passes the water at a controlled flow rate through two parallel oil/water separators for free oil removal. The water then passes into a stormwater pump station equipped with two submersible pumps that discharge to a treatment system. This water is comingled with the parking lot runoff prior to treatment and treated for turbidity, heavy metals, and volatile organics (benzene).

Crude oil stored in the tanks is pumped to the dock for transfer to a ship or barge. Approximately three to six variable speed pumps pump the crude oil, at least one of which would be on standby.

The pumps are housed in the tank storage pump basin located on the west side of the storage tank area. Stormwater collected in the pump basin flows by gravity through an oil-water separator. There is a manual isolation valve so that the basin can be isolated during maintenance activities or if there was a release of crude oil. The flow is routed through the treatment and discharge system associated with the containment berm sump.

The support buildings (including a storage building, fire water pump and foam building, control room/E-house, electrical pads, and mechanical pads) are constructed outside the containment area on

slab-on-grade foundations. A small storage tank of 500 gallons or less is located adjacent to the emergency fire pump and inside the pump building to hold ultra-low sulfur diesel fuel used to fuel the fire pump. The pump basin is isolated from the containment area by its concrete walls; the basin providing secondary containment for the pump machinery.

2.1.3 Area 400 – Marine Terminal

Crude oil is transferred by 36-inch-diameter pipeline to vessels at Berth 13, located at Area 400. Hoses supported by cranes or a pulley system are connected to the manifold used to transfer the crude oil from the piping system to the vessel being loaded. The hoses are connected to the grounding grid to protect against the buildup of static electricity. The loading system incorporates automatic shutoff valves with a maximum 30 seconds until shutoff. The pipelines serving the dock undergo annual hydrostatic testing as required by federal standards. A catchment capable of holding 3 bbl of discharge is positioned on the deck level for the containment of inadvertent releases, in addition to stormwater, that may fall in the catchment area. The catchment is a steel plate welded on deck with walls to provide containment. The contents of the containment are discharged within 1 hour of completion of any transfer, and flow by gravity upland to a treatment system and storm pump station for discharge to treatment swales, or for haul off if there was a release of crude oil

A fire pump and foam building located near the dock-side control house encompasses an emergency fire pump and fire protection systems associated with the marine terminal. A small storage tank of 500 gallons is located adjacent to the emergency fire pump to hold ultra-low sulfur diesel fuel.

Prior to oil transfer, a fence boom is placed between the vessel and the shoreline, and floating booms connect with the fence boom on the downstream end (but open on the upstream, offshore side of the moored vessel due to currents).

Marine vessels are generally empty, having inert (noncombustible) gases occupying the cargo tanks, when they arrive at the berth. When the vessel tanks are filled with crude oil, the vapors from previous cargo, vapors from the crude being added to the tank, and the inert gases are displaced from the tank. These vapors are collected and sent to the marine vapor combustion unit (MVCU) system, which combusts the hydrocarbons in the vapors. Piping from the dock conveys the vapors to the MVCUs located north of the access trestle and roadway. Once in the MVCUs, the vapors from the vessel hold are mixed with small amounts of natural gas and combusted in the MVCUs. The resulting combustion gases are be expelled from the MVCU stack. Eight units are installed on a 100- by 50-foot concrete slab, housing equipment that has eight steel stacks approximately 25 feet in height.

2.1.4 Area 500 – Transfer Pipelines

A combination of above- and belowground steel transfer pipelines convey crude oil from the rail unloading structure in Area 200 to the storage tanks in Area 300 and from the storage tanks to the marine vessel loading system in Area 400. The system includes the following.

- Three 24-inch-diameter, approximately 1,800-foot-long pipelines collect the crude oil unloaded at the rail unloading stations; one of these pipelines is electrically heat-traced to ensure that the viscosity of the crude oil is maintained at approximately 150°F while it is conveyed from the unloading structure.
- Three 24-inch-diameter, approximately 5,500-foot-long pipelines would connect the railcar unloading facility to the storage tanks in Area 300; one of these pipes would be electrically heat-traced to ensure that the viscosity of the crude oil requiring heating would be maintained while it is conveyed from the unloading facility to the storage area.
- One 36-inch-diameter, approximately 5,300-foot-long pipeline connects the storage tanks with the vessel loading system in Area 400.
- One 6- to 12-inch-diameter, approximately 5,300-foot-long pipeline returns crude oil from the vessel loading system back to the storage tanks; this pipeline is provided to handle loading process shutdowns and provide pressure relief and prevent pipe hammer in the pipe conveyance system.

- One 10-inch-diameter, approximately 600-foot-long pipe delivers hydrocarbon vapor generated during loading of vessels to the MVCU (described in Section 2.3).

Piping is constructed to the specifications of American Standards Testing and Materials (ASTM) A53 or A106. Aboveground runs of piping are supported so that the bottom of the piping is a minimum of 1 foot off the ground on vertical supports located every 20 to 25 feet. The vertical supports are fixed on spread footings. Where multiple pipes are placed within the routing, pipelines are either placed side-by-side or stacked. Expansion loops are constructed along the transfer pipeline runs to accommodate thermal expansion of the pipelines during operation. Where road or rail crossings occur and in other areas of limited space, the pipelines are located underground or raised above the ground in accordance with standard American Railway Engineering and Maintenance-of-Way Association (AREMA) clearances. Secondary containment with leak detection is provided for pipeline segments installed underground. Runs of aboveground pipeline are standard-walled to ensure ease of inspection and maintenance and designed in accordance with the applicable requirements of WAC 173-180-340 and 49 Code of Federal Regulations (CFR) 195.246 through 49 CFR 195.254. Transfer pipelines have cathodic protected at all underground sections to prevent corrosion.

To allow greater flexibility in operations, the transfer piping system is designed to allow crude oil being unloaded in Area 200 to be directly conveyed to Area 400, Marine Terminal, for loading onto vessels. This capability allows occasional topping off of vessel loads, and may allow the Facility to begin limited operation during the construction of the Area 300 storage tanks.

The piping system and associated supports and foundations are designed to applicable seismic protection standards and are electrically grounded to protect against the buildup of static electricity during crude oil conveyance. Manual and automatic isolation valves are located on the piping system at the exit of the railcar unloading facility and at the entrance to the storage tank area and Area 400.

2.1.5 Area 600 – Boiler Building

Area 600 (Boiler Building) contains a boiler building with a natural-gas boiler. The boiler is used to generate steam for heated crude unloading operations inside Area 200. Area 600 also includes an E-house and associated parking.

2.1.6 Rail Infrastructure

Three rail loops (Tracks 4105, 4106, and 4107), ranging from approximately 7,700 to 8,100 feet in length, service the Area 200 unloading facility. These rail loops exist inside of several other loops owned and operated by the Port. In addition, the following rail infrastructure is part of the Facility.

- A connection with cross-over switches allows for departure on any of two of the departure tracks.
- Two tracks (designated as Tracks 4109 and 4110) located off the loop tracks serve as a temporary staging location for railcars that have deficiencies and have been removed from the unit train prior to the cars being released back to the rail carrier. (Track 4109 is approximately 200 feet long, and Track 4110 is approximately 700 feet long.)

2.2 Type of Oil and Storage Capacity

The Facility handles Groups 2, 3, and 4 persistent oils, as defined in WAC 173-182-030 (42), with a specific gravity less than 1 and an API gravity ranging from 15 to 45.

2.2.1 Bulk Oil Storage

Crude oil is stored at the site in six double-bottom, internal floating-roof ASTs. The tanks are approximately 50 feet in height and 240 feet in diameter. Each tank has capacity to store 380,000 bbl of crude oil. The maximum volume of oil to be stored is 360,000 bbl, based on capacity reductions due to the presence of a floating roof and other internal tank equipment and appurtenances. **Table B-1a** in Appendix B provides a list of the six bulk storage tanks with their contents and capacities.

2.2.2 Other Storage Facilities

Three double-walled 500-gallon diesel tanks are used at the Facility to store ultra-low sulfur diesel for powering emergency fire water pumps. Each of the tanks is located adjacent to the associated fire water pump it serves, one at each of the following locations: Area 200 – Unloading and Office, Area 300 – Storage Area, and Area 400 – Marine Terminal. These fuel tanks are listed in **Table B-1a** in Appendix B.

Table B-1b presents a list of other containers, their contents, and capacities. The locations of all containers are presented on figures for each area in Appendix A.

2.2.3 Mobile and Portable Containers

Mobile oil storage tanks are not used at the facility. Portable containers may be used to temporarily store products recovered during response actions; such storage will occur on portable containment devices or within a containment structure.

2.2.4 Buried Tanks

There are no underground storage tanks installed at the Facility.

2.2.5 Partially Buried Tanks

There are no partially buried storage tanks installed at the Facility.

2.3 Equipment Failure Considerations

The 40 CFR 112.7(b) requires that the plan identify a prediction of the direction, rate of flow, and total quantity of oil that could be discharged from the Facility as a result of each type of major equipment failure "where experience indicates a reasonable potential for equipment failure (such as loading or unloading equipment, tank overflow, rupture, or leakage, or any other equipment known to be a source of a discharge)." Within the meaning of 40 CFR 112.7(b), the analysis required "will depend on the experience of the facility and how sophisticated the facility equipment is."[3] Consequently, while this Plan conforms to the language of the regulation, which is applicable to any facility, given the design, engineering and character of the facility and the site as described herein, "experience" does not indicate a "reasonable potential for equipment failure" for this Facility.

[3] EPA Guidance, Federal Register Vol. 67, No. 137 at 47100 (July 17, 2002). "'Experience' includes the experience of the facility and the industry in general." "[T]he required explanation will be tailored to the type of equipment used and the experience with that equipment."

It is the Applicant's policy to conduct all facility operations in a safe and conscientious manner. Inherent in the storage and handling of crude oil, however, is the potential for spills from equipment failure or human error. Potential spill scenarios and applicable preventative measures are summarized in **Table B-3 in Appendix B**. The following scenarios were considered[4]:

- Storage Tank Leak or Failure
- Storage Tank Overflow
- Tank Bottom Chronic Leak
- Spill or Railcar Failure at the Rail Unloading Facility
- Leak from Transfer Pipeline, Unloading Area to Storage Area[5]
- Leak from Transfer Pipeline, Storage Area to Marine Terminal
- Bulk Diesel Storage Tank Failure
- Bulk Diesel Storage Tank Overfill
- Transformer Container Leak

End of Section 2.0

[4] Discharge scenarios, including those with release to waters of the U.S., are also considered as part of the Facility oil spill contingency plan.

[5] Leaks from the transfer pipeline would also include transfers from the Rail Unloading Area directly to the Marine Terminal.

3. Spill Prevention Training

Personnel training and spill prevention procedures are in place at the Facility as described in the following subsections. A summary of training and exercises pertaining to spill response is also contained in Appendix A of the Facility Oil Spill Contingency Plan. Training and certification for Facility operators complies with the requirements of WAC 173-180 Part E.

3.1 Person Accountable for Discharge Prevention at this Facility

The Applicant has assigned a qualified and trained staff person to be accountable for discharge control and prevention for the facility. This individual reports to the Facility Manager. An example Employee Training and Discharge Prevention Training Record is included as **Table B-4** in Appendix B.

3.2 Initial Training

All new maintenance and operating personnel receive training on the proper operation and maintenance of the Facility's spill prevention equipment and procedures. New employees are provided documented orientation covering these materials within one week of their start of employment. The training is presented in-person at the Facility by training personnel. The initial training covers the following minimum subjects.

- Operation and maintenance of equipment to prevent oil discharges;
- Oil discharge procedures and protocols;
- Applicable oil spill prevention laws, rules, and regulations (State and Federal);
- General Facility operations, including the contents of the Facility's Oil Handling Manual;
- Orientation to this SPCCP and the Facility's Oil Spill Contingency Plan

SPCCP training records are maintained by the Facility Manager.

3.3 Discharge Prevention Briefings

The SPCCP is the subject of annual training for all oil-handling employees in the Facility. One person is assigned to this Facility to provide discharge prevention briefings. Spill response drill training and exercises are held at least annually. These exercises highlight and describe known discharges or failures, malfunctioning components, and any recently developed precautionary measures. Spill/incident reports are also highlighted periodically during safety meetings.

An example record of this training is included in **Table B-4** in Appendix B. Training records are maintained for at least three years.

3.4 Alcohol and Drug Use Awareness and Treatment Program

All personnel (including supervisors and contractors) associated with the operation and maintenance of the storage, pipeline, and transfer operations covered by this SPCCP are subject to drug and alcohol testing as dictated by Facility policy.

The Facility has an established Safety Health and Environmental Policy, which includes provisions to promotion of a safe, productive and drug-free work environment. Every employee is provided initial training to ensure understanding of this policy, and is provided annual drug training to ensure ongoing understanding and compliance with elements and procedures associated with the alcohol and drug awareness policy.

3.4.1 Alcohol and Drug Use Policy

Management will test employees and prospective employees for the presence of drugs or alcohol in accordance with the provisions of this policy and as a condition of employment. All employees are subject to drug testing. Management does so to maintain a safe, productive, high-quality, and secure drug-free work environment. Anyone who violates this policy may be terminated, even for the first offense. The policy is summarized below.

A. Employees shall not use, manufacture, possess, sell, store, trade, or offer for sale illegal drugs.

B. Employees shall not use, manufacture, possess, sell, or consume alcohol on the job.

C. Employees shall not report to work under the influence of illegal drugs or alcohol.

D. Employees shall not use prescription drugs illegally.

E. Any employee who tests positive for illegal drugs or alcohol is subject to disciplinary action, which may include termination of employment and may have legal consequences.

F. Any employee who attempts to alter, adulterate, or substitute the specimen provided for drug or alcohol testing is subject to disciplinary action, which may include termination of employment and may have legal consequences.

G. Any employee or job applicant who refuses to consent to testing for illegal drugs or alcohol is subject to disciplinary action, which may include termination.

H. Failure to notify management prior to commencing employment of a previous conviction for a criminal drug violation for activities that occurred in the workplace may result in termination.

I. Vacancy announcements will state that substance abuse testing is required.

J. Notification that drug abuse testing is a requirement for (of) employment shall be posted in a conspicuous location.

K. Applicants and employees shall be informed that copies of drug policy are available in the personnel office or other suitable location.

3.4.2 Alcohol and Drug Use Policy Procedures

The following programs, procedures, and rules are implemented as part of the policy:

A. **Type of Test and Identification of Those Being Tested:** The Company may designate the type of sample to be used in the testing program. Prior to testing, employees and prospective employees may be required to provide personal identification.

B. **Pre-Employment Testing:** All prospective employees are to be tested as a condition of employment. Prospective employees who refuse to take a test or whose test is positive will be denied employment. Tests that yield a “dilute” result give the Company the option to withdraw an offer of employment. Attempts to alter, adulterate, or substitute the specimen provided will give the Company the option to withdraw an offer of employment.

C. **Random Testing:** All employees will be subject to random testing. Random testing will be performed using a system imposed without individualized suspicion that a particular individual is using illegal drugs, and may either be

   1 Uniform-unannounced testing of designated employees occupying a specified area, element or position; or
   2 A statistically random sampling of such employees based on a neutral criterion, such as social security numbers.
   3 Annual random testing shall be conducted, at a minimum, on 30 percent of the average staff, and 50 percent substance/10 percent alcohol on all employees.

D. **Post-accident Testing:** Employees involved in an accident or a claim of work-related injury or illness must submit to testing. Post-accident alcohol testing should be done within 2 hours of the accident, and always within 8 hours. Post-accident drug testing should be done as timely as practical and within 24 hours of the accident. Use the form at the end of this section to determine whether a DOT or non-DOT test needs to be performed for each employee. The bottom section of the form should be sent with the employee to the collection facility.

E. **Reasonable Suspicion Testing:** An employee may be required to submit to a drug and/or alcohol test if the Company has reasonable suspicion that the employee is impaired due to the influence of drugs or alcohol. Testing for reasonable suspicion is based on the observations of a trained supervisor who identifies specific, clearly stated observations concerning appearance, behavior, speech, or body odor.

F. **Refusal to Test:** An employee who refuses to be tested when so required or requested will be suspended, pending investigation and will be subject to disciplinary action, which may include termination. Attempts to alter, adulterate, substitute the specimen, or leave the collection facility without providing a sample will be deemed a Refusal to Test.

G. **Insufficient Sample or Shy Bladder (for Urine Samples Only):** (Refer to CFR 40.193) If the employee is unable to provide the required quantity of urine for testing, the collection agent will discard the partial sample. The collection agent shall instruct the employee to drink up to 40 ounces of fluid, distributed reasonably over a period of up to 3 hours, or until the individual has provided a sufficient sample, whichever comes first. If the employee refuses to provide a new urine specimen or leaves the collection site before the collection is complete, the collection agent shall terminate the collection and notify the employer that the employee has refused to submit to testing. *If the employee has not provided an adequate sample within 3 hours of the first attempt, the test shall be treated as a Refusal to Test and the collection agent shall discontinue the test and notify the employer.* The employer, after consulting with the Medical Review Officer (MRO), will direct the employee to obtain an evaluation within five days from a licensed physician, acceptable to the MRO, who has expertise in the medical issues raised by the employee's inability to provide a sufficient specimen. If the doctor cannot determine any medical reason why the employee could not provide a sufficient sample within the allotted time, the test shall stand as a *Refusal to Test.*

   Note: Neither the collection agent nor any employee shall grant permission for the employee to leave the collection site without providing a sample within the 3-hour time limit. Leaving the collection site under any circumstances without providing a sample will constitute a *Refusal to Test*. For more information on this topic, please refer to CFR 40.193 or contact the Service Support Center.

H. **Analysis of Samples:** Testing and analysis of the sample will be done by scientifically accepted analytical methods. "Positive" tests will be confirmed or verified by gas chromatography-mass spectroscopy or other comparable and reliable methods.

I. **Positive Result of Test:** Upon receipt of a verified or confirmed positive drug or alcohol test result, or upon the refusal of an employee or prospective employee to provide a sample, the Company may use that test result or refusal as the basis for disciplinary action, including termination. If a test is deemed positive, the employee may within five days request that the sample be re-tested. The request for re-testing must be made to the MRO who shall then direct the laboratory which analyzed the specimen to provide the specimen to another Department of Health and Human Services certified laboratory for analysis. The cost of the re-testing shall be borne solely by the employee. However, if the reanalysis or re-test is negative the employee shall be reimbursed the cost of the same. Termination due to an adulterated, dilute or positive test or a refusal to test, will preclude an individual from rehire with the Company.

J. **"Dilute" Result of Test:** Upon receipt of a drug test that yields a "dilute" result, the Company may require a re-test of the individual. "The guidelines state that employees having observed collections must be instructed to raise clothing, just above the naval; lower clothing, to mid-thigh; then turn around to show the same gender observers they do not have prosthetic devices for beating the test. If no device is detected, the employee is permitted to return clothing to its proper observed-collection position. Then the observed collection will take place." In pre-employment drug testing, tests that yield a "dilute" result give the Company the option to withdraw an offer of employment.

K. **Substance Abuse Training:** The Company will provide training for all employees on substance abuse as it relates to our policy.

L. **Confidentiality:** It is the Company's policy to make all reasonable efforts to assure the confidentiality of all information, interviews, reports, statements, and test results which are developed, received, or generated as a consequence of the implementation of this policy. Use of any information generated as a result of this policy will be restricted to the pursuit and achievement of those purposes and objectives defined in this policy.

M. **Notification of Supervisor:** Anyone taking or using mind altering medication, whether or not prescribed by the employee's physician for a medical condition, which is known or advertised as possibly affecting or impairing judgment, coordination, or other senses, or which may adversely affect ability to perform work in a safe and productive manner, must notify his or her supervisor or other appropriate management official prior to starting work or entering the Company's or client facilities.

   The management official, after consulting the MRO, if appropriate, will decide if the employee can remain at work or on the Company Premises or work sites and what work restrictions, if any, are deemed necessary. Any employee violating this policy will be subject to discipline, including termination.

N. **Other:**

   1 Employees arrested for using, possessing or trafficking drugs may be suspended pending company investigation of facts & circumstances or in a court judgment.
   2 Employees convicted of possessing or trafficking drugs may be terminated.
   3 The Company maintains the right to search any Company property at any time and also search an employee's personal belongings, and his/her vehicles for alcohol, drugs, or related paraphernalia while such are on Company property or otherwise in the employee's possession while the employee is in the service of the Company. Failure to allow reasonable search may be considered a violation of this policy.

End of Section 3.0

4. Maintenance, Testing, and Inspections

Facility inspection, testing, and recordkeeping requirements are detailed throughout this SPCCP, and are more specifically described in the Facility's Oil Handling Manual. A summary of inspections and testing procedures is provided below.

4.1 Daily Inspections and Product Inventory Control Documentation

1. Gauges tanks and record temperature and meter readings on all tanks. While performing gauging duties, visually inspect tanks, product lines, pumps, valves, and other equipment. Complete Daily Gauging and Terminal Inspection Sheet.
2. Input gauge, temperature, and meter data into the computer control system.
3. Input receipts or deliveries into the computer.
4. Distribute bills of lading to the appropriate offices.
5. Generate daily delivery and inventory report. Compare computer calculations with manual totals on delivery sheet.
6. Monitor schedule for pending receipts.
7. Input meter readings into the computer system, generate meter report. Distribute appropriate copies. Record copy to terminal file.
8. Compare movement and inventory data with daily delivery information to verify that inventories are accurate.
9. Send daily reports to appropriate offices and file one report locally.

4.2 Weekly Procedures

1. Back up computer system on disk and put into a secured storage.
2. Inspect any Dangerous (Hazardous) Waste accumulation drum(s), record inspection results on posted inspection form.

4.3 Monthly Procedures

A monthly equipment inspection checklist is provided in **Table B-5** (or equivalent) in Appendix B.

1. Take physical inventory by hand gauging all tanks.
2. Inspect tank roofs and rooftop equipment while doing hand gauging.
3. Check all valve packing for leaks. Correct per Manufacturer's Service Manual. Stroke each valve five turns to assure operational readiness.
4. Check all flanges and fittings for leaks and repair/replace as necessary.
5. Complete wharfage report. Send copy to Port.
6. Complete terminal exchange reports and balance with movement and inventory report.
7. Monitor cathodic protection readings and record in log.
8. Hold safety meeting.
9. Conduct SPCC monthly inspection of storage tanks, secondary containment systems, piping, unloading systems, drainage systems, etc. and record in log.

4.4 Quarterly Procedures and Preventative Maintenance

1. Conduct safety inspection and record in log.
2. Perform MVCU maintenance and adjustments (contract maintenance).
3. Pump and motor inspection and maintenance (see following guidelines).

4.5 Annual Procedures

1. Test foam fire protection system(s) (contract maintenance and inspection).
2. Test back flow preventer valve (contract maintenance and inspection).
3. Test fire extinguishers (contract maintenance and inspection).

4. Pressure test dock hose, shoreline and all underground product lines for leaks per U.S. Coast Guard (USCG) pressure requirements. Stencil latest hydro test date on hose and pipes.
5. USCG dock inspection (scheduled by USCG).
6. Port facility environmental inspection (scheduled by Port).

4.6 Quarterly Pump and Motor Inspection and Maintenance Checks

1. Inspect Pumps and Motors for Leaks and Proper Lube Oil Level.
    a. Mechanical Seals: If seal is leaking, replace per manufacturers recommendations.
    b. Bolted Joints: Inspect case, seal flush lines, and suction and discharge connections for leakage. Tighten bolts or replace gaskets as required.
    c. Lube Oil Leaks: Inspect motor and pump bearings for oil leaks and proper oil level.
2. Pump and Motor Noise and Vibration Checks
    a. Roller Bearings: Damaged bearings may emit a high-pitched squealing or a lower pitched growling noise. Bearing housings may get warm or even hot to touch. Roller bearings with these indications are either worn or damaged and should be replaced.
    b. Cavitation: Cavitation may sound like rocks in the pump and will produce erratic discharge pressure. Prolonged cavitation will result in damage to the impeller and possible bearing damage. Throttling the discharge of the pump or increasing pressure to the suction can reduce cavitation. A plugged suction screen will also cause cavitation.
    c. High Overall Vibration: Excessive vibration may be caused by cavitation, bearing damage, misalignment, bent shafts, looseness, or out of balance. Pumps and motors must not be run with excessive vibrations. If vibration is occurring, check each of the above possible causes and correct.
3. High Temperature at Pumps and Motors
    a. Pump Casing High Temperature: High temperature of the pump case may be caused by low flow through the pump. Check for blocked or throttled discharge and signs of cavitation. High temperatures may be evident by seal or gasket failure and/or a vapor lock.
    b. Pump and Motor Bearing High Temperature: High temperature in pumps or motor bearings usually is caused by loss of cooling (no product in line) or damaged bearings. Check for both if pump or motors are running hot.
    c. Motor Frame: High temperatures can be caused by overload on the motor. If this is suspected, contact electrician and check amperage draw against nameplate ratings.
4. Fittings and Mount Looseness at Pumps and Motors
    a. Normal operating conditions can loosen fittings with time. Check all guards, motor and pump base plates, mounting bolts, and all appurtenances for bolt tightness. Replace bolts, washers, nuts, etc. as appropriate.
5. External Corrosion at Pumps and Motors
    a. Exposed pumps and motors, valves and flanges, and pipe work can corrode. Check exposed metal in base plates, as well as equipment for signs of corrosion. Paint, re-enforce, or replace as needed.

4.7 Testing and Inspection of Aboveground Tanks

- Exteriors of the bulk storage tanks are observed and recorded during tank farm daily routines.
- Monthly SPCC inspections are performed and documented by operators
- In-service inspections are conducted to industry standards; API Standard 653 (Tank Inspection, Repair, Alterations, and Reconstruction) for the crude oil ASTs, and STI SP-001 for the diesel ASTs.
- Applicant has established testing schedules to assure that ASTs are tested in accordance with existing industrial and regulatory standards.

- Documentation is maintained on all Facility tanks storing oil including monthly inspections, in-service inspections and internal inspections.

The crude oil ASTs will be inspected periodically by API 653 certified tank inspectors in accordance with API Standard 653 to assess their physical condition and determine their suitability for continued use.

The basic requirements that will be used to test the tanks include

- Radiograph examination of shell butt welds; Vacuum box testing of floor seams; and
- Hydrostatic or vacuum box testing of the tank shell.

The general requirements for safety, external inspection, and internal inspection are:

- Emphasize safety as the most important aspect of inspection program;
- Consider all tanks as permit-required confined space;
- Use inspectors with appropriate training;
- Use access structures that comply with Occupational Safety and Health Administration provisions; and
- Employ a test plate of the same thickness as the tank segment to be scanned when using ultrasonic equipment to detect corrosion metal loss within the desired threshold

External (visual) tank inspection and data collection will include

- The bottom course of shell joints;
- Acoustic emission testing for mapping and locating defects in the shell;
- Inspection of shell for bulges and distortion;
- Ultrasonic spot testing of roof and shell for thickness determination;
- Inspection of tank appurtenances for defects and evidence of leakage;
- Tank plumbness, secondary containment volume and permeability survey; and
- Integrity of labels and placards.

Internal tank inspection will include

- Inspection of the shell for pitting, bulges and distortions;
- Inspection of bottom plate for corrosion damage;
- Visual inspection of the floor for evidence of leakage;
- Visual inspection of floor-to-shell weld and shell joints;
- Inspection of the interior of the roof, nozzles and piping; and
- Survey of tank shell and floor edge for settlement-induced distortion.

The diesel ASTs will be inspected periodically in accordance with STI SP-001. In accordance with SP-001, for 500-gallon shop fabricated tanks, documented periodic owner/operator visual inspections are sufficient to meet the requirements. Intermittent inspection and testing by an STI-certified tank inspector will not be required if appropriate periodic visual inspections are performed and documented.

4.8 Aboveground Pipeline Inspection

All aboveground valves, piping, and appurtenances are inspected on a regular basis in accordance with Facility inspection and maintenance procedures, and in compliance with API 570 (Piping Inspection Program). Daily visual inspections are performed in the normal course of business. Inspections include the assessment of the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces. Integrity and leak testing was conducted at the time buried piping was installed and will be conducted at the time of any modification, construction, relocation, or replacement.

4.9 Maintenance, Inspection, and Testing Records

The Applicant maintains test and inspection reports for the required three years. A qualified supervisor or inspector is assigned to sign and maintain inspection and testing reports.

End of Section 4.0

5. Spill Prevention Procedures Technologies

In accordance with 40 CFR 112.1 and WAC 173-180-630 (12), the Facility must implement procedures, equipment, and other measures to control and prevent for oil discharge. This section describes specific technologies designed to limit or reduce the potential for an oil spill or release. Such technologies include operational procedures, facility design considerations, secondary containment, and proper design of drainage facilities. The Facility elements have been designed in accordance with standard industry criteria and complies with the requirements of WAC 173-180 Part C.

5.1 Operational Prevention Procedures

5.1.1 Visible Discharges

Visible discharges that result in a loss of oil from the storage tanks, transfer line, or pipelines, including, but not limited to, seams, gaskets, pipes, valves, rivets, and bolts, are promptly corrected in accordance with Facility monitoring, inspection, and repair procedures. Any accumulation of oil in a diked area is promptly removed by trained employees. Visual inspections of these systems are conducted daily during the normal course of business.

5.1.2 Buried Pipeline Inspections

If buried piping is ever exposed, a thorough inspection is conducted by trained employees to detect deterioration due to corrosion. If corrosion damage is detected, additional examination and corrective action will be implemented.

5.1.3 Relief Valves

For transferring product from the rail unloading area, a predetermined pipeline connection (PLC) setpoint from a pressure transmitter signal will automatically power off the facility pump at approximately 100 psi. The pressure transmitter is located on the 10-inch pump discharge pipeline at the pump basin. In addition to the pump shutdown, the system has a pressure relief valve downstream of each pump that will recirculate the crude in the event that the pump discharge piping is blocked and the pressure transmitter fails. This pressure relief valve is set at approximately 110 psi. The system also has thermal pressure relief valves relieving thermal expansion in blocked portions of the piping between the rail unloading area (Area 200) and the storage area (Area 300). These valves are set at varying pressures depending on their location in the piping system.

For transferring product from the storage area (Area 300) to the marine terminal area (Area 400), a predetermined PLC setpoint from a pressure transmitter signal will automatically power off the facility pump at approximately 100 psi. The pressure transmitter is located on the 36-inch pump discharge pipeline at the pump basin. In addition to the pump shutdown, the system has a pressure relief valve on the pump discharge header that will recirculate the crude in the event that the pump discharge piping is blocked and the pressure transmitter fails. This pressure relief valve is set at approximately 110 psi. The system also has thermal pressure relief valves relieving thermal expansion in blocked portions of the piping between the storage area (Area 300) and the marine terminal are (Area 300). These valves are set at varying pressures depending on their location in the piping system.

5.1.4 Routine Handling Discharge Prevention Measures

Written procedures for routine product handling have been prepared; employees receive training based on the written procedures prior to working at the facility. All transfers of product are through steel pipes or

using systems specifically designed for hydrocarbon use, such as steel reinforced rubber hoses. Railcar unloading hoses are fitted with dry fit connectors.

Written procedures, which are readily available to all employees in the administration office, are summarized below.

5.1.4.1 General Transfer Operating Procedures

- All tank valves will be maintained in the closed position when not in use.
- All tank water draw valves will be closed and locked when not in use
- All rail deliveries to the facility will be monitored at all times by trained facility employees. Audible alarms will be activated by the tank high level alarm systems. In response to an alarm, the facility employees will divert flow to another tank or stop pumping operations.
- All marine loading activities will be monitored at all times by trained employees. The marine loading operations will be performed in accordance with a wharf operations manual.

5.1.4.2 Procedures for Oil Receipt from Rail

- The new facility has developed detailed written procedures for the receipt of rail deliveries. These procedures are extensive and described in detail in the Facility's Oil Handling Manual, and are only highlighted here. Copies of written procedures will be available at time of completion.
- Unit train locomotives will be attended at all times within the Facility site during unloading operations.
- The designated responsible facility employee will arrange to open the tank receiving valve.
- During receipt of crude oil: Qualified employees will be on duty at all times. Communications will be maintained by two-way radio between rail unloading and control room employees.
- After completion of pumping, valves on the transfer line will be closed. The tanks are electronically gauged. All transfers will be recorded as required by the facility operating procedures

5.1.4.3 Procedures for Oil to Berth Transfers

- The new facility will have developed detailed written procedures for the marine loading operations. Marine loading operations are beyond the scope of this SPCCP. Copies of written procedures will be available at time of completion. These procedures are extensive and only the tank farm aspects are highlighted here.
- The designated responsible facility employee will arrange to open the source tank valve.
- During transfer of crude oil: Qualified employees will be on duty at all times. Communications will be maintained by two-way radio and video surveillance between berth and the control room employees.
- After completion of pumping: Valves on the transfer line will be closed. The tanks are electronically gauged. All transfers will be recorded as required by the facility operating procedures.

5.1.5 Countermeasures for Discharge Discovery, Response, and Cleanup

All six bulk storage tanks at the Facility are fitted with liquid level gauges and equipped with high-level alarms. Alarms are sounded and monitored in the continuously manned control rooms, which allows for immediate manual shutdown of pumps and closure of valves (see emergency shutdown discussion in Section 5.1.10 below). If any abnormal situation is detected during a product transfer, all activities are stopped and an emergency shutdown is initiated. Transfer operations are not resumed until the system has been inspected and repaired, and the Facility Manager has deemed the system fit for continued operations. If leakage or uncontrolled discharge is detected, the transfer is immediately terminated or not initiated.

Trained employees patrol the storage area on a regular basis and immediately report any discovered releases.

Should a release occur to the bermed bulk storage area, released materials are collected in approved temporary storage containment or using a vacuum truck and removed for disposal off site at an approved location.

The double-walled diesel storage tanks are monitored by employees on a regular basis. An operator and the delivery driver are present during diesel deliveries, and rely on deployable sorbent from a spill kit for secondary containment and response.

Areas surrounding transformer locations are monitored by employees on a regular basis. In the event of a mineral oil leak, operators deploy sorbent to block and absorb the oil.

Small discharge discoveries that do not pose significant safety or environmental concern, are assessed and evaluated individually in terms of necessary response and cleanup procedures.

The Facility Oil Spill Contingency Plan addresses the specific procedures to be followed for notification and response actions in the event of a spill.

5.1.6 Methods of Disposal of Recovered Materials

Methods and procedures to recover and dispose of oil and oily water are detailed in the Facility Oil Spill Contingency Plan. In the event of an oil spill, the operator will rely on the Facility Oil Spill Contingency Plan to implement appropriate notifications.

5.1.7 Vehicles Entering Facility

Warning signs are erected to warn drivers of aboveground piping and that they are entering an oil transfer operation facility.

5.1.8 Diesel Fuel Delivery

Deliveries of diesel to the diesel storage tank will be infrequent. The truck delivering the diesel will be staged adjacent to the tank and associated fire pump building. An operator and the delivery driver will be present during the transfer, and will rely on deployable sorbent from a spill kit for secondary containment. Contractors delivering fuel are required to follow their own spill plan and carry a spill kit.

5.1.9 Inspection for Brittle Fracture or Other Catastrophe

If ever a field-constructed aboveground container at this Facility undergoes a repair, alteration, reconstruction, or a change in service that might affect the risk of a discharge or failure due to brittle fracture or other catastrophe, or has discharged oil, or has failed due to brittle fracture failure or other catastrophe, the container will be evaluated for risk of discharge or failure due to brittle fracture or other catastrophe and appropriate action will be taken.

The Applicant has adopted this recommendation to the maximum extent practical for this Facility. Applicant's tank assessments for the likelihood of brittle fracture are based on applicable criteria set forth in API 653 and the use of prudent engineering judgment. An assessment for brittle fracture is required on all field constructed aboveground containers during change of service, inspection, repairs, alteration and complete tank reconstruction. During original construction, major repairs, alteration and complete tank reconstruction a hydrostatic test is required. Major tank repairs and alterations can forgo a hydrostatic test after additional nondestructive testing has been performed and accepted and repairs approved by an authorized tank inspector and engineer experienced in storage tank design. Experience shows that once an existing tank has demonstrated the ability to withstand the combined effects of maximum liquid level and lowest operating temperature without failing, the risk of failure due to brittle fracture with continued service is minimal.

5.1.10 Emergency Shutdown System

While unloading railcars and pumping oil to the storage facility or directly to the marine terminal, operators can manually stop the process by pressing an emergency shutdown (ESD) push button. When pressed,

automated valves will close at each of the rail offload stations, isolating the crude inside the railcars from the pump header, shut down the rail transfer pumps, and close the 24-inch valves at the beginning of the rail transfer lines, isolating the rail area process from the transfer pipeline.

When an ESD push button has been pressed, the control room will receive an alert stating which station's push button has been pressed, and an alarm will sound throughout the rail unloading area with horns and beacons.

Within the tank storage area, the ESD system will be manually activated by pressing an ESD push button. When an ESD is pressed, all automated valves on the storage tanks will close isolating the crude in the tanks, the marine vessel loading pumps will shut down, and the control rooms will receive an alert stating which push button has been pressed and that an ESD occurrence has taken place.

While loading a marine vessel at the berth, operators may manually stop the process by pressing one of the ESD push buttons on the dock. An ESD can also be initiated by the vessel. When pressed, the marine vessel loading pumps will shut down, the automated valve near the dock will close and an alert will be sent to the control rooms indicating which ESD push button was pressed.

If a facility-wide emergency is necessary, there is a facility-wide button to press within each area. When a facility-wide ESD is necessary, all operations will be stopped as outlined above for all areas of the Facility.

5.2 Railcar Unloading Facility

The rail unloading facility (Area 200) is a covered structure through which the trains are pulled and secured for unloading. The structure is approximately 1,850 feet long by 91 feet wide with a maximum height of approximately 50 feet. The building structure is open on the north, west, and east sides, and the southern wall is partially enclosed with built segments along the wall acting as a weather break.

Each of the three tracks includes 30 unloading stations for handling crude oil. Each station uses a completely closed loop of piping to prevent any atmospheric contact with the product during unloading. The entire 1,850 feet of the rail unloading facility includes full coverage rail collection pans, and the interior ground surfaces are constructed of concrete to contain any accident releases, as well as provide catchments for all stormwater that drips from railcars or is blown into the rail unloading facility by the wind.

All mechanical piping is located in concrete secondary containment trenches, and the pump basins used to transfer crude oil from the rail unloading facility to Area 300 storage are in below-grade concrete basins. The collection piping from the rail drip pans and rail unloading facility floor drains is also located in these concrete trenches with discharge pumps located in the pump basins. Water collected from within the rail unloading facility is collected in these systems and pumped to two containment tanks located in the area of the administrative/support buildings. Other than from office buildings, there is no hydraulic connection to storm or sanitary sewers from within the rail unloading footprint.

Several accessory structures and equipment pads are located adjacent to the rail unloading facility, including electrical house (E-house) control rooms, fire pump and foam building, electrical equipment pads, and mechanical equipment pads.

The administrative/support buildings are located north of the rail unloading facility adjacent to Old Lower River Road. This area consists of three proposed modular structures, parking, and associated landscaping. In addition, the containment tanks for discharges from the rail unloading facility are located near the parking lot. A pedestrian bridge connects the administrative/support buildings to the rail unloading facility.

The entire 1,850 feet of the rail unloading facility includes full coverage rail collection pans, and the interior ground surfaces are constructed of concrete. Any releases of product are contained, as is stormwater that drips from railcars or is blown into the rail unloading facility by the wind.

Pumps used to transfer crude oil from the rail unloading facility to Area 300 storage are situated within below grade concrete basins. The collection piping from the rail drip pans and rail unloading facility floor drains is direct-buried that feeds to a header pipe located within the concrete secondary containment. Collection discharge pumps are co-located within the underground concrete pump basins. Water collected from within the rail unloading facility is directed to two containment tanks located in the area of the administrative/support buildings. Collected water is taken to approved sites for recycling/disposal.

5.2.1 Rail Unloading Rack

The Facility receives oil from railroad tank cars. Employees trained in unloading procedures, including emergency shutdown, transfer crude oil from the railcar by using the railcar rack system. Unloading hoses are manually connected to the valves on the cars using dry-fit connectors, one hose per tank car. Dry-fit connectors are designed so that the crude oil in the hose cannot come into contact with the atmosphere. The connector is designed such that crude oil will not flow without a secure connection. Each hose is equipped with an automatic shutoff valve. Containment pans are located under each railcar stationed for unloading; the pans drain to spill holding tanks with the capacity to contain the entire contents of a single tank car.

5.2.2 Prevention of Early Departure

Railcars are not uncoupled from the main engine. The locomotives will be shut down, braking systems will be engaged on the locomotive, and an appropriate number of railcars will be secured to prevent early departure. Chocks are also placed at the first and last railcars indexed in the rail unloading building. Communication between the locomotive engineer(s) and facility employees will be maintained throughout the unloading process to prevent early departure.

5.2.3 Prevent Discharges at Departure

This Facility is used for unloading crude oil from railroad tank cars only. Before an empty railcar leaves the rail unloading building it is thoroughly inspected for leaks or the presence of oil on the surface of the railcar. This includes all valves, inlets, or outlets on the car. If necessary, equipment is tightened or adjusted and a record maintained of maintenance activity that occurred. This Facility does not clean the interiors of the railroad tank cars.

5.2.4 Railcar Unloading Secondary Containment

The railcar unloading facility is composed of a covered structure through which the trains are pulled and safely secured while the unloading occurs. Unloading is accomplished with a closed-loop system, i.e., the crude oil will be contained in an enclosed system from when it leaves the railcar to when it enters the storage tanks. Collection pans are located between the rails and connected to piping that conveys releases to the spill control and holding tanks located near the office area. A 9-foot-wide by 5-foot-deep concrete trench is located underneath each rail unloading area and runs the length of the railcar unloading facility. The trench provides secondary containment in the event of a spill or leak. The trench containment system has capacity to contain at least the entire volume of a single railcar (approximately 750 bbl).

Any spills from the collection pans or trench are pumped to the spill holding tanks located adjacent to the administrative/support area, (total holding capacity of approximately 1,000 bbl). These connected tanks provide secondary containment to the piping system that receives inadvertent releases captured in the collection pans and trenches. The combined volume of the tanks can contain the entire contents of a

single tank car. Crude oil captured in a collection pan or containment trenches flows by gravity into a dedicated line, and is pumped from the unloading facility to the spill holding containment tanks.

5.3 Bulk Storage Facilities

5.3.1 Design and Construction

The storage area (Area 300) contains six double-bottom, internal floating-roof ASTs for storing crude oil. The tanks are approximately 50 feet in height and 240 feet in diameter. Each tank has capacity to store 380,000 bbl of crude oil. The maximum volume of oil to be stored is 360,000 bbl. The bulk storage tanks have been designed and constructed in accordance with API Standard 650 (Welded Tanks for Oil Storage), are constructed of compatible with the crude oil. The tanks are maintained at atmospheric pressure.

Two of the crude oil bulk storage tanks are equipped with electric heating coils to facilitate transfer of heavy crude when necessary. Internal temperature sensors ensure crude oil temperatures do not exceed operating parameters. The steam/condensate return from the heating lines is discharged to the boiler system. Condensate return is passed through a proprietary package treatment system prior to discharge to the sanitary sewer. Prior to discharge to the City sanitary system, an additional oil-water separator ensures that discharged water quality meets the discharge limits. Visual inspection and telemetry controls including flow and pressure monitor the steam limes for possible leaks.

The crude oil storage tanks are equipped with high liquid level pump cutoff devices set to stop flow at a predetermined content level.

Each tank has a fixed roof to keep precipitation from reaching the inside of the tank and an internal floating roof (with dual seals) to control vapor emissions from the tank to the atmosphere. The floating roof is designed to avoid tipping during operations.

The double-bottomed tanks include a leak detection system between the tank floors and are equipped with cathodic protection to prevent corrosion. The entire tank containment area is lined with an impervious membrane to prevent any potential spills from leaving the containment area via infiltration into the ground.

Crude oil stored in the tanks is pumped to the dock for transfer to a ship or barge. Approximately three to six variable speed pumps pump the crude oil, at least one of which would be on standby.

The pumps are housed in the tank storage pump basin located on the west side of the storage tank area. Stormwater that collects in the pump basin drains through an oil/water separator and discharges to the sanitary sewer. Stormwater evacuated from the basin is routed through the treatment and discharge system associated with the containment berm sump described above.

5.3.2 Bulk Storage Secondary Containment

With the exception of one manually operated valve, the entire storage area (Area 300) is situated within bermed secondary containment. A drip pan is situated below the valve not in containment.

The bulk storage containment berm is approximately 6 feet in height. The bermed containment area is designed with capacity to contain at least 110 percent of the volume of the largest tank in addition to the volume of runoff generated from a 24-hour rainfall event with a 100-year return period. Intermediate berms are installed within the larger containment area to isolate each tank. The entire tank containment area is lined with an impervious membrane to prevent any spills from leaving the containment area via the ground.

Stormwater in the bulk storage containment area is collected into a central collection system, which discharges to a control structure. The control structure discharges at a controlled flow rate through two

parallel oil/water separators for free oil removal. The water then passes into a stormwater pump station equipped with two submersible pumps that discharge to a treatment system. This water, which is comingled with the parking lot runoff prior to treatment, is treated for turbidity, heavy metals, and volatile organics (benzene)., The collection sumps and pump area is inspected for sheen prior to pump operation (pump operation is manual on and auto off). Inspections are conducted and documented (**Table B-5**) by authorized personnel on a continuous basis. Staff observe the operations at the site, and are instructed to inspect the sump for an oil sheen prior to pump operation. Pump operation proceeds when ponding in the sumps is observed.

Stormwater flows to a control structure, which passes the water at a

The containment area includes an earthen perimeter berm approximately 6 feet in height, which is tall in size to contain the release of 110 percent of one entire tank volume and a 100-year rainfall event. Intermediate berms approximately 2 feet tall are positioned between each tank to segregate the containment area. This capacity reflects the most stringent of Washington spill prevention and control and NFPA requirements.

5.4 Diesel Storage Tanks

The three double-walled diesel storage tanks for emergency fire water pumps tank are located on concrete slabs.

The diesel tanks each have a level gauge that is monitored by the Facility operators and will be visually indicated at the tank. The operator and driver will follow Facility operating procedures to gauge tank level prior to filling.

5.5 Oil Transfer Facilities

A combination of above- and belowground steel transfer pipelines convey crude oil from the rail unloading structure in Area 200 to the storage tanks in Area 300 and from the storage tanks to the marine vessel loading system in Area 400. The system includes the following.

- Three 24-inch-diameter, approximately 1,800-foot-long pipelines collect the crude oil unloaded at the rail unloading stations; one of these pipelines is electrically heat-traced to ensure that the viscosity of the crude oil is maintained at approximately 150ºF while it is conveyed from the unloading structure.
- Three 24-inch-diameter, approximately 5,500-foot-long pipelines would connect the railcar unloading facility to the storage tanks in Area 300; one of these pipes would be electrically heat-traced to ensure that the viscosity of the crude oil requiring heating would be maintained while it is conveyed from the unloading facility to the storage area.
- One 36-inch-diameter, approximately 5,300-foot-long pipeline connects the storage tanks with the vessel loading system in Area 400.
- One 6- to 12-inch-diameter, approximately 5,300-foot-long pipeline returns crude oil from the vessel loading system back to the storage tanks; this pipeline is provided to handle loading process shutdowns and provide pressure relief and prevent pipe hammer in the pipe conveyance system.
- One 10-inch-diameter, approximately 600-foot-long pipeline delivers hydrocarbon vapor generated during loading of vessels to the MVCU.

Piping is constructed to the specifications of ASTM A53 or A106. Aboveground runs of piping are supported so that the bottom of the piping is a minimum of 1 foot off the ground on vertical supports located every 20 to 25 feet. The vertical supports are fixed on spread footings. Where multiple pipes are placed within the routing, pipelines are either placed side-by-side or stacked.

Expansion loops are constructed along the transfer pipeline runs to accommodate thermal expansion of the pipelines during operation. Where road or rail crossings occur and in other areas of limited space, the pipelines are located underground or raised above the ground in accordance with standard AREMA clearances. Secondary containment with leak detection is provided for pipeline segments installed

underground. Runs of aboveground pipeline are standard-walled to ensure ease of inspection and maintenance and designed in accordance with the applicable requirements of WAC 173-180-340 and 49 CFR 195.246 through 49 CFR 195.254. Transfer pipelines are equipped with cathodic protection at all underground sections to prevent corrosion.

To allow greater flexibility in operations, the transfer piping system is designed to allow crude oil being unloaded in Area 200 to be directly conveyed to Area 400, Marine Terminal, for loading onto vessels. This capability allows occasional topping off of vessel loads and may allow the Facility to begin limited operation during the construction of the Area 300 storage tanks.

The piping system and associated supports and foundations are designed to applicable seismic protection standards and are electrically grounded to protect against the buildup of static electricity during crude oil conveyance. Manual and automatic isolation valves are located on the piping system at the exit of the railcar unloading facility and at the entrance to the storage tank area.

Runs of aboveground pipeline are standard-walled, to ensure ease of inspection and maintenance, and in accordance with the applicable requirements of WAC 173-180-340 and 49 CFR 195.246 through 49 CFR 195.254. Runs of underground piping are located in steel casings with incorporated leak detection. The terminal locations for underground transfer pipes are located within a concrete vaults that provides containment for leaks.

All flanges and aboveground valves associated with the transfer piping (Area 500) are equipped with drip pans. Areas underlying the pipelines are designed with surface drain inlets that will retain up to five gallons of oil in the event of a leak.

Cathodic protection has been provided for underground piping to prevent corrosion. Spill containment measures along the pipeline alignment comply with 40 CFR 112.7 by providing secondary containment, inspections, and contingency planning. Spill kits are located at the unloading area, storage area and marine terminal area.

Stormwater catch basins in the vicinity of the aboveground pipeline are fitted with sumps and 90-degree elbows at each outlet point to prevent spilled oil from entering the stormwater system.

5.6 Marine Terminal

The face of the dock at the marine terminal (Area 400) includes a containment area for the work areas, including the connections to the hose tower as well as for the first valve along the pipeline alignment, and all flanges and transfer hose areas. The containment area is sized to contain the release of at least three 3 bbl within a curbed area.

The dock area (outside of the first block valve inside onshore secondary containment) and associated spill prevention and response measures are addressed in the dock operations manual and the Facility Oil Spill Contingency Plan. The following is a summary of dock containment and response measures included.

- A catchment basin constructed at or below the deck level for the containment of inadvertent releases in addition to stormwater that may fall in the catchment area. Within 1 hour of completion of any transfer, materials captured in the catchment and are discharged by pumping them into the return line for return to the storage tanks.
- A spill response boat stationed at the dock to install a containment boom around the berthed ship prior to loading of product. The spill response boat is also equipped with additional boom and oil spill recovery equipment and absorption materials.

5.7 Other Controls

Electric power transformers are staged on concrete pads. In the event of a mineral oil leak, operators would deploy sorbent to block and absorb the mineral oil. Reliance on active secondary containment measures for this purpose is appropriate because the Facility is staffed 24/7.

Other than the storage area berm and concrete unloading trench and diesel containment, there are no oil spill retention ponds located at the Facility. Trained spill response staff and sorbent materials are present at the site at all times to provide active secondary containment for electrical transformers and for additional discharge control. Pipeline alignments are routed over areas in which surface drain inlets are designed to retain crude oil in the event of leaks or drips.

5.8 Facility Drainage

5.8.1 Diked Storage Area Drainage

Drainage from the berm surrounding the storage area is controlled by valves kept in the closed position, which are not opened until a visual inspection has been conducted by trained staff for the presence of oil. Pumps are used to transfer stormwater from the bermed area to the treatment system sumps located outside of the berm. The pumps are manually activated, and prior to transfer, the condition of the accumulation in the sumps is inspected to ensure no oil will be discharged. Drainage from the diked storage area is documented in **Table B-6** in Appendix B.

Stormwater from the bermed bulk storage area is drained from the sumps by pumps to the stormwater treatment systems located outside of the bermed area. The valves at the sumps are locked in the closed position when not in use. Stormwater is inspected for evidence of oil prior to discharging to the treatment systems. Treated stormwater is released to an existing drainage system within the Port. Trained employees will monitor all discharges from the bermed area and ensure that drain valves are closed and locked after drainage. Records will be kept documenting events when the bermed storage area is drained.

Each diesel tank is double-walled and is located undercover. The tanks are not directly exposed to rainfall and do not receive stormwater runoff.

Flapper-type valves are not used in the storm drainage system that drains the berm surrounding the Storage Area. Manual valves with an open/close design are installed for the berm drainage system.

5.8.2 Drainage Facilities for Undiked Areas

Undiked areas of the Facility include paved and gravel roads, administration building, rail unloading facility, pipeline rights of way and dock. Storm drainage systems in these areas with a potential for oily runoff are equipped with oil/water separators and water quality facilities designed to capture oil prior to discharge. These systems are inspected and cleaned periodically. These areas are outside the 100-year floodplain and are not prone to flooding.

5.8.3 Drainage Treatment Facility – Pumping Systems

As described above, drainage from diked areas relies on a pump system to transfer accumulated water to a water quality treatment system and to discharge point. To prevent potential loss of containment dike capacity due to water transfer pump failure, active pumps backed up by a pump on standby are provided.

End of Section 5.0

6. Facility Security

The Facility is staffed 24 hours per day, 7 days a week. Operations at the marine terminal are staffed during vessel loading operations.

Security placards and emergency contact names and 24-hour telephone numbers are posted at the Facility office. Facility security measures are implemented in accordance with the Port's security program. Security cameras and lighting are installed throughout the Facility to monitor facility premises involved in oil handling and storage.

Access to the Port's marine terminals is allowed primarily through the main security gate at the 26th Avenue overpass. The Port's security plan and policies require that all people entering the Port's terminal areas show photo identification and have a valid business purpose to be on the facility. This is accomplished through the Port's screening process, administered to anyone who enters the Port's marine terminals. In addition, this area is secured with fencing, video camera monitors and 24/7 stationary and mobile patrols.

The Facility has implemented an Operations Site Security Plan pursuant to 33 CFR 105. Security measures anticipated at the site include fencing to prevent any public access to project facilities. The northern side of the Terminal 5 rail loop facilities is fenced to prevent public access. Security gating is provided at the rail loop access at the Gateway overpass. Parking for the Facility's operations and maintenance staff is provided at the administration and support buildings. All other persons, such as vendor equipment employees, maintenance contractors, material suppliers, and all others, must acquire permission for access from a designated site employee prior to entrance. Access to each project area is granted on a project/job need basis by the Plant Manager.

Locations where oil handling and storage occur are fenced by a chain link fence with three strands of barbed wire above to prevent unauthorized entry. Fencing is provided around the Administration Building, Rail Unloading Facility, and the Storage Area. Access to the Marine Terminal is through locked gates. All gates are locked 24 hours a day, and there is no unattended public access for these areas. Persons entering the Facility must be granted authorization from a responsible Facility employee. It is possible for the public to have access to a portion of the transfer pipelines; however, the pipelines are monitored both by Facility staff and electronic monitors.

All employees who perform work (including contractors and consultants) within Area 400 – Marine Terminal are required to have a Transportation Worker Identification Credential (TWIC) or be escorted at all times by a person with the appropriate TWIC credentials.

All valves and pump controls are enclosed within the locked security areas. Outlet valves which could lead to an oil spill are protected by facility security fencing, blind flanges, and all valves that could direct the outward flow of the tank contents directly to the surface are securely locked in the closed position.

Automated pump starters associated with the rail unloading, storage area, and vessel loading facilities are authorized through the secure terminal automation system at each location.

No normal transportation loading/unloading connections are idle or not in use at the Facility. All tank and PLCs, such as drains or vents, are securely capped or blank-flanged when not in service or placed in standby service for extended periods of time.

The Facility is equipped with low-level lighting around exits, and general outdoor lighting for operating areas, roadways, fuel storage areas, and ship loading, railcar unloading, and parking areas. This lighting is provided for operator access and safety under regular operating conditions and assists in the detection of leaks. Spot lighting is provided for illumination-level enhancement, where needed, around loading

equipment maintenance areas and stairwells and catwalks. This lighting will be higher in intensity than general outdoor lighting, but will be limited to specific areas and assist in the detection of oil leaks.

The lighting systems installed at the Facility are appropriate to both prevent acts of vandalism and assist in the discovery of oil discharges.

Warning signs have been erected to advise drivers that they are entering an oil transfer operation facility, and to be aware of aboveground piping.

End of Section 6.0

7. Industry Standards

The EPA suggested industry standards that have been implemented by the facility are summarized below.

40 CFR Section	Section Description	Organization Name	Standard No.	Standard Name (Reason for use)
112.2	Definitions	API	653	Tank Inspection, Repair, Alteration, Reconstruction (Help in understanding term alteration)
112.2	Definitions	NFPA BOCA API API	30 none 2015 1604	Flammable & Combustible Liquids Code National Fire Prevention Code Safe entry and Cleaning of Petroleum Storage Tanks Removal and Disposal of Used Underground Storage Tanks (Useful for permanent closure of tanks)
112.2	Definitions	API	653	Tank Inspection, Repair, Alteration, Reconstruction (Helpful to understand "repair")
112.2.7(c)	Secondary Containment	NFPA BOCA API	30 None 2610	Flammable & Combustible Liquids Code National Fire Prevention Code Construction, Operations, Maintenance, & Inspection of Terminal & Tank Facilities (Assist with secondary containment)
112.7(d)	Contingency Planning	API API API ASME ASME STI UL	653 575 570 B31.3 B31.4 SP001 142	Tank Inspection, Repair, Alteration, Reconstruction Inspection of Atmospheric and Low Pressure Tanks Piping Inspection Code - Inspection, Repair, Alteration, & Rerating of In-service Piping systems Process Piping Liquid Transportation systems for Hydrocarbons etc. Inspection of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible & Flammable Liquids Steel Aboveground Tanks for Flammable & Combustible Liquids (Helpful for integrity testing)
112.7(g)	Security (excluding oil production facilities	API	2610	Construction, Operations, Maintenance, & Inspection of Terminal & Tank Facilities (Assist in Security purposes)
112.7(h)	Loading/unloading (excluding offshore)	NFPA API	30 2610	Flammable & Combustible Liquids Code Construction, Operations, Maintenance, & Inspection of Terminal & Tank Facilities (Assist in loading/unloading area)
112.7(i)	Brittle fracture	API API	653 920	Tank Inspection, Repair, Alteration, Reconstruction Prevention of Brittle Fracture in Pressure Vessels (Assist with brittle fracture evaluation)
112.8(b)(1)	Diked Storage Area Drainage	NFPA API	30 2610	Flammable & Combustible Liquids Code Construction, Operations, Maintenance, & Inspection of Terminal & Tank Facilities (Assist with facility drainage)
112.8(c)(1)	Construction & Materials Used for Containers	API API STI STI UL	620 650 F911 R931 58	Design and Construction of Large, Welded, Low-Pressure Storage Tanks Welded Steel Tanks for Oil Storage Standard for Diked Aboveground Steel Tanks Double Wall Aboveground Storage Tank Installation

40 CFR Section	Section Description	Organization Name	Standard No.	Standard Name (Reason for use)
		UL UL PEI	142 1316 200	Standard for Steel Underground Tanks for Flammable & Combustible Liquids Steel Aboveground Tanks for Flammable and Combustible Liquid Glass Reinforced Plastic USTs for Petroleum Products Installation of AST for Motor Vehicle Fueling (Assist w/ materials and construction of containers)
112.8(c)(2)	Secondary Containment Bulk Storage Containers	NAPF BOCA API PEI	30 none 2610 200	Flammable and Combustible Liquids Code National Fire Prevention Code Construction, Operations, Maintenance, and Inspection of Terminal and Tank Facilities Installation of AST for Motor Vehicle Fueling (Assist w/ secondary containment for bulk storage containers)
112.8(c)(6)	Integrity Testing	API API STI	653 575 SP001	Tank Inspection, Repair, Alteration, Reconstruction Inspection of Atmospheric & Low Pressure Tanks Inspection of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible & Flammable Liquids (Assist with integrity testing)
112.8(c)(8)	Good Engineering Practice – Alarm Systems	NFPA API API	30 2350 none	Flammable & Combustible Liquids Code Overfill Protection for Storage Tanks in Petroleum Facilities Manual of Petroleum Measurement Standards (Assist with alarm systems, discharge prevention systems and inventory control systems)
112.8(c)(11)	Mobile Containers	NFPA BOCA	30 none	Flammable & Combustible Liquids Code National Fire Prevention Code (Assist with secondary containment for mobile containers)
112.8(d)(1)	Buried Piping, Etc. (Excludes production facilities)	NACE STI	0169 892	Control of external corrosion on Underground or submerged metallic piping systems Corrosion Protection of underground piping networks associated with liquid storage and dispersing systems (Assist corrosion protection for buried piping)
112.8(d) (4)	Inspection of Aboveground Valves and Piping	API API ASME ASME	570 574 B31.3 B31.4	Piping Inspection Code - Inspection, Repair, Alteration, & Rerating of In-service Piping systems Inspection Practices for Piping System Components Process Piping Liquid Transportation for Hydrocarbons, etc. (Assist with inspection & testing of valves, piping, appurtenances)

End of Section 7.0

8. List of Acronyms and Abbreviations

API: American Petroleum Institute

Applicant/Company: Tesoro Savage Petroleum Terminal LLC

AREMA: American Railway Engineering and Maintenance-of-Way Association

ASME: American Society of Mechanical Engineers

AST: aboveground storage tank

bbl: barrel/barrels

BOCA: Building Officials and Code Administrators

CFR: Code of Federal Regulations

EFSEC: Energy Facility Site Evaluation Council

E-house: electrical house

EPA: U.S. Environment Protection Agency

ESD: emergency shutdown

Facility: Vancouver Energy

I-5: Interstate 5

MRO: Medical Review Officer

MVCU: marine vapor combustion unit

NACE: National Association of Corrosion Engineers

NFPA: National Fire Protection Association

PE: professional engineer

PEI: Petroleum Equipment Institute

PLC: pipeline connection

Port: Port of Vancouver USA

RM 103.5: River Mile 103.5

SPCCP: spill prevention, control, and countermeasures plan

SR 501: State Route 501

TWIC: Transportation Worker Identification Credential

UL: Underwriters Laboratories

USCG: U.S. Coast Guard

WAC: Washington Administrative Code

End of Section 8.0

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Vancouver Energy
Operations Spill Protection, Control, and Countermeasure Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix A
Figures

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Figure 1. Vicinity Map

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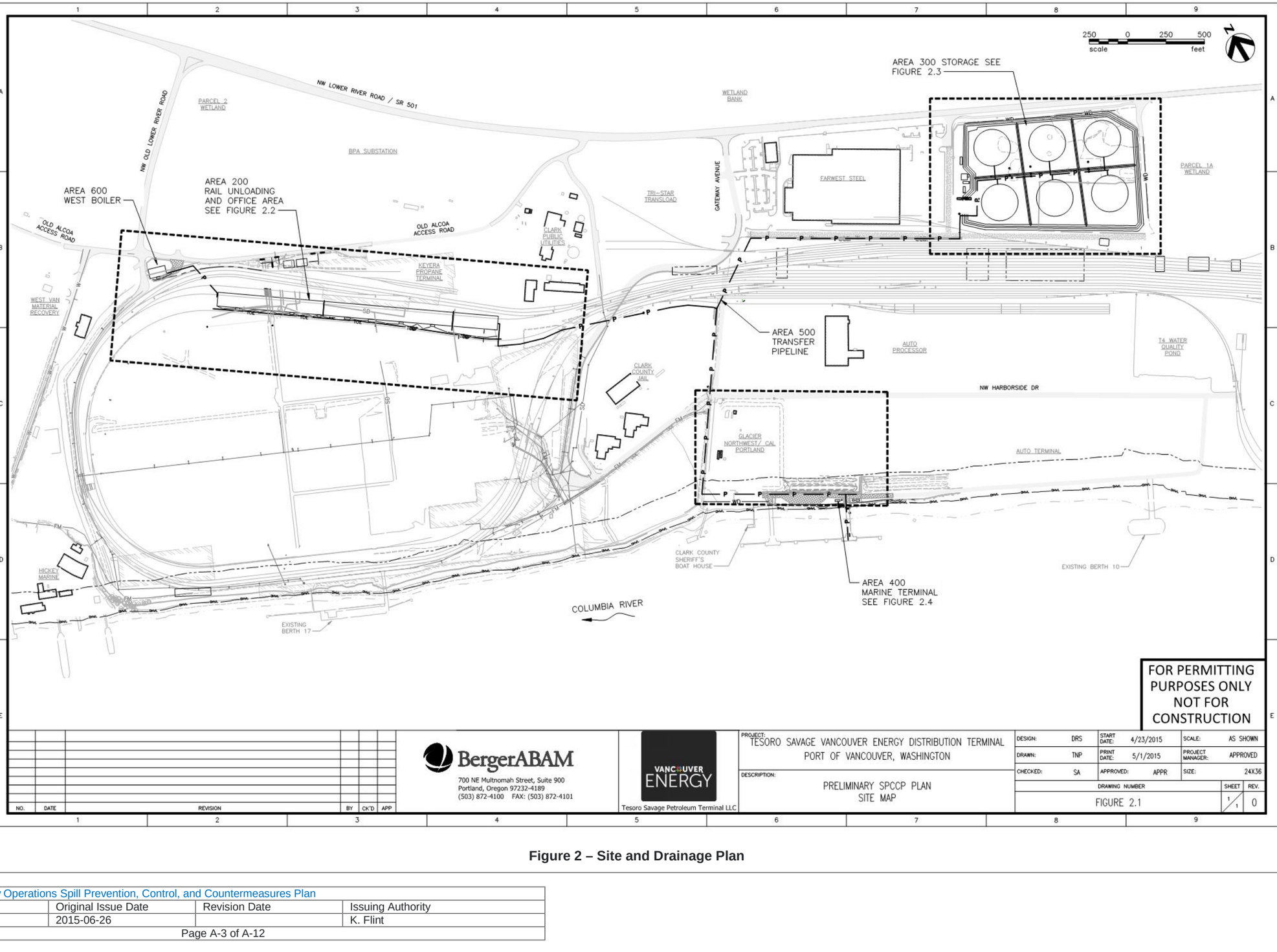

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Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVAGE VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: PRELIMINARY SPCCP PLAN
SITE MAP

DESIGN: DRS	START DATE: 4/23/2015	SCALE: AS SHOWN	
DRAWN: TNP	PRINT DATE: 5/1/2015	PROJECT MANAGER: APPROVED	
CHECKED: SA	APPROVED: APPR	SIZE: 24X36	
DRAWING NUMBER		SHEET	REV.
FIGURE 2.1		1/1	0

Last Saved by: Tony.pritchett on: Apr 23, 2015 7:21 AM File: Q:\Vancouver\2013\A13.026700\CADD\dwg\Figures\SPCCP FIGURES\FIGURE 2.1.dwg

Figure 2 – Site and Drainage Plan

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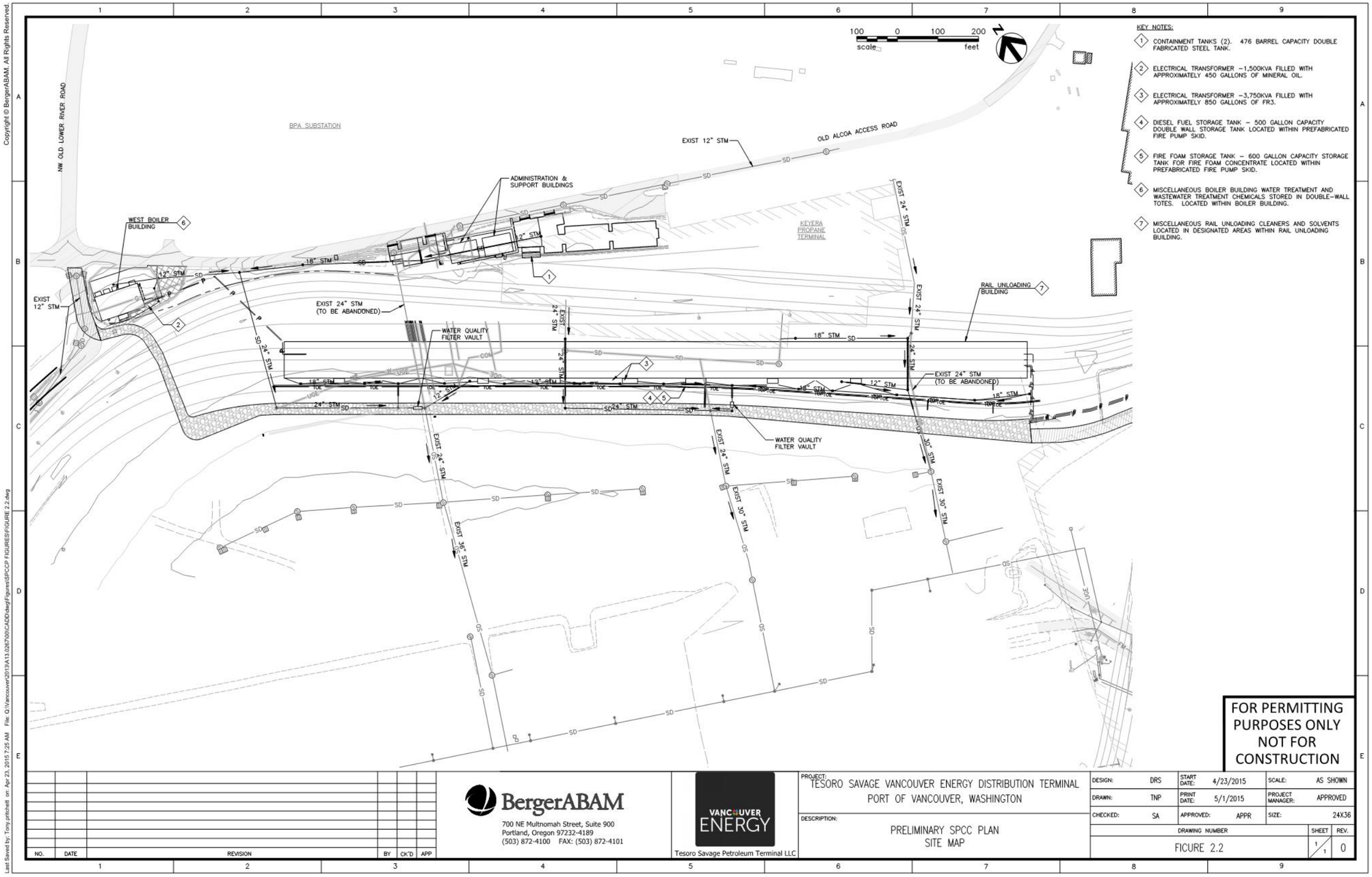

Figure 2 – Site and Drainage Plan (Continued)

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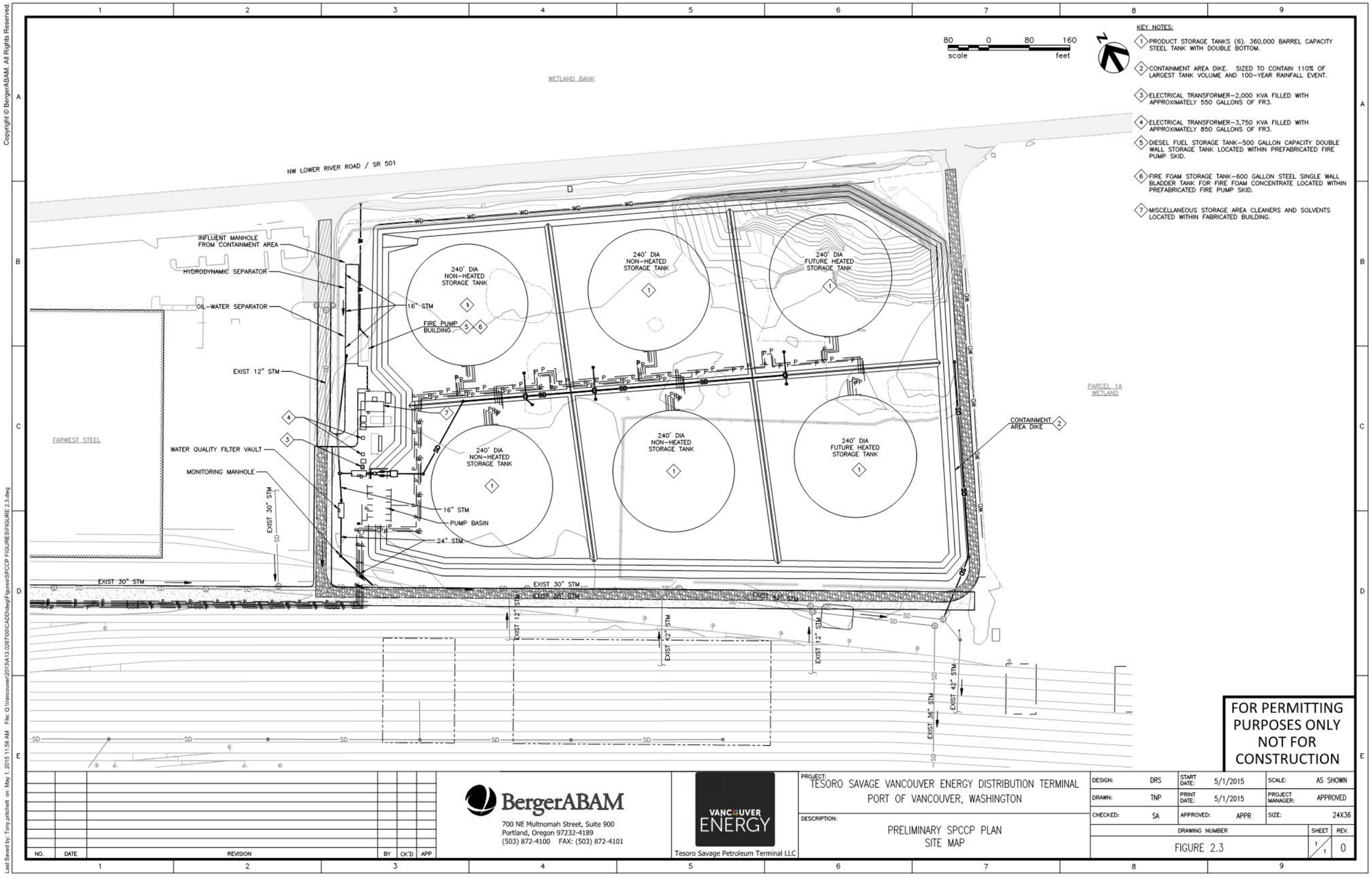

Figure 2 – Site and Drainage Plan (Continued)

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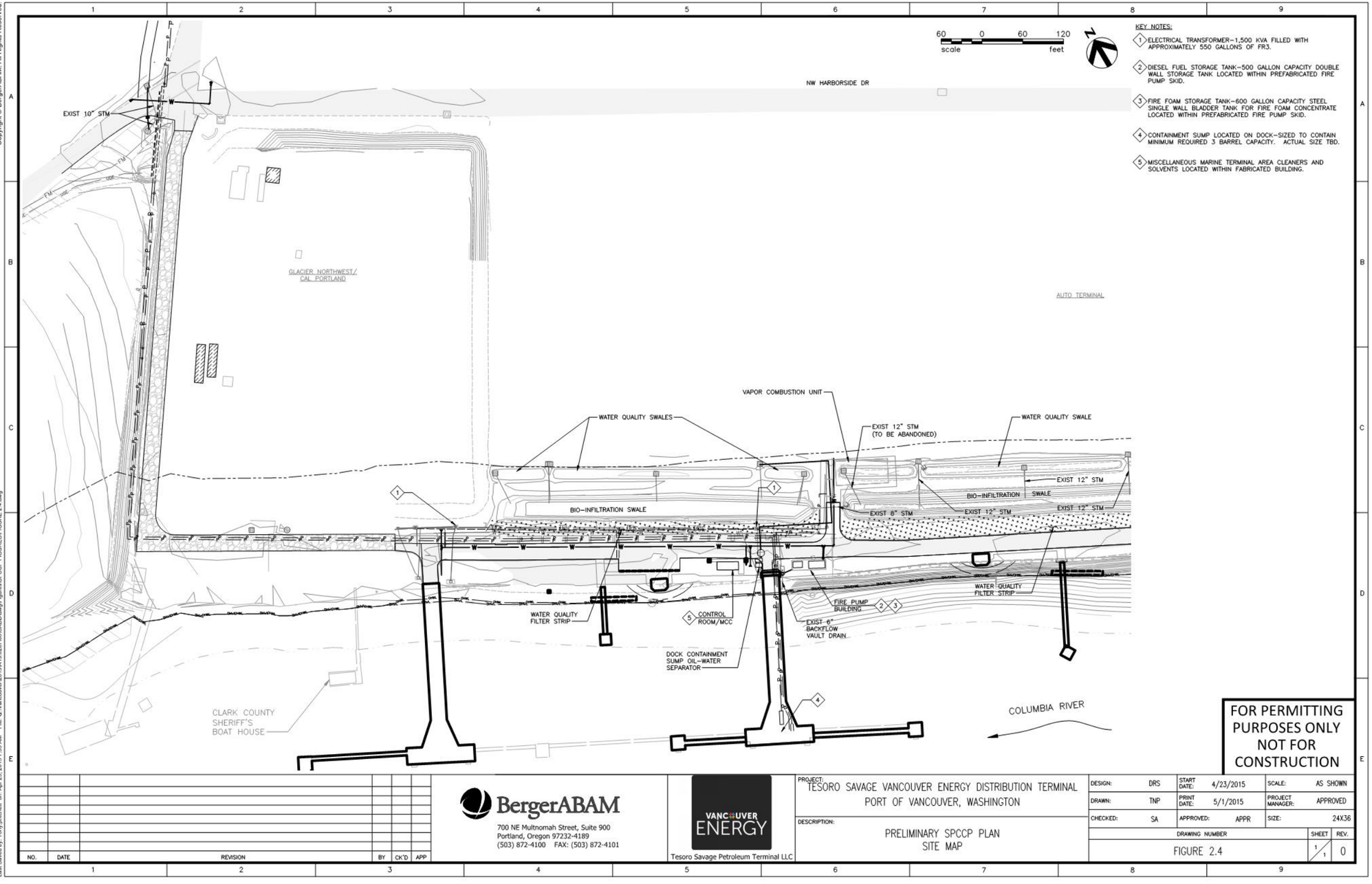

Figure 2 – Site and Drainage Plan (Continued)

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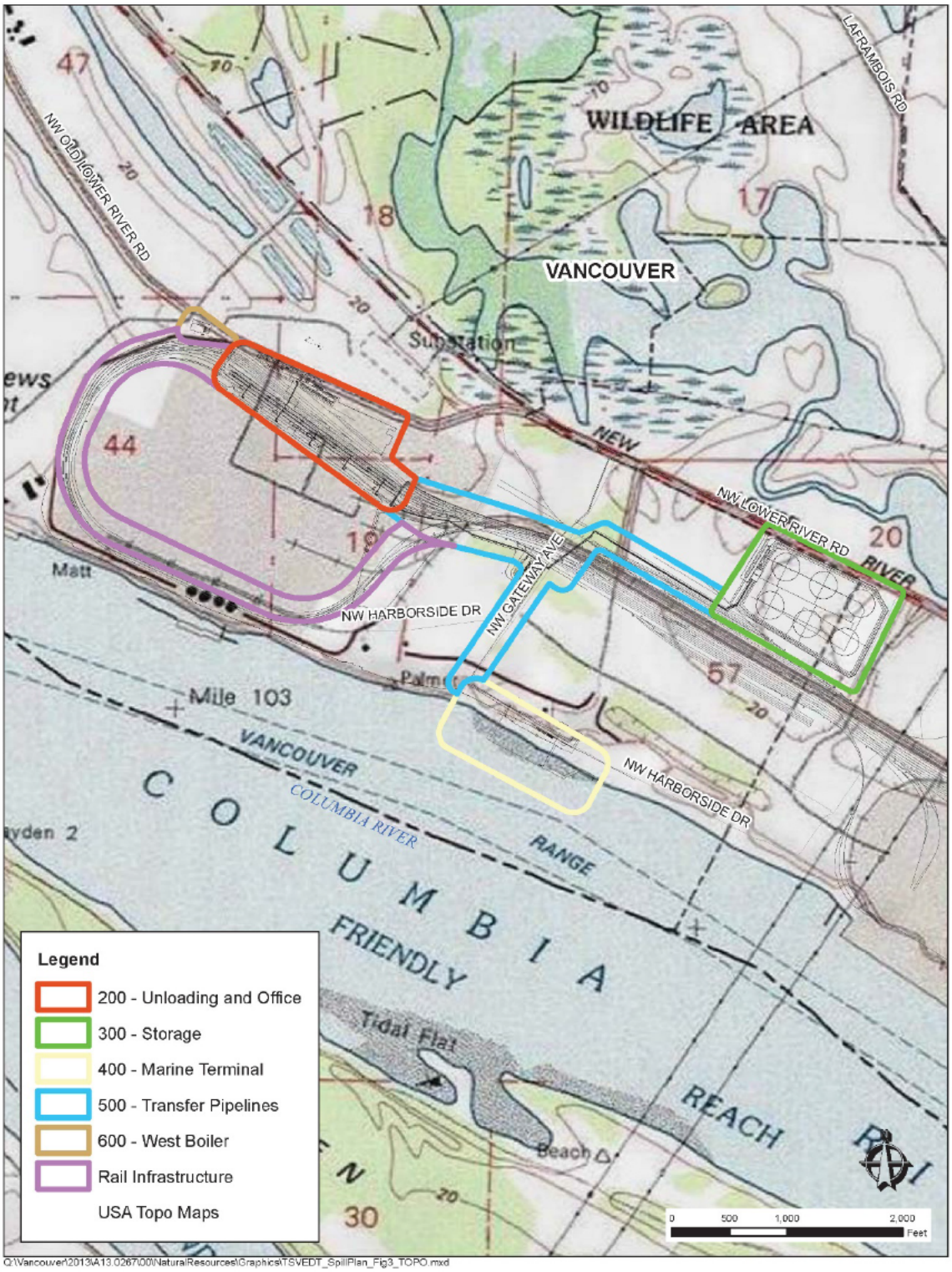

Figure 3 – USGS Topographic Map

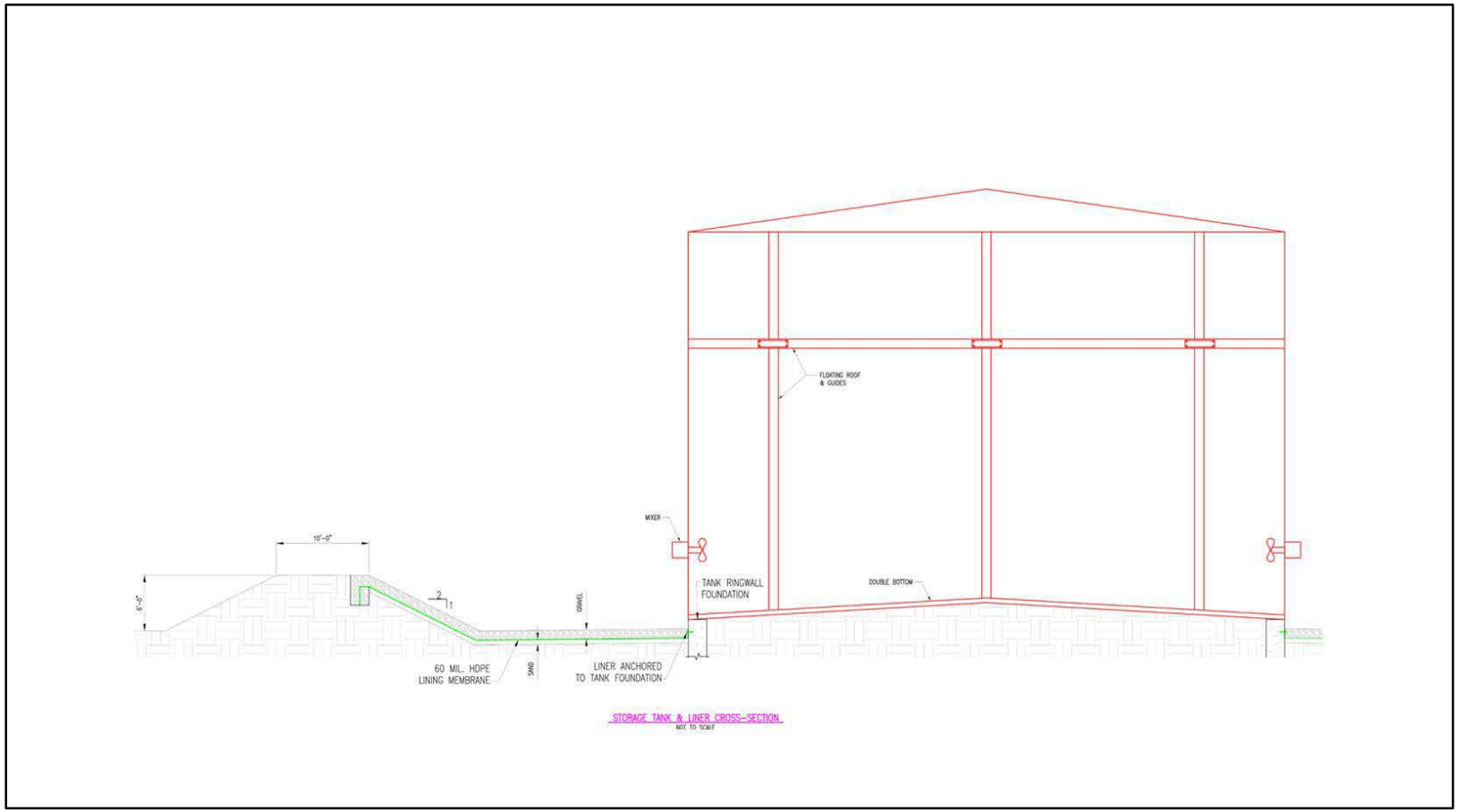

Figure 4 – Containment Berm

Vancouver Energy
Operations Spill Protection, Control, and Countermeasure Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix B
Tables

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Table B-1a – Bulk Storage Container Summary

Tank No.	Description	Liquid Stored/ Treated	Discharge Control	Construction Material	Height/ Length (feet)	Diameter (feet)	Measured Volume (bbl)	Date Installed
300-TK-001	Aboveground Storage Tank	Crude Oil	Containment Berm	Steel	50	240	360,000	TBD
300-TK-002	Aboveground Storage Tank	Crude Oil	Containment Berm	Steel	50	240	360,000	TBD
300-TK-003	Aboveground Storage Tank	Crude Oil	Containment Berm	Steel	50	240	360,000	TBD
300-TK-004	Aboveground Storage Tank	Crude Oil	Containment Berm	Steel	50	240	360,000	TBD
300-TK-005	Aboveground Storage Tank	Crude Oil	Containment Berm	Steel	50	240	360,000	TBD
300-TK-006	Aboveground Storage Tank	Crude Oil	Containment Berm	Steel	50	240	360,000	TBD
TBD	Fuel Tank	Ultra-Low Sulfur Diesel	Double-Walled	Steel	TBD	TBD	500 gallons	TBD
TBD	Fuel Tank	Ultra-Low Sulfur Diesel	Double-Walled	Steel	TBD	TBD	500 gallons	TBD
TBD	Fuel Tank	Ultra-Low Sulfur Diesel	Double-Walled	Steel	TBD	TBD	500 gallons	TBD

Table B-1b –Container Summary

Tank No.	Description	Liquid Stored/Treated	Discharge Control	Construction Material	Height/ Length (feet)	Diameter (feet)	Measured Volume (gallons)	Date Installed
Area 200 Transformer A	Oil filled transformer	Mineral oil	Deployable sorbent	steel	TBD	TBD	450	TBD
Area 200 Transformer B	Oil filled transformer	Mineral oil	Deployable sorbent	steel	TBD	TBD	850	TBD
Area 300 Transformer A	Oil filled transformer	Mineral oil	Deployable sorbent	steel	TBD	TBD	550	TBD
Area 300 Transformer B	Oil filled transformer	Mineral oil	Deployable sorbent	steel	TBD	TBD	850	TBD
Area 400 Transformer	Oil filled transformer	Mineral oil	Deployable sorbent	steel	TBD	TBD	550	TBD

Table B-2 – Calculated Minimum Secondary Containment Dimensions

Proposed Containment Dimensions				Container Volume			Effective Dike Volume (bbl)	Minimum Required Height for Largest Container (ft)	Minimum Dike Height Including 4-inch Freeboard (ft)
Width (ft)	Length (ft)	Height (ft)	Volume (bbl)	Diameter (ft)	Height (ft)	Effective Volume (bbl)			
Storage Area									
1,152	2,080	5.0	759,908(1)	(5) 240	48	360,000(2)	558,308	3.5	3.8
Fire Pump Diesel Tanks									
Diesel Tank 1	TBD	TBD	500 gallons	TBD	TBD	TBD	500 gallons	TBD	NA
Diesel Tank 2	TBD	TBD	500 gallons	TBD	TBD	TBD	500 gallons	TBD	NA
Diesel Tank 3	TBD	TBD	500 gallons	TBD	TBD	TBD	500 gallons	TBD	NA

(1) The calculations to determine the minimum dike height incorporate the National Oceanic and Atmospheric Administration 100-year, 24-hour rainfall (inches) isopleth to determine sufficient freeboard. For this site "sufficient freeboard" is determined to be 4.5 inches.

(2) Although shell capacity is 380,000 bbl, actual capacity is restricted to 360,000 bbl due to the presence of a floating roof and other internal tank appurtenances.

Table B-3 – Overview of Potential Spill Scenarios

Spill Scenario	Flow Direction	Rate of Flow	Total Quantity Released	Preventative Measures
Crude Storage Tank Leak or Failure	South	Instantaneous	360,000 bbl	Berm constructed around tanks Inspection and testing of tanks and associated level monitoring equipment Monitoring of storage area
Crude Storage Tank Overflow	South	Pipeline flow rate	Flow rate* discovery time* shutdown time	Berm Communications between rail pad and tank operators High level alarms High level shutdown interlock
Storage Tank Bottom Leak	Subsurface	Slow	Quantity depends on duration before detection	Double bottom Interstitial monitoring Visual leak monitoring at detection weep points Cathodic protection
Spill or Railcar Failure at the Rail Unloading Area	South	Instantaneous	900 bbl	Containment trenches Spill holding tanks
Leak from Transfer Pipeline, Unloading Area to Storage Area	South	Pipeline flow rate	Flow rate* discovery time* shutdown time	Communications between Unloading Area and Storage Area operators Pipeline flow and pressure measurement Line inspections and maintenance Emergency shutdown system od transfer operations Oil retention system in surface water drains
Leak from Transfer Pipeline, Storage Area to Marine Terminal	South	Pipeline flow rate	Flow rate* discovery time* shutdown time, Maximum of 3,802 bbl	Communications between Storage Area operators and Marine Terminal operators Pipeline flow and pressure measurement Line inspections and maintenance Emergency shutdown system for transfer operations Oil retention system in surface water drains
Bulk Diesel Storage Tank Failure	Localized	Instantaneous	500 gallons	Concrete berm Tank maintenance and inspections
Bulk Diesel Storage Tank Overfill	Localized	Slow	20 gallons	Operator present during diesel transfers Driver required to stay in immediate area during diesel transfers Secondary containment curbing Visible liquid level gauge Audible high level alarm
Transformer Container Failure	Localized	Slow	Transformer volume	Monthly visual inspections Concrete slab

[1] As required by Section 3.6, (112.7(b)) – Fault Analysis, listed below are potential "major Equipment" failures which could cause a discharge as described in 112.1(b).

Table B-4 – Personnel Training and Discharge Prevention Training Record

This information is to be included as shown in Section 3.10, required by 112.7(f). This Training Record must be maintained for three (3) years.		
112.7(f)(2) Facility Accountable Person		
Name:	Title:	Phone:

112.7(f)(1) Oil handling personnel have been trained in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; applicable pollution control laws, rules and regulations; general facility operations; and the contents of this Facility SPCCP.	
Leader:	Training Date:
Attendee Sign:	Title:
Attendee Sign:	Title:
Attendee Sign:	Title:
Describe Material Covered:	

112.7(f)(3) Discharge prevention briefings for oil-handling personnel are conducted at least once a year to assure adequate understanding of the SPCCP for this Facility. These briefings highlight and describe known discharges as described in 112.1(b) or failures, malfunctioning components, and any recently developed precautionary measures.	
Leader:	Training Date:
Attendee Sign:	Title:
Attendee Sign:	Title:
Attendee Sign:	Title:
Describe Material Covered:	

Table B-5 – Equipment Inspection Checklist

This information is required by 112.7 (e); this information is also required in 112.8 (c)(6) under Section 4.3.6. These record sheets will be maintained for a period of three years. (See Facility Daily Gauging, Terminal Inspection Reports, Monthly Leak Inspections under Terminal file and Quarterly Floating Roof Visual Inspection Form).

INSTRUCTIONS: This checklist is to be completed monthly and is to complement daily and weekly inspections. If any items need attention, they should be noted on the second page of this Table and corrected as soon as possible. These inspection reports should be maintained for at least three years.

Inspected by _____ Date Inspected _____

Field Supervisor _____

Storage Tanks (Include Crude Oil and Diesel Fuel Tanks)						
Good	Needs Attention			Good	Needs Attention	
		Foundation				Support
		Equalization lines				Vacuum protection
		Shell				Fittings/flanges
		Alarms/level indicator				Manways
		Vents				Thief hatch
Lines and Fittings (Transfer Pipelines and other Lines and Fittings)						
Good	Needs Attention			Good	Needs Attention	
		Above-ground flowline				Corrosion protection
		Flanges				Screw fittings
		Coating				Bleeders
		Gate Valves				Check Valves
Pumps						
Good	Needs Attention			Good	Needs Attention	
		Seals				Bleeders
		Flanges				Screw fittings
Secondary Containment (Dikes, Curbs, Trenches, etc.)						
Good	Needs Attention			Good	Needs Attention	
		Berm				Wall
		Drain				Other

Table B-5 – Equipment Inspection Checklist (continued)

Loading						
Good	Needs Attention			Good	Needs Attention	
		Valves				Drip pans
		Valve Locks/seals				Other
Spill Kits and Spill Response Supplies						
Good	Needs Attention			Good	Needs Attention	
		Sorbent socks				Containment boom
		Sorbent boom				Other
Comments						
Additional information and records pertaining to this issue can be found at the Facility Administration Office.						

Table B-6 – Record of Drainage of Rainwater from Diked Areas

This information is to be included as shown in Section 4.3.3, required by 112.8(c)(3). These records sheets will be maintained for three years.

Date of Drainage	Time of Drainage	Employee/Supervisor Present	Duration of Drainage	Was Water Free of Any Sign of Oil?	Valves Locked

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Vancouver Energy

Operations Spill Protection, Control, and Countermeasure Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix C
Regulatory Cross Reference Lists

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Appendix C.1
Cross Reference to Chapter 173-180 WAC
Part F: Prevention Plans for Class 1 Facilities
Section 173-180-630 - Plan Content Requirements

WAC Section	Requirement	Section/Figure
173-180-630 (1)	Each plan must contain a submittal agreement which: (a) includes the name, address, and phone number of submitting party;	Page vi
	(b) verifies acceptance of the plan by the owner or operator of the facility by either signature of the owner or operator or signature by a person with authority to bind the corporation which owns or operates the facility;	Page vi
	(c) commits the owner or operator of the facility to execution of the plan, and verifies that the plan holder is authorized to make appropriate expenditures in order to execute plan provisions; and	Page vi
	(d) includes the name, location, and address of the facility, type of facility, starting date of operations, types of oil(s) handled, and oil volume capacity.	Page vi and Table 1.1
173-180-630 (2)	Each plan must include a log sheet to record amendments to the plan. The log sheet must be placed at the front of the plan. The log sheet must provide for a record of the section amended, the date that the old section was replaced with the amended section, verification that ecology was notified of the amendment pursuant to WAC 173-180-670, and the initials of the individual making the change. A description of the amendment and its purpose must also be included in the log sheet, or filed in the form of an amendment letter immediately after the log sheet.	Page viii
173-180-630 (3)	Each plan must include a detailed table of contents based on chapter, section, and appendix numbers and titles, as well as tables and figures.	Page i to iii
173-180-630 (4)	Each plan must describe its purpose and scope, including, but not limited to:	Section 1
	(a) the onshore facility or offshore facility operations covered by the plan;	Section 1.2 and 2.1
	(b) The relationship of the prevention plan to other oil spill plans and operation manuals held by the facility;	Section 1.4
	(c) The relationship of the plan to all applicable local, state, regional, tribal, and federal government prevention plans, including the Washington statewide master oil and hazardous substance spill contingency plan; and	Section 1.4.3
	(d) Information required under facility oil spill contingency plan standards in chapter 173-182 WAC; spill prevention, countermeasure, and control plan standards in 40 C.F.R. 112.4(a); or facility operations manual standards in 33 C.F.R. 154.310 (1-4) may be used to address (a) of this subsection.	N/A
173-180-630 (5)	Each plan must describe the procedures and time periods for updating the plan and distributing the plan and updates to appropriate parties.	Section 1.5
173-180-630 (6)	Each plan must establish that the facility is in compliance with the Federal Oil Pollution Act of 1990. Within thirty calendar days after federal deadlines for facility requirements under that act, the plan must be updated to include any applicable evidence of compliance.	Section 1.3

WAC Section	Requirement	Section/Figure
173-180-630 (7)	Within thirty calendar days after evidence of financial responsibility is required by rules adopted by ecology pursuant to chapter 88.46 RCW, the plan must be updated to include any applicable evidence of compliance.	Section 1.5
173-180-630 (8)	Each plan must describe the types and frequency of spill prevention training provided to personnel.	Section 3
173-180-630 (9)	Each plan must provide evidence that the facility has an approved oil spill contingency plan or has submitted a contingency plan to ecology in accordance with standards and deadlines established by chapter 173-182 WAC.	Section 1.4.1
173-180-630 (10)	Each plan must address the facility's alcohol and drug use awareness and treatment program for all facility personnel. (a) The plan must include at a minimum: (i) Documentation of an alcohol and drug awareness program. The awareness program must provide training and information materials to all employees on recognition of alcohol and drug abuse; treatment opportunities, including opportunities under the Alcohol and Drug Addiction Treatment and Support Act pursuant to chapter 388-800 WAC; and applicable company policies; (ii) A description of the facility's existing drug and alcohol treatment programs; and (iii) A description of existing provisions for the screening of supervisory and key employees for alcohol and drug abuse and related work impairment.	Section 3.4
	(b) Evidence of conformance with applicable federal "Drug-Free Workplace" guidelines or other federal or state requirements may be used to address (a) of this subsection.	N/A
173-180-630 (11)	Each plan must describe the facility's existing maintenance and inspection program. (a) The description must summarize: (i) Frequency and type of all regularly scheduled inspection and preventive maintenance procedures for tanks; pipelines; other key storage, transfer, or production equipment, including associated pumps, valves, and flanges; and overpressure safety devices and other spill prevention equipment; (ii) integrity testing of storage tanks and pipelines, including but not limited to frequency; pressures used (including ratio of test pressure to maximum operating pressure, and duration of pressurization); means of identifying that a leak has occurred; and measures to reduce spill risk if test material is product; (iii) external and internal corrosion detection and repair; (iv) Damage criteria for equipment repair or replacement; and (v) Any other aspect of the maintenance and inspection program.	Section 4
	(b) The plan must include a current index of maintenance and inspection records of the storage and transfer facilities and related equipment five-year period for subsequent activity.	Section 4 and Appendix B
	(c) Documentation required under 40 C.F.R. 112.7(e) or 33 C.F.R. 154 Subparts C and D may be used to address elements of this subsection.	N/A

WAC Section	Requirement	Section/Figure
	(d) Existing copies of the facility's maintenance and inspection records for the five-year period prior to plan submittal must be maintained and must be available for inspection if requested by ecology. The plan must document the use of a system to maintain such records over a five-year period for subsequent activity.	N/A
173-180-630 (12)	Each plan must describe spill prevention technology currently installed and in use, including:	Section 5
	(a) Tank and pipeline materials and design	Section 5
	(b) Storage tank overflow alarms, low level alarms; tank overflow cut-off switches; automatic transfer shutdown systems; methods to alert operators; system accuracy; and tank fill margin remaining at time of alarm activation in terms of vertical distance, quantity of liquid, and time before overflow would occur at maximum pumping rate; documentation required under 40 C.F.R. 112.7 (e)(2)(viii) or 33 C.F.R. 154.310 (a)(12-13) may be used to address some or all of these elements;	Section 5.3.1 and 5.1.5
	(c) Leak detection systems for both active and non-active pipeline conditions, including detection thresholds in terms of duration and percentage of pipeline flow; limitations on system performance due to normal pipeline events; and procedures for operator response to leak alarms;	Section 5.1.5
	(d) Documentation required under 40 C.F.R. 112.7 (e)(3) may be used to address some or all of these elements;	N/A
	(e) Rapid pump and valve shutdown procedures, including means of ensuring that surge and over-pressure conditions do not occur; rates of valve closure; sequence and time duration (average and maximum) for entire procedure; automatic and remote control capabilities; and displays of system status for operator use;	Section 5.1.10
	(f) Documentation required under 40 C.F.R. 112.7 (e)(3) may be used to address some or all of these elements;	N/A
	(g) Methods to minimize post-shutdown residual drain-out from pipes, including criteria for locating valves; identification of all valves (including types and means of operation) that may be open during a transfer process; and any other techniques for reducing drain-out;	N/A
	(h) Means of relieving pressure due to thermal expansion of liquid in pipes during quiescent periods;	5.5
	(i) Secondary containment, including capacity, permeability, and material design;	Section 5.2.4, 5.3.2, 5.5
	(j) Documentation required under 40 C.F.R. 112.7 (e)(1) and (2)(iii-iv) may be used to address some or all of these elements;	N/A
	(k) Internal and external corrosion control coatings and monitoring;	N/A
	(l) Storm water and other drainage retention, treatment, and discharge systems, including maximum storage capacities and identification of any applicable discharge permits;	Section 5.8
	(m) Documentation required under 40 C.F.R. 112.7 (e)(1) and (2)(iii and ix) may be used to address some or all of these elements; and	N/A
	(n) Criteria for suspension of operations while leak detection or other spill control systems are inoperative.	Section 5.1.5

WAC Section	Requirement	Section/Figure
173-180-630 (13)	Each plan must describe measures taken to ensure facility site security, including: (a) Procedures to control and monitor facility access; (b) Facility lighting (documentation required under 33 C.F.R. 154.570 may be used to address some or all of this element); (c) Signage; and (d) Right of way identification or other measures to prevent third-party damage (documentation required under 40 C.F.R. 112.7 (e)(3)(v) and (9) may be used to address some or all of this element).	Section 6
173-180-630 (14)	Each plan must list any discharges of oil in excess of twenty-five barrels (one thousand fifty gallons) to the land or waters of the state which occurred during the five-year period prior to the plan submittal date. For each discharge, the plan must describe: (a) Quantity; (b) Type of oil; (c) Geographic location; (d) Analysis of cause, including source(s) of discharged oil and contributing factors (e.g., third party human error, adverse weather, etc.); and (e) Measures taken to remedy the cause and prevent a reoccurrence. *The period between July 1, 1987, and January 1, 1993, the facility must provide existing information regarding (a) through (e) of this subsection for such discharges, and must document the use of a system to record complete information for subsequent discharges.*	Not Applicable (New Facility)
173-180-630 (15)	Each plan must include a detailed and comprehensive analysis of facility spill risks based on the information required in subsections (11) through (14) of this section, and other relevant information. (a) The risk analysis must: (i) Evaluate the construction, age, corrosion, inspection and maintenance, operation, and oil spill risk of the transfer, production, and storage systems in the facility, including piping, tanks, pumps, valves, and associated equipment; (ii) Evaluate spill minimization and containment systems within the facility; (iii) Be prepared under the supervision of (and bear the seal of) a licensed professional engineer or another individual which ecology has deemed to have an acceptable level of expertise. (b) Documentation required under 40 C.F.R. 112.7 (b) and (e) may be used to address some or all of the elements of this subsection.	Appendix B Table B-3, Table B-2
173-180-630 (16)	Each plan must describe how the facility will incorporate those measures that will provide best achievable protection to address the spill risks identified in the risk analysis required in subsection (15) of this section. *Information documented pursuant to 40 C.F.R. 112.7(e) and 33 C.F.R. 154.310 (a)(1-4) may be used to address some or all of these elements of this subsection.*	Appendix B Table B-3
173-180-630 (17)	If the prevention plan is combined with a contingency plan, the prevention plan may incorporate information required in this section by reference if that information is provided in the contingency plan.	The Facility Contingency Plan is a Separate Document

Appendix C.2
Cross Reference to 40 CFR Sections 112.7 and 112.8

Section	Requirement	Section/Figure
112.7	**General requirements for Spill Prevention, Control, and Countermeasure Plans.** If you are the owner or operator of a facility subject to this part you must prepare a Plan in accordance with good engineering practices. The Plan must have the full approval of management at a level of authority to commit the necessary resources to fully implement the Plan. You must prepare the Plan in writing. If you do not follow the sequence specified in this section for the Plan, you must prepare an equivalent Plan acceptable to the Regional Administrator that meets all of the applicable requirements listed in this part, and you must supplement it with a section cross-referencing the location of requirements listed in this part and the equivalent requirements in the other prevention plan. If the Plan calls for additional facilities or procedures, methods, or equipment not yet fully operational, you must discuss these items in separate paragraphs, and must explain separately the details of installation and operational start-up. As detailed elsewhere in this section, you must also:	Page vi Appendix C
112.7 (a)	(1) Include a discussion of your facility's conformance with the requirements listed in this part.	Section 1.1
112.7 (a)	(2) Comply with all applicable requirements listed in this part. Except as provided in § 112.6, your Plan may deviate from the requirements in paragraphs (g), (h)(2) and (3), and (i) of this section and the requirements in subparts B and C of this part, except the secondary containment requirements in paragraphs (c) and (h)(1) of this section, and §§ 112.8(c)(2), 112.8(c)(11), 112.9(c)(2), 112.9(d)(3), 112.10(c), 112.12(c)(2), and 112.12(c)(11), where applicable to a specific facility, if you provide equivalent environmental protection by some other means of spill prevention, control, or countermeasure. Where your Plan does not conform to the applicable requirements in paragraphs (g), (h)(2) and (3), and (i) of this section, or the requirements of subparts B and C of this part, except the secondary containment requirements in paragraph (c) and (h)(1) of this section, and §§ 112.8(c)(2), 112.8(c)(11), 112.9(c)(2), 112.10(c), 112.12(c)(2), and 112.12(c)(11), you must state the reasons for nonconformance in your Plan and describe in detail alternate methods and how you will achieve equivalent environmental protection. If the Regional Administrator determines that the measures described in your Plan do not provide equivalent environmental protection, he may require that you amend your Plan, following the procedures in § 112.4(d) and (e).	N/A

Section	Requirement	Section/Figure
112.7 (a)	(3) Describe in your Plan the physical layout of the facility and include a facility diagram, which must mark the location and contents of each fixed oil storage container and the storage area where mobile or portable containers are located. The facility diagram must identify the location of and mark as "exempt" underground tanks that are otherwise exempted from the requirements of this part under § 112.1(d)(4). The facility diagram must also include all transfer stations and connecting pipes, including intra-facility gathering lines that are otherwise exempted from the requirements of this part under § 112.1(d)(11). You must also address in your Plan: (i) The type of oil in each fixed container and its storage capacity. For mobile or portable containers, either provide the type of oil and storage capacity for each container or provide an estimate of the potential number of mobile or portable containers, the types of oil, and anticipated storage capacities; (ii) Discharge prevention measures including procedures for routine handling of products (loading, unloading, and facility transfers, etc.); (iii) Discharge or drainage controls such as secondary containment around containers and other structures, equipment, and procedures for the control of a discharge; (iv) Countermeasures for discharge discovery, response, and cleanup (both the facility's capability and those that might be required of a contractor); (v) Methods of disposal of recovered materials in accordance with applicable legal requirements; and (vi) Contact list and phone numbers for the facility response coordinator, National Response Center, cleanup contractors with whom you have an agreement for response, and all appropriate Federal, State, and local agencies who must be contacted in case of a discharge as described in § 112.1(b).	Section 2 Section 5 Oil Spill Contingency Plan
112.7 (a)	(4) Unless you have submitted a response plan under § 112.20, provide information and procedures in your Plan to enable a person reporting a discharge as described in § 112.1(b) to relate information on the exact address or location and phone number of the facility; the date and time of the discharge, the type of material discharged; estimates of the total quantity discharged; estimates of the quantity discharged as described in § 112.1(b); the source of the discharge; a description of all affected media; the cause of the discharge; any damages or injuries caused by the discharge; actions being used to stop, remove, and mitigate the effects of the discharge; whether an evacuation may be needed; and, the names of individuals and/or organizations who have also been contacted.	Response Plan
112.7 (a)	(5) Unless you have submitted a response plan under § 112.20, organize portions of the Plan describing procedures you will use when a discharge occurs in a way that will make them readily usable in an emergency, and include appropriate supporting material as appendices.	Response Plan
112.7(b)	Where experience indicates a reasonable potential for equipment failure (such as loading or unloading equipment, tank overflow, rupture, or leakage, or any other equipment known to be a source of a discharge), include in your Plan a prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each type of major equipment failure.	Appendix B, Table B-3

Section	Requirement	Section/Figure
112.7(c)	Provide appropriate containment and/or diversionary structures or equipment to prevent a discharge as described in § 112.1(b), except as provided in paragraph (k) of this section for qualified oil-filled operational equipment, and except as provided in § 112.9(d)(3) for flowlines and intra-facility gathering lines at an oil production facility. The entire containment system, including walls and floor, must be capable of containing oil and must be constructed so that any discharge from a primary containment system, such as a tank, will not escape the containment system before cleanup occurs. In determining the method, design, and capacity for secondary containment, you need only to address the typical failure mode, and the most likely quantity of oil that would be discharged. Secondary containment may be either active or passive in design. At a minimum, you must use one of the following prevention systems or its equivalent:	Section 5
112.7(c)	(1) For onshore facilities: (i) Dikes, berms, or retaining walls sufficiently impervious to contain oil; (ii) Curbing or drip pans; (iii) Sumps and collection systems; (iv) Culverting, gutters, or other drainage systems; (v) Weirs, booms, or other barriers; (vi) Spill diversion ponds; (vii) Retention ponds; or (viii) Sorbent materials.	Section 5
112.7(c)	(2) For offshore facilities: (i) Curbing or drip pans; or (ii) Sumps and collection systems.	N/A
112.7(d)	Provided your Plan is certified by a licensed Professional Engineer under § 112.3(d), or, in the case of a qualified facility that meets the criteria in § 112.3(g), the relevant sections of your Plan are certified by a licensed Professional Engineer under § 112.6(d), if you determine that the installation of any of the structures or pieces of equipment listed in paragraphs (c) and (h)(1) of this section, and §§ 112.8(c)(2), 112.8(c)(11), 112.9(c)(2), 112.10(c), 112.12(c)(2), and 112.12(c)(11) to prevent a discharge as described in § 112.1(b) from any onshore or offshore facility is not practicable, you must clearly explain in your Plan why such measures are not practicable; for bulk storage containers, conduct both periodic integrity testing of the containers and periodic integrity and leak testing of the valves and piping; and, unless you have submitted a response plan under § 112.20, provide in your Plan the following:	N/A
112.7(d)	(1) An oil spill contingency plan following the provisions of part 109 of this chapter.	N/A
112.7(d)	(2) A written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful.	N/A
112.7(e)	*Inspections, tests, and records.* Conduct inspections and tests required by this part in accordance with written procedures that you or the certifying engineer develop for the facility. You must keep these written procedures and a record of the inspections and tests, signed by the appropriate supervisor or inspector, with the SPCCP for a period of three years. Records of inspections and tests kept under usual and customary business practices will suffice for purposes of this paragraph.	Section 4
112.7(f)	*Personnel, training, and discharge prevention procedures.* (1) At a minimum, train your oil-handling personnel in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; applicable pollution control laws, rules, and regulations; general facility operations; and, the contents of the facility SPCCP.	Section 3
112.7(f)	(2) Designate a person at each applicable facility who is accountable for discharge prevention and who reports to facility management.	Page vi

Section	Requirement	Section/Figure
112.7(f)	(3) Schedule and conduct discharge prevention briefings for your oil-handling personnel at least once a year to assure adequate understanding of the SPCCP for that facility. Such briefings must highlight and describe known discharges as described in § 112.1(b) or failures, malfunctioning components, and any recently developed precautionary measures.	Documented in the Facility Spill Contingency Plan
112.7(g)	*Security (excluding oil production facilities).* Describe in your Plan how you secure and control access to the oil handling, processing and storage areas; secure master flow and drain valves; prevent unauthorized access to starter controls on oil pumps; secure out-of-service and loading/unloading connections of oil pipelines; and address the appropriateness of security lighting to both prevent acts of vandalism and assist in the discovery of oil discharges.	Section 6
112.7(h)	*Facility tank car and tank truck loading/unloading rack (excluding offshore facilities).* (1) Where loading/unloading rack drainage does not flow into a catchment basin or treatment facility designed to handle discharges, use a quick drainage system for tank car or tank truck loading/unloading racks. You must design any containment system to hold at least the maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded at the facility.	Section 5.2.4
112.7(h)	(2) Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks or vehicle brake interlock system in the area adjacent to a loading/unloading rack, to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.	Section 5.2.2
112.7(h)	(3) Prior to filling and departure of any tank car or tank truck, closely inspect for discharges the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.	Section 5.2.3
112.7(i)	If a field-constructed aboveground container undergoes a repair, alteration, reconstruction, or a change in service that might affect the risk of a discharge or failure due to brittle fracture or other catastrophe, or has discharged oil or failed due to brittle fracture failure or other catastrophe, evaluate the container for risk of discharge or failure due to brittle fracture or other catastrophe, and as necessary, take appropriate action.	Section 5.1.9
112.7(j)	In addition to the minimal prevention standards listed under this section, include in your Plan a complete discussion of conformance with the applicable requirements and other effective discharge prevention and containment procedures listed in this part or any applicable more stringent State rules, regulations, and guidelines.	Section 5
112.7(k)	*Qualified Oil-filled Operational Equipment.* The owner or operator of a facility with oil-filled operational equipment that meets the qualification criteria in paragraph (k)(1) of this sub-section may choose to implement for this qualified oil-filled operational equipment the alternate requirements as described in paragraph (k)(2) of this sub-section in lieu of general secondary containment required in paragraph (c) of this section.	N/A
112.7(k)	(1) *Qualification Criteria—Reportable Discharge History:* The owner or operator of a facility that has had no single discharge as described in § 112.1(b) from any oil-filled operational equipment exceeding 1,000 U.S. gallons or no two discharges as described in § 112.1(b) from any oil-filled operational equipment each exceeding 42 U.S. gallons within any twelve month period in the three years prior to the SPCCP certification date, or since becoming subject to this part if the facility has been in operation for less than three years (other than oil discharges as described in § 112.1(b) that are the result of natural disasters, acts of war or terrorism); and	N/A (New Facility)

Section	Requirement	Section/Figure
112.7(k)	(2) *Alternative Requirements to General Secondary Containment.* If secondary containment is not provided for qualified oil-filled operational equipment pursuant to paragraph (c) of this section, the owner or operator of a facility with qualified oil-filled operational equipment must: (i) Establish and document the facility procedures for inspections or a monitoring program to detect equipment failure and/or a discharge; and (ii) Unless you have submitted a response plan under § 112.20, provide in your Plan the following: (A) An oil spill contingency plan following the provisions of part 109 of this chapter. (B) A written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful.	N/A (Secondary Containment is Provided)
112.8	**Spill Prevention, Control, and Countermeasure Plan requirements for onshore facilities (excluding production facilities).** If you are the owner or operator of an onshore facility (excluding a production facility), you must:	N/A
112.8 (a)	(a) Meet the general requirements for the Plan listed under § 112.7, and the specific discharge prevention and containment procedures listed in this section.	N/A
112.8 (b)	*Facility drainage.* (1) Restrain drainage from diked storage areas by valves to prevent a discharge into the drainage system or facility effluent treatment system, except where facility systems are designed to control such discharge. You may empty diked areas by pumps or ejectors; however, you must manually activate these pumps or ejectors and must inspect the condition of the accumulation before starting, to ensure no oil will be discharged.	Section 5.8.1
	(2) Use valves of manual, open-and-closed design, for the drainage of diked areas. You may not use flapper-type drain valves to drain diked areas. If your facility drainage drains directly into a watercourse and not into an on-site wastewater treatment plant, you must inspect and may drain uncontaminated retained stormwater, as provided in paragraphs (c)(3)(ii), (iii), and (iv) of this section.	Section 5.8.1
	(3) Design facility drainage systems from undiked areas with a potential for a discharge (such as where piping is located outside containment walls or where tank truck discharges may occur outside the loading area) to flow into ponds, lagoons, or catchment basins designed to retain oil or return it to the facility. You must not locate catchment basins in areas subject to periodic flooding.	Section 5.8.2
	(4) If facility drainage is not engineered as in paragraph (b)(3) of this section, equip the final discharge of all ditches inside the facility with a diversion system that would, in the event of an uncontrolled discharge, retain oil in the facility.	N/A
	(5) Where drainage waters are treated in more than one treatment unit and such treatment is continuous, and pump transfer is needed, provide two "lift" pumps and permanently install at least one of the pumps. Whatever techniques you use, you must engineer facility drainage systems to prevent a discharge as described in § 112.1(b) in case there is an equipment failure or human error at the facility.	Section 5.8.3
112.8 (c)	***Bulk storage containers.*** (1) Not use a container for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature.	Section 5.3.1

Section	Requirement	Section/Figure
	(2) Construct all bulk storage tank installations (except mobile refuelers and other non-transportation-related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. You must ensure that diked areas are sufficiently impervious to contain discharged oil. Dikes, containment curbs, and pits are commonly employed for this purpose. You may also use an alternative system consisting of a drainage trench enclosure that must be arranged so that any discharge will terminate and be safely confined in a facility catchment basin or holding pond.	Section 5.3.2
	(3) Not allow drainage of uncontaminated rainwater from the diked area into a storm drain or discharge of an effluent into an open watercourse, lake, or pond, bypassing the facility treatment system unless you: (i) Normally keep the bypass valve sealed closed. (ii) Inspect the retained rainwater to ensure that its presence will not cause a discharge as described in § 112.1(b). (iii) Open the bypass valve and reseal it following drainage under responsible supervision; and (iv) Keep adequate records of such events, for example, any records required under permits issued in accordance with §§ 122.41(j)(2) and 122.41(m)(3) of this chapter.	Section 5.8.1
	(4) Protect any completely buried metallic storage tank installed on or after January 10, 1974 from corrosion by coatings or cathodic protection compatible with local soil conditions. You must regularly leak test such completely buried metallic storage tanks.	N/A
	(4) Protect any completely buried metallic storage tank installed on or after January 10, 1974 from corrosion by coatings or cathodic protection compatible with local soil conditions. You must regularly leak test such completely buried metallic storage tanks.	N/A
	(5) Not use partially buried or bunkered metallic tanks for the storage of oil, unless you protect the buried section of the tank from corrosion. You must protect partially buried and bunkered tanks from corrosion by coatings or cathodic protection compatible with local soil conditions.	N/A
	(6) Test or inspect each aboveground container for integrity on a regular schedule and whenever you make material repairs. You must determine, in accordance with industry standards, the appropriate qualifications for personnel performing tests and inspections, the frequency and type of testing and inspections, which take into account container size, configuration, and design (such as containers that are: shop-built, field-erected, skid-mounted, elevated, equipped with a liner, double-walled, or partially buried). Examples of these integrity tests include, but are not limited to: visual inspection, hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or other systems of non-destructive testing. You must keep comparison records and you must also inspect the container's supports and foundations. In addition, you must frequently inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas. Records of inspections and tests kept under usual and customary business practices satisfy the recordkeeping requirements of this paragraph.	Section 4
	(7) Control leakage through defective internal heating coils by monitoring the steam return and exhaust lines for contamination from internal heating coils that discharge into an open watercourse, or pass the steam return or exhaust lines through a settling tank, skimmer, or other separation or retention system.	Section 5.3.1

Section	Requirement	Section/Figure
	(8) Engineer or update each container installation in accordance with good engineering practice to avoid discharges. You must provide at least one of the following devices: (i) High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. (ii) High liquid level pump cutoff devices set to stop flow at a predetermined container content level. (iii) Direct audible or code signal communication between the container gauger and the pumping station. (iv) A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. (v) You must regularly test liquid level sensing devices to ensure proper operation.	Section 5.3.1
	(9) Observe effluent treatment facilities frequently enough to detect possible system upsets that could cause a discharge as described in § 112.1(b).	N/A
	(10) Promptly correct visible discharges which result in a loss of oil from the container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts. You must promptly remove any accumulations of oil in diked areas.	Section 5.1.1
	(11) Position or locate mobile or portable oil storage containers to prevent a discharge as described in § 112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation.	N/A
112.8 (d)	*Facility transfer operations, pumping, and facility process.* (1) Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage.	Section 5.5
	(2) Cap or blank-flange the terminal connection at the transfer point and mark it as to origin when piping is not in service or is in standby service for an extended time.	Section 6
	(3) Properly design pipe supports to minimize abrasion and corrosion and allow for expansion and contraction.	Section 2.1.4
	(4) Regularly inspect all aboveground valves, piping, and appurtenances. During the inspection you must assess the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces. You must also conduct integrity and leak testing of buried piping at the time of installation, modification, construction, relocation, or replacement.	Section 4
	(5) Warn all vehicles entering the facility to be sure that no vehicle will endanger aboveground piping or other oil transfer operations.	Section 5.1.7

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Appendix D.3

Operations Facility Oil Handling Manual

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Vancouver Energy
Operations Facility Oil Handling Manual

Plan No. OP.05 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 26 June 2015

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Vancouver Energy

Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
26 June 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Record of Revisions

This record of revisions complies with the regulations of U.S. Coast Guard found at 33 CFR Section 154.310(c), and Washington State Department of Ecology regulations found at WAC 173-180-415(3).

No.	Date	Section Amended	Description of Change	Initials
00	26 June 2015		Submittal for Application Review	

Vancouver Energy
Operations Facility Oil Handling Manual

Table of Contents

Section

Record of Revisions **4**
1. Introduction **5**
1.1 Purpose of Plan 5
1.2 Submittal Agreement 5
1.2.1 Name, Address, and Phone Number of the Submitting Party 5
1.2.2 Verification of Acceptance and Commitment to Execution 5
2. Facility Description **6**
2.1 Geographic Location 6
2.2 Physical Description 6
2.2.1 Area 200 – Unloading and Office 9
2.2.2 Area 300 – Storage 10
2.2.3 Area 400 – Marine Terminal 11
2.2.4 Area 500 – Transfer Piping 11
2.2.5 Area 600 – Boiler Building 12
2.2.6 Rail Infrastructure 12
2.3 Firefighting and Safety Equipment 12
3. Hours of Operation **13**
4. Sizes, Types, and Numbers of Vessels **13**
5. Product Information **15**
5.1 Oil Types Transferred at the Facility 15
5.2 Handling Hazards, Instructions for Safe Handling, and Firefighting Procedures 15
6. Transfer Staffing and Duties **15**
6.1 Duties of the Terminal Person-in-Charge 15
6.2 Duties of the Vessel Person-in-Charge 16
6.3 Duties of the Tank Farm Monitoring Personnel 16
6.4 Rail to Storage Transfer Staffing 16
6.5 Storage to Vessel Transfer Staffing 16
6.6 Rail Direct to Vessel Transfer Staffing 16
7. Procedures for Emergencies/Notification **16**
8. Duties of Watchman for Unmanned Vessels **19**
9. Communication Systems **19**
10. Personnel Shelter **19**
11. Drip and Discharge Collection **19**
11.1 Area 200 Drip and Discharge Collection 19
11.2 Area 300 Drip and Discharge Collection 19
11.3 Area 400 Drip and Discharge Collection 20

11.4 Area 500 Drip and Discharge Collection 20
12. Emergency and Shutdown Systems 20
12.1 Area 200 – Fire/Safety Systems 20
12.2 Area 300 – Fire/Safety Systems 21
12.3 Area 400 – Fire/Safety Systems 22
12.4 Area 500 – Fire/Safety Systems 23
12.5 Area 600 – Fire/Safety Systems 23
12.6 Rail Infrastructure – Fire/Safety Systems 23
13. Monitoring Devices 23
14. Oil Spill Containment Equipment 23
15. Fire Extinguishers 24
15.1 Fire Extinguisher Location 24
15.2 Fire Extinguisher Instructions for Use 24
16. Maximum Allowable Working Pressure and Relief Valves 24
17. Transferring Procedures 25
17.1 Transfer to Vessel 25
17.2 Transfer from Railcar 26
17.2.1 Railcar Spotting and Bottom Hook-Up 26
17.2.2 Platform Operation and Hook-Up 26
17.2.3 Initiating the Transfer and Transfer in Progress 27
17.3 Completion of Pumping 27
17.3.1 Transfer to Vessel 27
17.3.2 Transfer from Railcar 27
18. Procedures for Spill Reporting and Initial Containment 28
19. Federal, State, and Local Laws and Regulations 28
19.1 Federal Law 28
19.2 State of Washington Law 28
19.3 State of Oregon Law 29
20. Shielding Portable Lighting Procedures 29
21. Terminal Training and Qualification Program 29
22. Hose Marking 32
23. Tank Cleaning Operations and Recordkeeping Procedures 32
24. Inspection and Maintenance Schedules 32
25. Recordkeeping 32
26. Work Hours 33
27. Operations Manual Review and Approval 33
28. List of Acronyms and Abbreviations 34

List of Tables

Table 1. Summary of Facility Areas 9
Table 2. Dimensions of Articulated Tug Barges and Tanker Vessels Anticipated to Dock at the Facility 14
Table 3. Emergency Notifications 17
Table 4. On-Site Oil Spill Response Equipment 24

List of Figures

Figure 1. Facility Location Map 7
Figure 2. Site Plan 8

List of Appendices

Appendix A. Facility and Dock Plot Plans
Appendix B. USCG Jurisdiction Map
Appendix C. Material Safety Data Sheets
Appendix D. Response Equipment
Appendix E. Response Equipment Instructions
Appendix F. Example Declaration of Inspection Form
Appendix G. Example Maintenance and Inspection Forms
Appendix H. General Inspection, Maintenance, and Product Control Procedures
Appendix I. Example Oil Transfer Load Plan
Appendix J. Example Advance Notice of Oil Transfer
Appendix K. Safe and Effective Threshold Report
Appendix L. Unsafe Operating Conditions
Appendix M. Pre-booming Oil Transfer
Appendix N. Regulatory Cross Reference

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1. Introduction

1.1 Purpose of Plan

This operations facility oil handling manual has been prepared for the Tesoro Savage Petroleum Terminal LLC's (Company) Vancouver Energy (Facility) to satisfy the requirements for an operations manual as found in Washington State statutes and the federal requirements of the U.S. Coast Guard (USCG) for facilities transferring oil in bulk.

This document is a PRELIMINARY version of the manual that will be prepared, implemented, and submitted as necessary to applicable state and federal agencies in accordance with applicable laws and regulations prior to the beginning of operations of the Facility. This manual has been developed based on Facility design completed at the time of writing. The Company will update this manual based on additional consultation conducted during the permitting effort for the Facility and the final design of the Facility. This preliminary manual is intended to be indicative of the planning and response strategies to be implemented by the Company at the Facility.

The purpose of this operations facility oil handling manual is to provide information and operational procedures for the transfer of oil product in bulk. The manual is written to address the operations manual requirements found at Washington Administrative Code (WAC) Chapter 173-180-420, and at Title 33 Code of Federal Regulations (CFR) Part 154, Subpart B. A regulatory cross reference is provided in Appendix N.

1.2 Submittal Agreement

This section complies with the regulations of the Washington State Department of Ecology (Ecology) found at WAC 173-180-420(2)(a) through (d).

1.2.1 Name, Address, and Phone Number of the Submitting Party

Vancouver Energy
Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Submitted by:
Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Telephone: 801-944-6600

1.2.2 Verification of Acceptance and Commitment to Execution

The undersigned, owner and operator of this Class 1 Facility, verifies acceptance of the operations manual and commits to execution of the operations manual. The undersigned is a person with the authority to bind the corporation, who owns this Facility and to make appropriate expenditures in order to execute the provisions of this operations manual.

_____ _____

By: Date
Title:

2. Facility Description

2.1 Geographic Location

This section complies with the regulations of USCG found at 33 CFR Section 154.310 (a)(1), and Ecology regulations found at WAC 173-180-420(3)(a).

The Facility is located at the Port of Vancouver USA (Port) within the City of Vancouver (City) in Clark County, Washington. The site is located on the Washington shore of the Columbia River. The site address is 5501 NW Lower River Road, Vancouver, Washington 98660. The marine dock is located at Port Terminal No. 4, on the north side of the Columbia River, at River Mile 103.5, approximately 2.5 miles downriver of the Interstate 5 bridge. The facility is located at latitude 45° 39' 6" N and longitude 122° 43' 52" W. The facility location is shown in Figure 1.

2.2 Physical Description

This section complies with the regulations of USCG regulations found at 33 CFR Section 154.310(a)(2) and Ecology regulations WAC 173-180-420(3)(a) (ii) and (xiii).

The Facility provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 2 and detailed in Table 1, Summary of Facility Areas. More detailed plans are provided in Appendix A.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at Berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility will receive an average of four unit trains per day and unload an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 380,000 bbl tanks are used to store crude oil on site. A transfer pipeline system will be used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400.

Figure 1. Facility Location Map

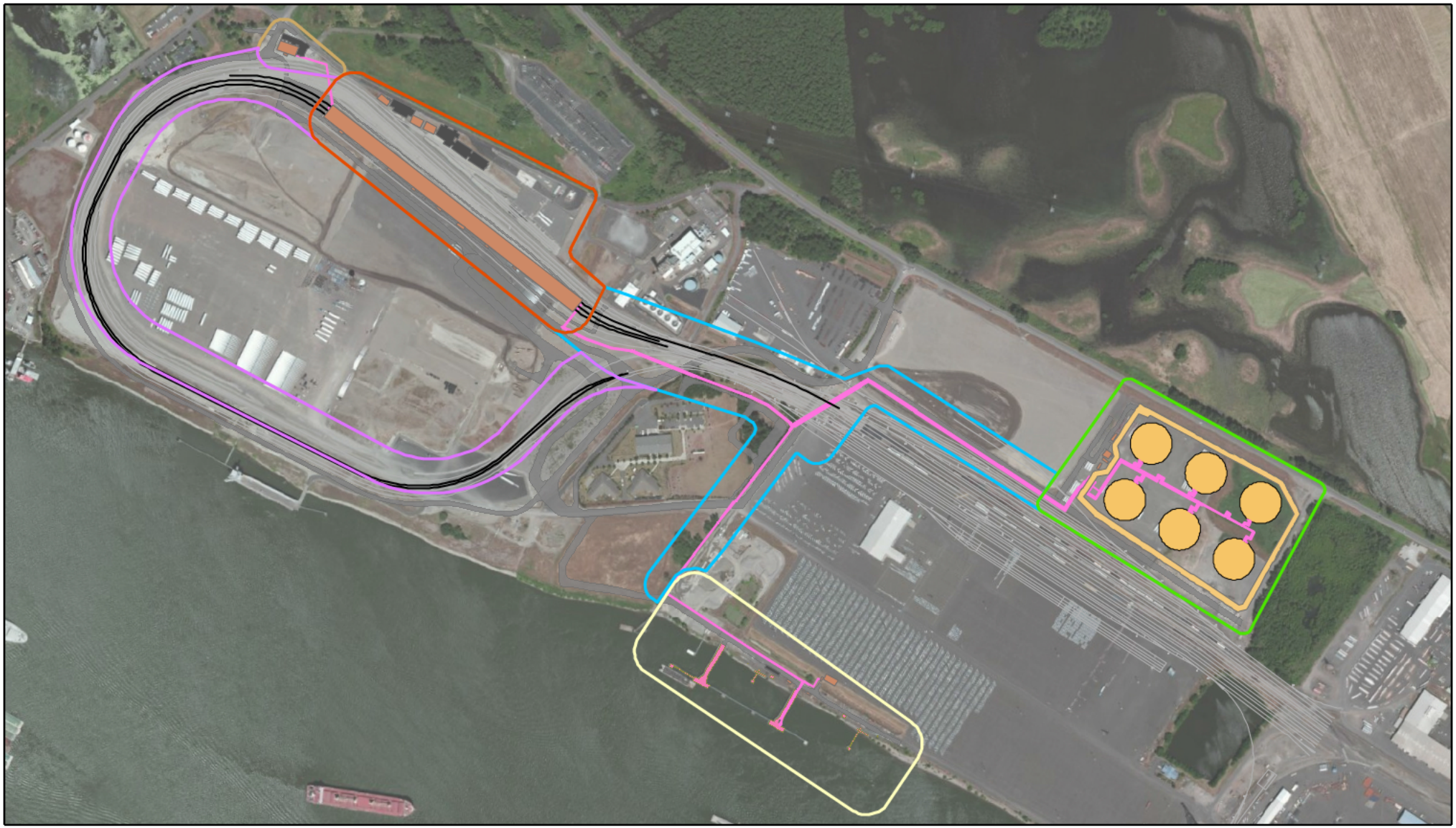

Figure 2 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000 Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

Table 1. Summary of Facility Areas

Facility Area	Project Elements	Acreage
200 – Unloading and Office	Rail Unloading Area Control Rooms/E-houses Fire Pump and Foam Building Admin/Support Buildings	7.8 Acres
300 – Storage	Crude Oil Storage Tanks Secondary Containment Berm Storage Building Pump Basin Control Room/E-house Fire Pump and Foam Building	20.8 Acres
400 – Marine Terminal	Marine Vessel Loading Hoses and Equipment Control Room/E-house Dock Safety Unit Marine Vapor Combustion Units Vapor Blower Skid Spill Prevention, Response and Containment Equipment Dock Improvements Piping from Vessel Loading to Marine Vapor Combustion Units	7.7 Acres
500 – Transfer Pipelines	Transfer Piping from Area 200 to Area 300 Transfer Piping from Area 300 to Area 400*	4.9 Acres
600 – Boiler Building	Boiler Building	0.8 Acre
Rail Infrastructure	Rail Transportation Corridor	5.4 Acres
Total		47.4 Acres

*Transfer piping is arranged to also allow direct transfer from Area 200 to Area 400, bypassing storage in Area 300.

2.2.1 Area 200 – Unloading and Office

Area 200 is located at 5501 NW Old Lower River Road in Vancouver and includes the administrative and support buildings, parking, rail access to the rail unloading facility, and the rail unloading facility. Area 200 is accessible from an unnamed private road owned and maintained by the Port. Area 200 facilities cover an area approximately 7.8 acres in size.

The rail unloading facility is a covered structure through which the trains are pulled and secured for unloading. The structure is approximately 1,850 feet long by 91 feet wide with a maximum height of approximately 50 feet. The building structure is open on the north, west, and east sides, and the southern wall is partially enclosed with built segments along the wall acting as a weather break.

Each of the three tracks includes 30 unloading stations for handling crude oil. Each station uses a completely closed loop of piping to prevent any atmospheric contact with the product during unloading. The entire 1,850 feet of the rail unloading facility includes full coverage rail collection pans, and the interior ground surfaces are constructed of concrete to contain any accident releases, as well as provide catchments for all stormwater that drips from railcars or is blown into the rail unloading facility by the wind.

All mechanical piping is located in concrete secondary containment trenches, and the pump basins used to transfer crude oil from the rail unloading facility to Area 300 storage are in below-grade concrete basins. The collection piping from the rail drip pans and rail unloading facility floor drains are mostly located in these concrete trenches with discharge pumps located in the pump basins. Water collected from within the rail unloading facility is collected in these systems and pumped to two containment tanks

located in the area of the administrative/support buildings. Other than from office buildings, there is no hydraulic connection to storm or sanitary sewers from within the rail unloading footprint.

Several accessory structures and equipment pads are located adjacent to the rail unloading facility, including electrical house (E-house) control rooms, fire pump and foam building, electrical equipment pads, and mechanical equipment pads.

The administrative/support buildings are located north of the rail unloading facility adjacent to Old Lower River Road. This area consists of three proposed modular structures, parking, and associated landscaping. In addition, the containment tanks for discharges from the rail unloading facility are located near the parking lot. A pedestrian bridge connects the administrative/support buildings to the rail unloading facility.

2.2.2 Area 300 – Storage

Area 300 contains storage tanks and associated containment areas, and includes a single pump basin used to transfer crude oil from the storage tanks to the Marine Terminal and associated support buildings and equipment pads.

The storage area includes six double-bottom, internal floating-roof aboveground storage tanks for storing crude oil. The tanks are approximately 50 feet in height and 240 feet in diameter. Each tank has capacity to store 380,000 bbl of crude oil. The maximum volume of oil to be stored is 360,000 bbl.

The containment area includes an earthen perimeter berm approximately 6 feet in height, which is tall in size to contain the release of 110 percent of one entire tank volume and a 100-year rainfall event. Intermediate berms approximately 2 feet tall are positioned between each tank to segregate the containment area. This capacity reflects the most stringent of Washington spill prevention and control and National Fire Protection Association (NFPA) requirements.

Each tank has a fixed roof to keep precipitation from reaching the inside of the tank and an internal floating roof (with dual seals) to control vapor emissions from the tank to the atmosphere. The floating roof is designed to avoid tipping during operations.

The double-bottomed tanks include a leak detection system between the tank floors and are equipped with cathodic protection to prevent corrosion. The entire tank containment area is lined with an impervious membrane to prevent any potential spills from leaving the containment area via infiltration into the ground.

Stormwater flows to a control structure, which passes the water at a controlled flow rate through two parallel oil/water separators for free oil removal. The water then passes into a stormwater pump station equipped with two submersible pumps that discharge to a treatment system. This water is comingled with the parking lot runoff prior to treatment and treated for turbidity, heavy metals, and volatile organics (benzene).

Crude oil stored in the tanks is pumped to the dock for transfer to a ship or barge. Approximately three to six variable speed pumps pump the crude oil, at least one of which would be on standby.

The pumps are housed in the tank storage pump basin located on the west side of the storage tank area. Stormwater flows by gravity from the pump basin through an oil/water separator to the sanitary sewer. There is a valve on the line to interrupt flow to the sewer if necessary.

The support buildings (including a storage building, fire water pump and foam building, control room/E-house, electrical pads, and mechanical pads) are constructed outside the containment area on slab-on-grade foundations. A small storage tank of approximate 500-gallon capacity is located inside the fire pump skid to hold ultra-low sulfur diesel fuel used to fuel the fire pump. The pump basin is isolated from the containment area by its concrete walls; the basin providing secondary containment for the pump machinery.

2.2.3 Area 400 – Marine Terminal

Crude oil is transferred by 36-inch-diameter pipeline to vessels at Berth 13, located at Area 400. Hoses supported by cranes or a pulley system are connected to the manifold used to transfer the crude oil from the piping system to the vessel being loaded. The hoses are connected to the grounding grid to protect against the buildup of static electricity. The loading system incorporates automatic shutoff valves with a maximum 30 seconds until shutoff. The pipelines serving the dock undergo annual hydrostatic testing as required by federal standards. A steel containment pan capable of holding 3 bbl of discharge is positioned below the deck level for the containment of inadvertent releases, in addition to stormwater, that may fall in the catchment area. The containment pan gravity flows to upland treatment (oil/water separator and carbon filtration) and discharges into on-site swales.

A fire pump and foam building located near the dock-side control house encompasses an emergency fire pump and fire protection systems associated with the Marine Terminal. A small storage tank of approximate 500-gallon capacity is located within the fire pump skid to hold ultra-low sulfur diesel fuel.

Prior to oil transfer, a fence boom is placed between the vessel and the shoreline, and floating booms connect with the fence boom on the downstream end (but open on the upstream, offshore side of the moored vessel due to currents).

Marine vessels are generally empty, having inert (noncombustible) gases occupying the cargo tanks, when they arrive at the berth. When the vessel tanks are filled with crude oil, the vapors from previous cargo, vapors from the crude being added to the tank, and the inert gases are displaced from the tank. These vapors are collected and sent to the marine vapor combustion unit (MVCU) system, which combusts the hydrocarbons in the vapors. Piping from the dock conveys the vapors to the MVCUs located north of the access trestle and roadway. Once in the MVCUs, the vapors from the vessel hold are mixed with small amounts of natural gas and combusted in the MVCUs. The resulting combustion gases are be expelled from the MVCU stack. Eight units are installed on a 100- by 50-foot concrete slab, housing equipment that has eight stacks approximately 25 feet in height and ranging between 3 and 4 feet in diameter.

2.2.4 Area 500 – Transfer Piping

A combination of above- and belowground steel transfer pipelines convey crude oil from the rail unloading structure in Area 200 to the storage tanks in Area 300 and from the storage tanks to the marine vessel loading system in Area 400. The system includes the following.

- Three 24-inch-diameter, approximately 1,800-foot-long pipelines collect the crude oil unloaded at the rail unloading stations; one of these pipelines is electrically heat-traced to ensure that the viscosity of the crude oil is maintained at approximately 150ºF while it is conveyed from the unloading structure.
- Three 24-inch-diameter, approximately 5,500-foot-long pipelines would connect the railcar unloading facility to the storage tanks in Area 300; one of these pipes would be electrically heat-traced to ensure that the viscosity of the crude oil requiring heating would be maintained while it is conveyed from the unloading facility to the storage area.
- One 36-inch-diameter, approximately 5,300-foot-long pipeline connects the storage tanks with the vessel loading system in Area 400.
- One 6- to 12-inch-diameter, approximately 5,300-foot-long pipeline returns crude oil from the vessel loading system back to the storage tanks; this pipeline is provided to handle loading process shutdowns and provide pressure relief and prevent pipe hammer in the pipe conveyance system.
- One 10-inch-diameter, approximately 600-foot-long pipeline delivers hydrocarbon vapor generated during loading of vessels to the MVCU (described in Section 2.2.3).

Piping is constructed to the specifications of American Standards Testing and Materials A53 or A106. Aboveground runs of piping are supported so that the bottom of the piping is a minimum of 1 foot off the ground on vertical supports located every 20 to 25 feet. The vertical supports are fixed on spread footings. Where multiple pipes are placed within the routing, pipelines are either placed side-by-side or

stacked. Expansion loops are constructed along the transfer pipeline runs to accommodate thermal expansion of the pipelines during operation. Where road or rail crossings occur and in other areas of limited space, the pipelines are located underground or raised above the ground in accordance with standard American Railway Engineering and Maintenance-of-Way Association clearances. Secondary containment with leak detection is provided for pipeline segments installed underground. Runs of aboveground pipeline are standard-walled to ensure ease of inspection and maintenance and designed in accordance with the applicable requirements of WAC 173-180-340 and 49 CFR 195.246 through 49 CFR 195.254. Transfer pipelines are cathodically protected at all underground sections to prevent corrosion.

To allow greater flexibility in operations, the transfer piping system is designed to allow crude oil being unloaded in Area 200 to be directly conveyed to Area 400, Marine Terminal, for loading onto vessels. This capability allows occasional topping off of vessel loads and may allow the Facility to begin limited operation during the construction of the Area 300 storage tanks.

The piping system and associated supports and foundations are designed to applicable seismic protection standards and are electrically grounded to protect against the buildup of static electricity during crude oil conveyance. Manual and automatic isolation valves are located on the piping system at the exit of the railcar unloading facility and at the entrance to the storage tank area.

2.2.5 Area 600 – Boiler Building

Area 600 (Boiler Building) contains a boiler building with a natural-gas boiler. The boiler is used to generate steam for heated crude unloading operations inside Area 200. Area 600 also includes an E-house and associated parking.

2.2.6 Rail Infrastructure

Three rail loops, ranging from approximately 7,700 to 8,100 feet in length, service the Area 200 unloading facility. (The three rail loops servicing Area 200 are located inside of several other loops owned and operated by the Port that are not part of the Facility.) In addition to the three rail loops servicing Area 200, the following rail infrastructure is part of the Facility.

- A connection with cross-over switches capable of departing on any of two of the departure tracks listed below.
- Two tracks located off the loop tracks (of 200- and 700-foot lengths) to serve as a temporary staging location for railcars that have deficiencies and have been removed from the unit train prior to the cars being released back to the rail carrier.

2.3 Firefighting and Safety Equipment

Firefighting equipment is installed and maintained throughout the Facility and includes automatic and engineered controls, to allow control of fires should they occur. Fire suppression equipment and systems are designed to NFPA and American Petroleum Institute (API) requirements, the more stringent Factory Mutual Global insurance requirements, and state and local regulations. Process-related buildings are fireproofed, and emergency egress is provided in accordance with applicable fire and building codes. All automatic fire suppression systems are designed to activate automatically and is equipped with manual trip stations.

Fire suppression systems, linear heat detection, manual release stations, and gas monitors are connected to local audible alarms and visual strobes located in areas 200, 300, 400, and 600. Each area has its own fire alarm system control panel that transmits to a supervising station at the E-house/control room for each area. All alarm signals will also initiate the audible and visual alarm, transmit the alarm signal to the supervising station, and shut down the transfer operation, with all crude oil transfer valves closing within 30 seconds. General firefighting features and the locations of safety equipment are depicted in the figures included in Appendix A.

3. Hours of Operation

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(3), and Ecology regulations found at WAC 173-180-420(3)(a)(iii).

The Facility operates 24 hours per day, 365 days per year.

4. Sizes, Types, and Numbers of Vessels

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(4), and Ecology regulations found at WAC 173-180-420(3)(b)(i).

The dock facility loads only one vessel at a time. A vessel with a maximum length of 899 feet and a maximum draft of 43 feet at low water can be accommodated. Descriptions of the barges and vessels that use the dock are provided in Table 2 below.

Table 2. Dimensions of Articulated Tug Barges and Tanker Vessels Anticipated to Dock at the Facility

Vessel Class	27.5 MDWT	46 MDWT	75 MDWT	115 MDWT	125 MDWT	142 MDWT	160 MDWT
Type	Articulated Tug Barges	Oil Tanker	Oil Tanker	Oil Tanker	Oil Tanker	Oil Tanker	Oil Tanker
Length overall [feet]	587.4	601.1	748.0	816.8	869.0	894.7	899.0
Length between perpendiculars [feet]	583.1	570.9	718.5	784.1	825.0	847.0	866.1
Beam [feet]	74.0	105.6	105.64	143.7	136	151.6	157.5
Moulded depth [feet]	40.0	61.7	65.0	68.9	71.5	86.3	77.8
Ballast Condition *(for upriver transit)*							
Freeboard [feet]	23.8	42.7	44.5	48.4	50.0	54.3	49.8
Draft [feet]	16.2	19.0	20.5	20.5	21.5	32.0	28.0
Displacement (MT)	17,083	23,900	35,325	50,472	47,850	76,300	78,671
Loaded Condition *(for downriver transit)*							
Freeboard [feet]	9.8	20.7	22.0	25.9	28.5	43.3	34.8
Draft [feet]	30.2	41.0	43.0	43.0	43.0	43.0	43.0
Deadweight [MT]	27,181	46,172	64,100	94,200	86,821	90,700	103,000
Displacement [MT]	32,885	56,368	77,996	112,872	111,299	122,469	125,751
Cargo capacity at max draft, including FWA (bbl)	327,000	319,925	449,772	667,777	614,337	642,428	731,513

Notes:

MT = metric ton

FWA = freshwater allowance

5. Product Information

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(5), and Ecology regulations found at WAC 173-180-420-(3)(a)(viii) – (x).

5.1 Oil Types Transferred at the Facility

The only product transferred at this facility is North American crude oil.

Material Name (Trade Name)	DOT HM Y/N	Description	UN/NA No.	DOT ER Guide No.
Crude Oil	Y	Petroleum crude oil	1267	128
Crude Oil	Y	Combustible or flammable liquids	1993	128

Crude oil appears as a clear to brown liquid, with a rotten egg, petroleum-like odor.

5.2 Handling Hazards, Instructions for Safe Handling, and Firefighting Procedures

Appendix C presents representative crude oil Material Safety Data Sheets and Emergency Response Guidebook, Guide 128, Flammable Liquids (Non-Polar/Water-Immiscible) 2012. These documents address measures for safe handling of crude oil, general measures for spill response, personal exposure to crude oil, and typical firefighting procedures for fires involving crude oil.

In addition to this oil handling manual, the Facility implements the following plans for preventing and responding to crude oil spills.

- Vancouver Energy Operations Spill Prevention, Control, and Countermeasures Plan (SPCCP)
- Vancouver Energy Operations Facility Oil Spill Contingency Plan (OSCP)

6. Transfer Staffing and Duties

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(6), and Ecology regulations found at WAC 173-180-420(3)(b)(iv).

During ship or barge transfer operations, qualified personnel from the ship or barge staff the vessel. The cargo and vapor hoses are connected under the guidance of the vessel's Bosun, Pumpman, and a Deck Officer. One Facility employee is designated as the Terminal Person-in-Charge (TPIC) of the transfer, and one vessel employee (the ship's chief officer) is designated the Vessel Person-in-Charge (VPIC). One Facility employee is designated to monitoring conditions at the storage area, Area 300, from the Area 200 control room.

6.1 Duties of the Terminal Person-in-Charge

- The TPIC is at the site of the transfer operation and is immediately available to the VPIC vessel's oil transfer personnel.
- The TPIC has a current copy of the oil handling manual in his possession and is familiar with its contents.
- The TPIC conducts all transfers in accordance with the oil handling manual.
- The TPIC completes the "Declaration of Inspection" and "Declaration of Security" prior to start of the transfer. An example Declaration of Inspection form is provided in Appendix F.

- The TPIC maintains communications with vessel personnel and other facility personnel and responds to any emergencies.
- Together with the VPIC, the TPIC conducts the Pretransfer Meeting. During this meeting, all aspects of the transfer are discussed.
- The TPIC is NOT involved with any other duties or activities not related to the transfer operation, while conducting a transfer.

6.2 Duties of the Vessel Person-in-Charge

- The VPIC conducts the deck inspection with the TPIC.
- The VPIC provides oversight of all ship personnel involved in the transfer (Bosun, Pumpman, and Deck Officer).

6.3 Duties of the Tank Farm Monitoring Personnel

- Maintains communications with the TPIC on the dock.
- From the dock control room, start or stop the flow of products as directed by the TPIC on the dock.
- Gauges tanks as required during the transfer operation.
- Assists the TPIC during emergencies.

6.4 Rail to Storage Transfer Staffing

- Staffing includes two operators per train car being unloaded (for connecting transfer hoses, opening values, etc.). With six unloading stations per track and three tracks, this equals 36 operators at the unloading stations.
- Two operators at the Area 200 control room.

6.5 Storage to Vessel Transfer Staffing

- Two operators at the Area 400 control room (to include the TPIC). The control room will always be attended during transfer and the other operator will assist in making rounds.
- Two operators at the storage area/other.
- Vessel personnel (VPIC and other vessel personnel).

6.6 Rail Direct to Vessel Transfer Staffing

- Staffing includes two operators per train car being unloaded (for connecting transfer hoses, opening values, etc.). One track with six unloading stations has the capability of direct vessel loading; therefore, this equals 12 operators at the unloading stations.
- Two operators at the Area 200 control room.
- Two operators at the dock control room (to include the TPIC). The control room will always be attended during transfer, and the other operator will assist in making rounds.

7. Procedures for Emergencies/Notification

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(7), (17)(iv), (18), and Ecology regulations found at WAC 173-180-420(3)(d)(i) and (ii).

The Qualified Individual oversees the management of the entire response, establishes the response priorities and objectives, serves as the liaison with corporate management, and works with the state and federal on-scene coordinators in Unified Command. The Qualified Individual meets the requirements of the 33 CFR 154.1026; and is an English-speaking representative of the Facility, available on a 24-hour basis, familiar with the implementation of the OSCP, and trained in the responsibilities of the Qualified Individual.

The designated Qualified Individual is a member of the Tesoro West Coast Regional Response Team or Facility manager, as yet to be determined.

Oil spill response is discussed in more detail in the OSCP and operational SPCCP provided under separate cover. Emergency response is addressed in the emergency response plan that is included as a section of the operations facility safety program, also provided under separate cover. In summary, initial spill response actions include the following.

- Make an immediate and rapid assessment to determine
  - If anyone has been injured
  - If situation poses hazards to other personnel or the public (i.e., fire, explosion, fumes, etc.)
  - Source of the spill
  - Type of material spilled and approximate size
- Take immediate steps to stop the flow.
- Ensure safety of personnel. If someone requires medical attention or there is an emergency, dial 911.
- Alert the Facility manager and other Facility personnel. The Facility manager will be the initial Incident Commander.
- Evacuate personnel as necessary.
- Shut down and control the source of the spill, if safe to do so. Assess the potential hazards for explosion and airborne toxins.
- If safe to do so, direct facility responders to shut down potential ignition sources.
- Monitor the area for potential explosion and fire hazards. If fire is present, enable fire alarm and water system.
- Ready the area for firefighting.
- Use whatever resources are available to limit the spread of the spill.
- Establish safety zone around the spill.

In the event of an oil spill or other emergency requiring environmental response, the following agencies and other personnel may be contacted.

Table 3. Emergency Notifications

(* Represents after-hours telephone numbers)

Affiliation	Phone No.
A. COMPANY PERSONNEL	
TBD	TBD
B. MANDATORY NOTIFICATIONS	
National Response Center (NRC)	(800) 424-8802*
Washington Emergency Management Division	(800) 258-5990
Port of Vancouver Security	(360) 992-1120
C. SECONDARY NOTIFICATIONS	
USCG Marine Safety Office (MSO) – Portland	(503) 240-9301*
State of Washington Energy Facility Site Evaluation Council (EFSEC)	TBD
State of Washington Department of Ecology – Southwest Office	(360) 407-6300
Oregon Emergency Response System	(800) 452-0311
Clark Regional Emergency Services Agency	(360) 737-1911
City of Vancouver	(360) 487-8600 and/or (360) 693-9302
D. NOTIFICATIONS AS APPROPRIATE	
Federal Agencies	
Environmental Protection Agency Region 10 – Seattle	(206) 553-1264*
National Ocean and Atmospheric Association Seattle (Hazmat)	(206) 526-6317 and/or (206) 526-4911
National Weather Service Portland	(503) 326-2340 and/or (503) 326-2720
Federal Bureau of Investigation, Portland, Oregon	(503) 224-4181*
U.S. Forest Service, Mountlake Terrace, Washington	(800) 627-0062

Affiliation	Phone No.
U.S. Department of the Interior, Portland, Oregon	(503) 326-2489
Tribal Nations	
TBD	TBD
State Agencies	
Washington Highway Patrol	(360) 757-1175*; (360) 753-6540 (emergency only)
Washington State Department of Fish and Wildlife (WDFW)	(800) 258-5990; (360) 534-8233 (pager); (360) 902-8124 (office)
Oregon Emergency Response System	(800) 452-0311
WDFW Oil Spill Response Team	(360) 534-8233 (pager); (360) 902-8124 (office)
Washington State Department of Natural Resources (Regional)	(360) 856-3500
Washington State Department of Parks and Recreation	(360) 755-9231
Washington State Fire Marshall	(360) 596-3900
Oregon Department of Wildlife	(503) 872-5268
Local Agencies	
Port of Vancouver	(360) 992-1120
Vancouver Public Works Operations Center	(360) 693-9302
Clark Public Utilities	(360) 992-3000
Clark County Public Works (waste water)	(360) 397-6118
Vancouver-Clark Parks and Recreation	(360) 487-8311
Clark County Public Health	(888) 727-6230
E. EMERGENCY SERVICES	
Emergency Medical and Hospitals	
Legacy Salmon Creek Hospital	(360) 487-1000
SW Washington Medical Center (Emergency Room)	(360) 514-2064
Clark County/Vancouver Emergency Services	(360) 737-1911 or 911
Clark County Public Health	(360) 397-8215
Oregon Health and Science University, Portland, Oregon	(503) 494-7686
Providence Portland Medical Center	(503) 215-1111
Legacy Good Samaritan Hospital and Medical Center, Portland, Oregon	(503) 413-7711
Fire Departments	
Vancouver Fire Department	(360) 487-7211 or 911
Clark County Fire Marshall	(360) 397-2375, Ext. 2186
Clark County Hazardous Materials	(360) 397-2375
Police Departments	
Vancouver Police Administration	(360) 487-7400 or 911
Clark County Sheriff Administration	(360) 397-2366 or 911
F. RESPONSE CONTRACTORS	
Marine Spill Response Corporation	(800) 645-7745; (360) 417-9287 (office); (206) 799-1621 (Cell)
Clean Rivers Cooperative	(503) 220-2040*
CARDNO ENTRIX, Environmental Consultants	(800) 476-5886*
Global Diving and Salvage Inc. (no contract in place)	(206) 623-0621* and/or (800) 441-3483
NRC (no contract in place)	(800) 337-7455
Harder Mechanical	(503) 281-1112

8. Duties of Watchman for Unmanned Vessels

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(8).

There will be no unmanned vessels moored at the Facility's dock. All vessels moored at the Facility must maintain surveillance of their respective vessels. All vessels provide a person who is responsible for the security of the vessel and for keeping unauthorized persons off the vessel.

9. Communication Systems

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(9), and Ecology regulations found at WAC 173-180-420(3)(a)(xi).

Voice communication between the terminal dock and the tank farm is maintained with intrinsically safe two-channel portable radios. During transfer operations, the Facility dock personnel maintain both voice and visual contact with vessel crew. The Facility lends one portable radio to vessel personnel during transfer operations. Directions for use are provided in Appendix E.

10. Personnel Shelter

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(10), and Ecology regulations found at WAC 173-180-420(3)(a)(xiv).

The Area 400 dock-side control house is available for use by Facility and vessel personnel as a shelter.

11. Drip and Discharge Collection

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(11), and Ecology regulations found at WAC 173-180-420-(3)(b)(v).

11.1 Area 200 Drip and Discharge Collection

The entire 1,850 feet of the rail unloading facility (Area 200) includes full coverage rail collection pans, and the interior ground surfaces are constructed of concrete. Thereby any releases of product are contained, as is stormwater that drips from railcars or is blown into the rail unloading facility by the wind.

Pumps used to transfer crude oil from the rail unloading facility to Area 300 storage are situated within belowgrade concrete basins. The collection piping from the rail drip pans and rail unloading facility floor drains is direct-buried that feeds to a header pipe located within the concrete secondary containment. Collection discharge pumps are co-located within the underground concrete pump basins. Water collected from within the rail unloading facility is directed to two containment tanks located in the area of the administrative/support buildings. That is then taken to approved sites for recycling/disposal.

11.2 Area 300 Drip and Discharge Collection

With the exception of one manually operated valve, the entire storage area (Area 300) is situated within bermed secondary containment. A drip pan is situated below the valve not in containment. Stormwater from the secondary containment area is discharged through an oil/water separator and carbon filtration.

11.3 Area 400 Drip and Discharge Collection

The face of the dock at the Marine Terminal (Area 400) includes a containment area for the work areas, including all flanges and transfer hose areas. The containment area is sized to contain the release of at least three 3 bbl within a curbed area.

11.4 Area 500 Drip and Discharge Collection

All flanges and aboveground valves associated with the transfer piping (Area 500) is equipped with drip pans. Underground piping is located within a concrete utilidor that provides secondary containment.

12. Emergency and Shutdown Systems

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(12), and Ecology regulations found at WAC 173-180-420(3)d(iii).

Emergency plans and procedures are described in detail in the emergency response plan that is a section of the operations facility safety program provided under separate cover. The location of the emergency and safety equipment is depicted on the figures in Appendix A.

Fire suppression systems, linear heat detection, manual release stations, and gas monitors are connected to local audible alarms and visual strobes located in areas 200, 300, 400, and 600. Each area has its own fire alarm system control panel that transmits to a supervising station at the E-house/control room for each area. **All alarm signals also initiate the audible and visual alarm, transmit the alarm signal to the supervising station, and shut down the transfer operation, with all crude oil transfer valves closing within 30 seconds.** During crude oil transfer, operators can manually stop transfers by closing either dock valve or depressing the emergency shutdown buttons located on the dock, or the operator in the control room can stop the pumps or change the valve configuration.

12.1 Area 200 – Fire/Safety Systems

The railcar unloading area is served with a foam fire extinguishing system. A closed-head foam-water pre-action sprinkler system is installed inside the rail unloading structure at the roof level, under walkways (as required by code), and in the pump basin areas. The structure is divided into five zones; each zone will be activated either manually from the foam manual release stations or automatically from the linear heat detection installed at the roof level and at the pump basin level for that associated zone. The pump basins are located in the center of each zone respectively between the tracks. Note that this system is a closed-head pre-action foam-water system; therefore, foam-water solution will only be discharged once the fire is large enough to activate the linear heat detection, trip the valve, and then activate the sprinklers above the fire. In the event of a fire, foam would be used to control and extinguish the crude oil pool fire and will also provide cooling to the railcars and any adjacent equipment or building elements.

Manual foam release stations are located at the base and at the top of the stairs of the rail unloading structure and at every egress point of the rail unloading structure.

A closed-head wet-pipe sprinkler system (water only, no foam) is provided for the fire pump/foam building in accordance with NFPA 20, Section 4.12.1.1.2. The wetpipe system contains water under pressure; therefore, when a fire starts and grows large enough to trip a sprinkler at the ceiling/room, a sprinkler or sprinklers are expected to control the fire.

Manual fire pull stations are surface mounted, and typically located within 5 feet of every egress point, near the fire alarm control panel in the rail unloading structure and at exits from the fire pump/foam buildings and E-houses. These manual pull stations, when manually activated, will send an alarm signal

to the fire alarm panel, activate the audible and visual alarms, and transmit the alarm signal to the supervising station.

The system includes linear heat detectors, gas detectors, temperature monitors, pump monitors, automatic exterior alarm horns and strobes, manual alarm stations, automatic and manual foam release systems, and tamper-resistant systems. The manual foam release stations are mounted on catwalks near stairway exit paths. All systems interface with the Area 200 control room.

Fire hydrants supplied by the City water distribution system are located on the south side of the rail unloading structure, spaced at 300-foot intervals and are accessible to fire department apparatus. The office and support buildings are equipped with ABC-type fire extinguishers.

Hydrogen sulfide (H_2S) and lower explosive limit (LEL) monitors are located at each unloading station. H_2S, LEL, and oxygen (O_2) monitors are located in each pump pit basin. The high and low alarm set-points for the gas detector system are as follows.

Gas Detector	Low Alarm	High Alarm
H_2S	10 ppm	15 ppm
LEL	10% LEL	30% LEL
O_2	19%	24%

Eyewash and emergency shower stations are located near the pump pits and in the control room.

12.2 Area 300 – Fire/Safety Systems

Area 300 (Storage Area) contains six crude oil aboveground storage tanks. Area 300 also has a fire pump/foam building, storage building, E-house, and pump basin. All tanks are located inside a perimeter dike capable of containing 110 percent of the volume of the largest tank plus precipitation from a 24-hour, 100-year storm event. The tanks are positioned so that the distance between each tank is at least 120 feet in all directions. The distance from the tank to the dike varies from 33 to 150 feet.

An automatic fixed foam system is provided for each storage tank to protect the seal area of the internal floating roof. This system will be activated by the linear heat detection system installed at the foam dam of the floating roof or by the manual foam release stations associated with each respective tank. These automatic fixed foam systems are specifically designed to control a potential fire inside a tank. The linear heat detection cable located around the foam dam is connected to the fire alarm system.

Manual foam release stations are located at the base of the stairs on the tanks, at the top of the dike near the closest fire hydrant for each tank, and on a bank of release stations located at the foam/pump house.

The fire pump/foam building is equipped with a closed-head wet-pipe sprinkler system (water only, no foam) in accordance with NFPA 20. The wetpipe system contains water under pressure; therefore, if a fire starts and grows large enough to trip a sprinkler at the ceiling/room, a sprinkler or sprinklers are expected to control the fire.

Manual fire pull stations are surface mounted and typically located at every exit from the fire pump/foam buildings and E-houses within Area 300. These manual pull stations, when manually activated, will send an alarm signal to the fire alarm panel, activate the audible and visual alarms, and transmit the alarm signal to the supervising station.

Fire hydrants for fire department use are located around the perimeter of Area 300, spaced at 300-foot intervals. Two fire hydrants are located inside the dike area near the intersection of the intermediate dikes. These fire hydrants include a monitor nozzle that can be used to cool the tanks, reduce potential fire exposure, and apply the self-healing biodegradable foam.

Each fire hydrant is equipped with a monitor nozzle and foam eductor and pick-up line that can be placed in a bucket, pail, or other portable device of foam concentrate, which will draw foam concentrate from the pail/container to generate a foam solution. The flow of water from these monitor nozzles are provided to create a cooling effect on the tank wall. The foam eductor provided on each monitor nozzles will allow the fire hydrant to spray a foam water solution and control a small pool fire within the dike area. A predetermined size of foam concentrate will be kept in the fire pump/foam building. When the need arises for its use, such as a small spill or rubbish fire, the foam concentrate will be taken to the appropriate fire hydrant and the hose will be placed in the bucket, pail, or other portable device. The nozzle will draw the foam in at the manufacturer-determined proportioning rate to achieve the desired concentration of foam/water solution.

Additionally, an elevated monitor nozzle supplied with foam-water from the fire pump/foam building is located near the crude oil pump basin with the primary purpose of providing manual fire suppression to the pump basin. This monitor nozzle for the crude oil pump basin is capable of providing a 3 percent foam application to the pump basin area. Using a flow rate of 750 gallons per minute will provide coverage of the crude oil pump basin.

Hydrogen sulfide (H_2S), LEL, and O_2 monitors are located in the pump basin. The high and low alarm set-points for the gas detector system are as follows.

Gas Detector	Low Alarm	High Alarm
H_2S	10 ppm	15 ppm
LEL	10% LEL	30% LEL
O_2	19%	24%

Eyewash and emergency shower stations are located in the storage building and on the north side of the E-house.

12.3 Area 400 – Fire/Safety Systems

Two elevated fire monitors are installed at the marine loading dock. The monitor nozzles are supplied from a pre-action foam system located in the fire pump/foam building. Activation of the foam-water monitor nozzles is by manual foam release stations located in the E-house and throughout Area 400. The controller for the nozzles will be located in the E-house located shoreside. A fire hydrant is provided for fire department use near Area 400, supplied by the City water distribution system. This system is primarily for fires on the berth, but can be used to assist in the event of a vessel fire. Manual foam release stations are located at the loading berth.

The fire pump/foam building is equipped with a closed-head wet-pipe sprinkler system (water only, no foam) in accordance with NFPA 20. The wetpipe system contains water under pressure; therefore, if a fire starts and grows large enough to trip a sprinkler at the ceiling/room, a sprinkler or sprinklers are expected to control the fire.

Manual fire pull stations are surface mounted and typically located at every exit from the fire pump/foam buildings and E-houses for Area 400. These manual pull stations, when manually activated, will send an alarm signal to the fire alarm panel, activate the audible and visual alarms, and transmit the alarm signal to the supervising station.

International hose connections are located on the dock for vessel fire water. Vessels berthing at the Marine Terminal are required to have onboard fire protection systems, as well as contracts with commercial marine firefighting companies, to respond in the event of a shipboard fire.

Eyewash and emergency shower stations are located on the east and west sides of Berth 13.

12.4 Area 500 – Fire/Safety Systems

The pipeline area (Area 500) is served by previously existing and new (as constructed to serve specific Facility areas) fire hydrants in the vicinity of the pipeline alignment.

12.5 Area 600 – Fire/Safety Systems

Area 600 (West Boiler) contains a boiler building with a natural-gas boiler. The boiler building and surrounding area are served by adjacent fire hydrants. Smoke detectors, automatic and manual alarms, and hand-held fire extinguishers are located as appropriate inside and outside the boiler building as required by local fire code.

Eyewash and emergency shower stations are located along the east, south, and west walls of the boiler building.

12.6 Rail Infrastructure – Fire/Safety Systems

The rail infrastructure operated by the Facility is served by fire hydrants in the vicinity of the rail loop alignment. An overpass exists over the rail line on the east side of the rail loop; emergency services could use this overpass to access the interior of the rail loop.

13. Monitoring Devices

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(13), and Ecology regulations found at WAC 173-180-420(3)(a)(xii)(D).

The pressure, valve positions, volumetric flow rate, tank levels, and total volume transferred are monitored at every transfer from the Area 200 and/or Area 400 control rooms. During crude deliveries, flow is monitored using ultrasonic flow meters as it comes in from railcars and is delivered to storage tanks, and any flow discrepancies trigger an alarm and automated valves close. The pumping stations associated with the transfer also monitor crude oil density and contaminants (sediment and water), and collect regular samples for analysis.

When filling vessels, flow is monitored using ultrasonic flow meters as it is pumped from storage and when it is discharged to the vessel, and any flow discrepancies trigger an alarm and automated valves close.

14. Oil Spill Containment Equipment

This section complies with USCG regulations found at 33 CFR Section 154.310 (a)(14), and Ecology regulations found at WAC 173-180-420(3)(d)(iv).

The Facility maintains the following oil spill response equipment at the dock. The Facility is a member of Clean Rivers Co-op. As a Co-op member, a response contract is in place with Marine Spill Response Corporation (MSRC). In addition to the equipment listed below (Table 4), the Co-op's spill response equipment is available to the Facility within 2 hours of a spill and will be operated by their personnel. An inventory of equipment available from the Co-op is included in Appendix D. Instructions are found in Appendix E.

Table 4. On-Site Oil Spill Response Equipment

Item	Access Time	Location
1,600' of 18" Fence Boom	Immediate	VE Dock
1,000' 12" x 6" Containment Boom w/36" Floats	Immediate	VE Dock
2,000' 12" x 6" Containment Boom w/72" Floats	Immediate	VE Dock
1 - 20' ISO Storage Container	Immediate	VE Dock
3 - 12' x 30' Chafing Cloth	Immediate	VE Dock
2 - NOFI "Current Buster 2" High Speed Recovery System	Immediate	VE Dock
2 - Containerized Hydraulic Reels	Immediate	VE Dock
2 – 10-horse power Hydraulic Power Packs	Immediate	VE Dock
4 - High-Capacity Backpack Blowers	Immediate	VE Dock
2 - C-Disk 13/30 Coated Disc Skimmer Systems	Immediate	VE Dock
2 - 10,000-lb Flatbed Trailer w/Ramps	Immediate	VE Dock
1 - 18' Response Boat	Within 15 minutes	Tesoro Terminal Dock
2,800' of 20" Harbor Boom	Within 15 minutes	Tesoro Terminal Dock
8" x 12" Kepner Sea Boom	Within 15 minutes	Tesoro Terminal Dock

Note: Instructions for use of all equipment listed above is contained in Appendix E.

15. Fire Extinguishers

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(15), and Ecology regulations found at WAC 173-180-420(3)(d)(v).

15.1 Fire Extinguisher Location

Portable fire extinguishers are located as depicted in the figures in Appendix A. All extinguishers are dry chemical ABC-type; some hand-held and others on wheels. The number and type of portable extinguishers are based on the requirements of NFPA 10, OSHA Subpart L, Section 1910.157, WAC 296-24-592, and local codes.

15.2 Fire Extinguisher Instructions for Use

Portable fire extinguishers are operated as follows.

1. Positioning 8 to 10 feet from the blaze
2. Holding the unit upright and pulling the pin
3. Squeezing the lever while aimed at base of flame, and sweeping the foam spray from side to side
4. Advancing toward flames over the area that has been extinguished, while maintaining 8- to 10-foot distance

16. Maximum Allowable Working Pressure and Relief Valves

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(16), and Ecology regulations found at WAC 173-180-420(3)(a)(xv).

The maximum allowable working pressure for the loading hoses is as follows.

- Loading hoses (open to vessel) – 50 psi

For transferring product from the rail unloading area, a predetermined pipeline connection (PLC) setpoint from a pressure transmitter signal will automatically power off the facility pump at approximately 100 psi. The pressure transmitter is located on the 10-inch pump discharge pipeline at the pump basin. In addition to the pump shutdown, the system has a pressure relief valve downstream of each pump that will recirculate the crude in the event that the pump discharge piping is blocked and the pressure transmitter fails. This pressure relief valve is set at approximately 110 psi. The system also has thermal pressure relief valves relieving thermal expansion in blocked portions of the piping between the rail unloading area (Area 200) and the storage area (Area 300). These valves are set at varying pressures depending on their location in the piping system.

For transferring product from the storage area (Area 300) to the marine terminal area (Area 400), a predetermined PLC setpoint from a pressure transmitter signal will automatically power off the facility pump at approximately 100 psi. The pressure transmitter is located on the 36-inch pump discharge pipeline at the pump basin. In addition to the pump shutdown, the system has a pressure relief valve on the pump discharge header that will recirculate the crude in the event that the pump discharge piping is blocked and the pressure transmitter fails. This pressure relief valve is set at approximately 110 psi. The system also has thermal pressure relief valves relieving thermal expansion in blocked portions of the piping between the storage area (Area 300) and the marine terminal area (Area 400). These valves are set at varying pressures depending on their location in the piping system.

17. Transferring Procedures

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(17)(i) and (ii), and Ecology regulations found at WAC 173-180-420(3)(a)(xii)(A) and (B) and 173-180-420(3)(b)(ii) and (iii).

There are no loading arms located at the Facility dock. Transfers are from manifold to vessel via two-hose connections.

17.1 Transfer to Vessel

1. Only a single vessel is docked at a time.
2. Only a single vessel is loaded at a time.
3. Once a vessel is all fast and secured in place at a dock and the tugs are released, the dock shore gangway is then lowered to the deck to permit safe access for people to cross back and forth. After the gangway is on and the vessel is “all fast,” the full wrap boom is put around the vessel to contain any potential for oil spill. Once the boom is in place, the TPIC comes aboard the vessel and conducts a safety inspection with the ship’s Chief Officer VPIC. During the deck inspection, the cargo and vapor hoses are connected under the guidance of the vessel’s Bosun, Pumpman, or Deck Officer. After completion of cargo and vapor hose connection, the TPIC and VPIC conduct the Pretransfer Meeting (key meeting). During this meeting, all aspects of the cargo transfer are discussed, such as starting; coming up to rate; topping off; completion of loading; and any safety security concerns, including signals for shutdowns should the primary, secondary, and tertiary means of communication fail. An oil transfer load plan is completed, an example of which is provided in Appendix I.
4. The vessel is pre-boomed, following procedures in Appendix M.
5. The Facility is designed to load the ships using positive displacement pumps on a variable frequency drive, thus allowing adjustment of loading flow rate by increasing or decreasing the speed/flow rate of the pumps as needed. The pumps are also staged so they can be turned off and on in multiple configurations to ensure optimal loading feed to the vessels. Different vessels have different loading configurations. For example, a 46-DWT vessel calling to the Facility might have a header sized at 12 to 24 inches with the dimension of the header dictating the rate at which the vessel can be loaded. As a rule of thumb, vessels start loading at 10 to 25 percent of their maximum rate of fill. The top-off rate also depends on the vessel size and the amount of cargo it will carry. If a vessel is filling to less than 90 percent total cargo volume (as would be the case with some of the proposed larger vessels), the ship may be filled at full or near full rates to the very end. If the ship is filled to 95 to 98 percent of its rated capacity towards the end of the loading cycle, the fill rate is slowed down to the 10 to 25 percent.

17.2 Transfer from Railcar

The Facility receives crude oil by rail with offloading from tracks located at the Port's Terminal 5. There is one unloading header at each railcar position. The pumps are located between the unloading rails. Each railcar position is protected by a spill containment system.

During railcar unloading, the following procedures are followed.

17.2.1 Railcar Spotting and Bottom Hook-Up

1. The operators ensure that they have the necessary tools/equipment to accomplish this task. They work in teams of one on the ground and one on the mobile platform.
2. The operators don the required personal protective equipment.
3. Prior to starting the transfer, the operator initiates radio communication with team or other authorized personnel to perform a radio check.
4. Railcars are spotted on each of six unloading station.
5. The operator uses the set of railcar chocks, by resting each individual chock on top of the rail on opposite sides of the railcar's wheel; a wheel chock will be placed on the front and rear railcar of each string of railcars. This process is undertaken to prevent any accidental movement during the transfer process.
6. The operator sets the railcar's handbrake by turning the wheel in a clockwise motion; the brake is fully applied when you can no longer turn it. The front and rear railcars for the string of spotted cars will have handbrakes set. The handbrake is located on the railcar's B-end.
7. An operator qualified to do railcar inspections performs a general inspection of the railcar ensuring that it is in good operating condition and provides for a safe work environment.
8. The operator checks the surrounding area for slip or trip hazards, removing any hazards where possible and/or be warned that a hazard exists and to be cautious when working in that specific area.
9. An operator will place a containment pan (unloading fitting will be in the pan) under each railcar.
10. The operator uses the pipe wrench to remove the cap/plug from the railcar's bottom oil valve (BOV).
11. The operator attaches and secures the railcar's appropriate BOV fitting to the railcar's BOV.
12. The operator connects and secures the product hose to the recently installed 90 degree fitting.
13. At this time, the hose may need to be raised and tied off with a rope or strap to ensure the OPW valve and the 90 degree fitting are not sagging, which may create leakage of product.
14. At this time, the operator grasps the ball handle on the hose valve and pushes it down into the locked open position then checks for leaks.
15. Once fitting and hose are properly hooked up and secured, the BOV on the railcar is opened.
16. The operator verifies the product hose is charged to the site glass and not leaking.

17.2.2 Platform Operation and Hook-Up

1. The operator uses 4-point contact to climb the steps on the mobile platform to access the top of the railcar. Once the mobile platform is aligned, the walkway (ramp) is lowered with safety rail completely encompassing the platform area approximately 6 inches above the height of the railing of the platform.
2. The operator on the mobile platform works from side to side moving to the north, hooking up vent hoses/vacuum breakers.
3. The operator inspects the man-way bolts using a wrench to tap each bolt. All bolts must be tool tight, any bolt that moves is not tool tight and will be tightened before moving on.
4. The operator opens the dome cover lid to inspect for loose bolts on the flanges.
5. The operator ensures the vapor and liquid valves are closed, capped, and tool tight and there is no leakage or product loss.
6. The operator inspects the pressure relief device for visible damage, leakage, or product loss.
7. The operator lowers the rope to the operator on the ground to retrieve the vapor hose and pulls the hose up.
8. The operator removes the cap from the vapor valve on the tank car and attaches the vapor hose/vacuum breaker to the tank using a cam lock fitting.
9. The operator then opens the ball valve on the vapor hose (if hose is allocated) by moving the handle to the inline position.
10. The operator then opens the ball valve on the tank car vapor valve by moving the handle to the inline position, being careful to allow the railcar's internal pressure to be relieved.

11. Before leaving the tank car platform, the operator gathers tools and visually inspects that both the vapor valve on the tank car and the vapor recovery hose valve are open, then verbally acknowledging this by saying, “open, open” to the operator on the ground who will open the main product and vapor valve for that station while checking for leaks.

17.2.3 Initiating the Transfer and Transfer in Progress

1. Once a set of railcars has been hooked up for unloading, the drip pans are in place, the vent fittings and/or vent hoses are hooked up, the railcar BOVs have been opened, and all personnel are clear at both the top and bottom of the railcars, the operator on the ground checks with the operator in the control room via radio and then opens the product and vapor valves at each unloading station.
2. After the railcars are hooked up at each unloading station, an operator in the control room starts the pumps. Once the pumps are started, the operators check for leaks and any abnormalities. If leaks are detected, the BOVs are immediately closed and appropriate steps taken to stop the leak.
3. An operator continually monitors the product flowing into the manifold by observing the sight glass in the VISI FLOW fitting. In addition, the operators continue to check for leaks and any abnormalities on the entire terminal at a minimum of every 30 minutes.

17.3 Completion of Pumping

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(17)(iii), and Ecology regulations found at 173-180-420(3)(a)(xii)(C).

Crude oil is transferred at the terminal by two different methods.

1. Articulated tub barge (ATB) or ship (dispense).
2. Railcar (receive only).

Completion of pumping procedures is described for each of these methods below.

17.3.1 Transfer to Vessel

1. Upon completion of product transfer, the terminal dock operator assists ATB or vessel personnel in draining the hose, disconnecting the hose, and capping the end of the hose prior to the hose being passed over water for storage.
2. The vessel manifolds are fully blanked and secured.
3. The terminal dock operator closes all valves and secures each with a chain and lock.
4. The containment boom around the vessel is removed and the second mate tests gear, the engines are tested ahead and astern, and the steering gear is tested as are communications and alarms.
5. Upon completion of the transfer, the vessel is gauged by an independent third-party cargo surveyor, and cargo quantities are reviewed, confirmed, and documented.

17.3.2 Transfer from Railcar

1. The supervisor notifies other crew members that pumps are down and teardown can begin.
2. Once the product quits flowing through the VISI FLOW sight glass, the operator closes the BOV on the railcar and allows and residual product to finish draining from the hose.
3. The operator then closes the main (API) valve on the product hose.
4. Once both valves are closed, the hose is disconnected from the 90 degree fitting and placed on the containment pan after the end of the valve is wiped off with an absorbent wipe.
5. The 90 degree fitting is disconnected from the railcar and a 4-inch plug inserted. The cam lock levers are locked down and the fitting is placed in the containment pan. The end of the 90 degree fitting that the valve was once hooked to is wiped off with an absorbent wipe.
6. The product hose (the end with the API valve on it) is returned back to its holder by snapping it in place.
7. The main product valve and main vapor recovery valve are closed.
8. The containment pan is pulled out from under the railcar, and it is placed beside the main product valve at that station.

18. Procedures for Spill Reporting and Initial Containment

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(18), and Ecology regulations found at WAC 173-180-420(3)(d)(i).

Refer to Section 7 for reporting information. As previously stated, emergency response is addressed in the emergency response plan that is included as a section of the operations facility safety program, provided under separate cover.

In the event of an oil spill, all operations are shut down immediately using emergency shutdown buttons (see Section 12), and the TPIC shall secure the source of the discharge as soon as it is safe to do so. A Qualified Individual is immediately notified. The Qualified Individual notifies appropriate agencies as described in Section 7. The first responder is prepared to relay information regarding the source, estimated size, crude oil released, location, and other pertinent information available or requested. The Qualified Individual may request assistance from the Oil Spill Response Organization (Clean Rivers) or, under certain situations, may seek assistance from contractors directly (MSRC).

After the source of the discharge has been secured, the TPIC, along with Facility personnel, deploys the containment boom located in Area 400 in accordance with the Facility booming strategy. After the boom is deployed, Facility personnel will take any other measures necessary to contain and begin cleanup of the discharge until Clean Rivers arrives and takes over the cleanup operations, if it is safe to do so.

Transfer operations are not resumed until the system has been inspected and repaired, and the TPIC as well as the Captain of the Port have deemed the system fit for continued operations.

19. Federal, State, and Local Laws and Regulations

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(19), and Ecology regulations found at WAC 173-180-420(3)(a)(iv), and State of Oregon Law, Chapter 340, Division 47.

19.1 Federal Law

Federal law requires the immediate reporting of all spills of oil and hazardous substances to the water. The Federal Water Pollution Control Act amendments of 1972 made it unlawful to discharge oil “into or upon the navigable waters of the United States, adjoining shorelines, or into or upon waters of contiguous zone,” [22 USC 1321 (b)(3)]. Immediate reporting of such discharges is required by both the USCG and EPA. The responsibility is established in National Oil and Hazardous Substances Contingency Plan, 40 CFR 154.1036(b)(1) and (2). Spills on inland waters are the responsibility of the EPA, while the USCG has jurisdiction for coastal waters, ports, and harbors.

19.2 State of Washington Law

State of Washington Law Revised Code of Washington (RCW) 90.48 (Water Pollution Control) defines state laws regarding water pollution. RCW 90.56 provides statutory authority for developing regulations more specific for an oil handling facility’s operations. The following applicable WACs are authorized by RCW 90.56.

- WAC 173-180
- Part A General Requirements
- Part B Oil Transfer Requirements
- Part C Design Standards for Class I Facilities
- Part D Operations Manual Requirements for Class I and Class 2 Facilities
- Part E Training and Certification for Class I and Class 2 Facilities
- Part F Prevention Plans for Class 1 Facilities

Note that prevention plans prepared according to Part F requirements are often made to also comply with Federal SPCCP requirements found at 40 CFR 112. Additionally, WAC 173-182 includes regulations and response criteria for Facility OSCP, and is inclusive of requirements under the federal Facility Response Plan (40 CFR 112).

19.3 State of Oregon Law

Chapter 340 Division 47 Regulations Pertaining to Oil Spills into Public Waters defines state laws regarding water pollution. This chapter provides statutory authority for developing regulations more specific for an oil handling facility's operations. The following are applicable for oil spills that may affect Oregon waters.

- Chapter 340 Division 47
- 340-047-0015 Notice, Control and Cleanup of Oil Spills Required
- 340-047-0020 Approval Required For Use of Chemicals
- 340-047-0025 Approval Required For Disposal of Spilled Oils

20. Shielding Portable Lighting Procedures

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(20), and Ecology regulations found at WAC 173-180-420(3)(b)(vi).

No portable lighting is used at the Facility. The Facility has adequate fixed lighting to provide safe operations during dark hours.

21. Terminal Training and Qualification Program

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(21), and Ecology regulations found at WAC 173-180-510.

1. The Facility has developed and implemented oil transfer training for key supervisory, operations, maintenance, management, and indirect operations personnel identified pursuant to Subsection (3) of WAC 173-180-510.

    (a) The Facility has designed a training program, to the maximum extent practicable, to promote job competency and environmental awareness for the purpose of preventing oil spills.

2. Oil transfer training programs are approved by Ecology under WAC 173-180-525.
3. The Facility has identified, in writing, the specific position titles that the Facility has identified to be subject to its oil transfer training requirements. In making this determination, the Facility has evaluated the functions of Facility personnel positions using the following definitions.

    (a) "Key" means a position with direct responsibility for performing or overseeing the transfer, storage, handling, or monitoring of oil at a facility, or a job function, where typical human factors present the probability of a spill occurring.

    (b) "Operations" means direct involvement in the transfer, storage, handling, or monitoring of oil at a facility in a capacity that involves the risk of an oil spill to waters of the state. This functional group includes, but is not limited to, the person-in-charge, storage tank operators, pipeline operators, and oil transfer monitors.

    (c) "Supervisory" means involvement in directly supervising the transfer, storage, handling, or monitoring of oil at a facility by implementing operations policies and procedures that involve the risk of an oil spill to waters of the state.

    (d) "Maintenance" means direct involvement in maintaining and repairing the equipment used for the transfer, storage, handling, or monitoring of oil at a facility in a capacity that involves the risk of an oil spill to waters of the state.

(e) "Indirect operations" means involvement in on-site activities, such as new construction, in a capacity that indirectly involves the risk of an oil spill to waters of the state due to potential impacts to nearby oil handling operations (e.g., operating digging equipment next to an active transfer pipeline). For cases where certain job titles associated with indirect operations cannot be identified in advance, the Facility must identify the types of job orders or work sites that may involve the need for indirect operations oil transfer training.

4. The Facility has identified, in writing, the specific initial classroom and/or on-the-job oil transfer training requirements for each position, including minimum hours that are appropriate for each position given the facility's training needs and human factor risks. For the purposes of this section, "human factors" means human conditions, such as inadequate knowledge or fatigue, which can lead to incompetency or poor judgment, and "human factor risks" means risks of causing an oil spill due to the effects of human factors on competency and judgment.
5. Operations and supervisory personnel training. Requirements for training of operations and supervisory personnel focus on building personnel competency in operating procedures and spill prevention systems specific to the Facility. Oil transfer training requirements incorporate the following training topics at a minimum.

   (a) Overview of all oil handling, transfer, storage, and monitoring/leak detection operations at the Facility;

   (b) Operating procedures and checklists specific to trainee's job function;

   (c) Problem assessment, including recognition of human factor risks and how they can be minimized;

   (d) Awareness of preventative maintenance procedures;

   (e) Awareness of local environmental sensitivity and oil spill impacts;

   (f) Major components of Facility's oil spill prevention plan;

   (g) Major components of Facility's operations manual;

   (h) Major components of Facility's OSCP;

   (i) Safe use and handling of response equipment, including, but not limited to, containment, personal protection, and recovery equipment;

   (j) Decision-making for abnormal operating events and emergencies, including emergency spill prevention and safe shutdown conditions, responsibilities, and procedures;

   (k) Routine and emergency communications procedures;

   (l) Overview of applicable oil spill prevention and response laws and regulations; and

   (m) Drug and alcohol use awareness, pursuant to WAC 173-180-630.
6. Management personnel training: Requirements for initial oil transfer training of management personnel incorporate the following training topics at a minimum.

   (a) Overview of all oil handling, transfer, storage, and monitoring/leak detection operations at the Facility;

   (b) Management role in operations and oil spill prevention;

   (c) Recognition of human factor risks and how they can be minimized;

   (d) Awareness of local environmental sensitivity and oil spill impacts;

   (e) Major components of Facility's oil spill prevention plan;

   (f) Major components of Facility's operations manual;

   (g) Major components of Facility's OSCP;

   (h) Decision-making for abnormal operating events and emergencies, including emergency spill prevention and safe shutdown conditions, responsibilities, and procedures;

   (i) Overview of applicable oil spill prevention and response laws and regulations; and

   (j) Drug and alcohol use awareness, pursuant to WAC 173-180-630.

7. Maintenance personnel training: Requirements for initial oil transfer training of maintenance personnel incorporate the following training topics at a minimum.

   (a) Overview of all oil handling, transfer, storage, and monitoring/leak detection operations at applicable maintenance work sites within the Facility;

   (b) Equipment problem assessment and preventative maintenance procedures;

   (c) Awareness of local environmental sensitivity and oil spill impacts;

   (d) Major components of Facility's oil spill prevention plan;

   (e) Major components of Facility's operations manual;

   (f) Major components of Facility's OSCP;

   (g) Emergency spill prevention and safe shutdown conditions, responsibilities, and procedures;

   (h) Overview of applicable oil spill prevention and response laws and regulations; and

   (i) Drug and alcohol use awareness, pursuant to WAC 173-180-630.

8. Indirect operations personnel training: Requirements for initial oil transfer training of indirect operations personnel incorporate the following training topics at a minimum.

   (a) Overview of oil handling, transfer, storage, and monitoring/leak detection operations at specific indirect operations work site within the Facility;

   (b) Awareness of local environmental sensitivity and oil spill impacts;

   (c) Notification procedures for emergency spill prevention actions; and

   (d) For Facility employees, drug and alcohol use awareness, pursuant to WAC 173-180-630.

9. Training topics identified in subsections (5) through (8) of this section, do not prescribe fixed subject titles for class outlines or training organization. Facility may combine or integrate these topics as appropriate and check that information on each topic is presented in the applicable personnel training program.
10. Facility identifies, in writing, the specific oil spill prevention continuing education requirements for each affected position, including minimum hours, which are appropriate given the Facility's training needs and human factor risks. Ongoing training occurs at least annually, and at a minimum addresses

    (a) Any changes in the core topics identified in subsections (5) through (8) of this section, unless affected personnel have already been informed about the change after its occurrence;

    (b) Refresher awareness training on environmental sensitivity and oil spill impacts;

    (c) Review and analysis of oil spills that have occurred during the past year;

    (d) Refresher training on emergency spill prevention procedures; and

    (e) For key supervisory, operations, and management personnel, a practice exercise of the Facility's procedures for preventing a spill during a particular abnormal operations event.

11. Existing personnel that have entered their current position prior to adoption of this chapter are regarded as having met the Facility's initial oil transfer training requirements if

    (a) Facility has documented that those personnel have received the required training in the past; or

    (b) Facility attests in writing and in detail, how those personnel have had on-the-job training or other experience equivalent to the Facility's initial training requirements, including type and frequency of past training when known.

12. Facility develops follow-up remedial training for personnel clearly responsible for causing an oil spill while functioning in their position, unless such personnel no longer occupy a position identified under subsection (3) of this section.
13. Contractors hired by the Facility to perform key supervisory, operations, maintenance, management, or indirect operations functions, as identified by the Facility under subsection (3) of this section, are considered "personnel"

for the purposes of this chapter and are subject to the same oil transfer training requirements as Facility employees. The Facility is responsible to validate that such contractors have met the Facility's oil transfer training requirements before they perform a key supervisory, operations, maintenance, management, or indirect operations function.

14. Facility has developed minimum training and/or experience qualifications for trainers who will demonstrate Facility-specific procedures, equipment use, supervise practice sessions, and provide other on-the-job training to new operations personnel.
15. Facility has developed and maintains written oil transfer training materials, such as training manuals or checklists.
16. Oil transfer training is documented, and records are kept at the Facility in a central and accessible location for at least five years from the date of training completion.

22. Hose Marking

This section complies with USCG regulations found at 33 CFR Section 154.310(a)(22).

The Facility only transfers crude oil; therefore, there is no need to have hoses for different products marked.

23. Tank Cleaning Operations and Recordkeeping Procedures

This section complies with USCG regulations found at 33 CFR Section 154.310 (a)(23).

Examples of recordkeeping and inspection forms for the Facility and dock are presented in Appendix G. Periodically, tanks located at the Facility will be cleaned for routine maintenance and inspection (such as API 653 inspection). Cleaning and inspection are performed by a contractor. Tank cleaning and recordkeeping is done in compliance with Washington Solid and Dangerous Waste Regulations.

24. Inspection and Maintenance Schedules

This section complies with Ecology regulations found at WAC 173-180-420(3)(a)(vii).

Bulk storage tanks are inspected every 10 years according to API 653 protocol. Daily, weekly, monthly, and annual inspection and maintenance routines for other equipment is presented in Appendix H.

25. Recordkeeping

This section complies with Ecology regulations found at WAC 173-180-420(3)(a)(v) and 173-180-040. Appendices F, G, and J supplement this section.

Records required by WAC 173-180 will be maintained and available to Ecology for a minimum of three years, except for the following.

1. Preload plans and declaration of inspection forms are kept for at least 30 days from date of the oil transfer operation.
2. The design, construction, and repair records for storage tanks, pipelines, and all oil transfer equipment testing and repair records are kept for the life of the equipment. Inspection, maintenance, and repair records for pumps, valves, manifolds, and other ancillary equipment used in oil transfers are kept for 10 years.
3. Oil transfer personnel training and certification records are kept for five years from the date the persons were certified.
4. All records required in this chapter are available to Ecology for photocopying upon request.

26. Work Hours

This section complies with Ecology regulations found at WAC 173-180-055.

Personnel with oil transfer duties do not work more than 16 hours in any 24-hour period, no more than 40 hours in any 72-hour period, except in an emergency or spill response operation. “Emergency” means an unforeseen situation that poses an imminent threat to human safety, or the environment, or substantial loss of property. The terminal maintains records (e.g., maintenance records and/or payroll records) demonstrating compliance with work hour restrictions.

27. Operations Manual Review and Approval

This section complies with Ecology regulations found at WAC 173-180-430.

1. Upon receipt of an operations manual, EFSEC (with the assistance of Ecology) determines whether the operations manual is complete. If the agencies determine that an operations manual is incomplete, they will notify the Facility of the deficiencies.
2. When reviewing operations manuals, the agencies consider the following.

    (a) The ability of the operations manual to provide best achievable protection from damages caused by the discharge of oil into waters of the state;

    (b) The volume and type of oil(s) addressed by the Facility’s operations manual;

    (c) The history and circumstances of prior spills by similar types of facilities, including spills reported to the state and federal government in Washington State;

    (d) Inspection reports;

    (e) The presence of operating hazards;

    (f) Sensitivity and value of natural resources within the geographic area covered by the operations manual; and

    (g) Any pertinent local, state, and federal agency and public comments received on the operations manual.

3. The agencies endeavor to notify the Facility owner or operator within five working days after completing the review whether Ecology approves the operations manual.
4. If the operations manual receives approval, the agencies send the Class 1 facility owner or operator an approval letter describing the terms of approval, including an expiration date (Class 1 facility is defined in RCW 90.56.010, as any structure, group of structures, equipment, pipeline, or device, other than a vessel, located on or near the navigable waters of the state that transfers oil in bulk to or from a tank vessel or pipeline, that is used for producing, storing, handling, transferring, processing, or transporting oil in bulk).
5. Conditional approval as follows.

    (a) The agencies may approve an operations manual conditionally by requiring a facility owner or operator to operate with specific precautionary measures until acceptable components of the operations manual are resubmitted and approved by the agencies.

    (b) Precautionary measures may include, but are not limited to,

        (1) Reducing oil transfer rates;
        (2) Increasing personnel levels;
        (3) Restricting operations to daylight hours; or
        (4) Additional requirements to ensure availability to response equipment.

6. After receiving notification of conditional status from the agencies, a Class 1 facility submits and implements required changes to the agencies within 30 calendar days. The agencies may issue an extension at Ecology's discretion. Operations manual holders who fail to meet conditional requirements or provide required changes in the time allowed will lose conditional approval status.
7. If the operations manual approval is denied, the agencies must send an explanation of the factors for disapproval and a list of deficiencies to the Class 1 facility owner or operator.

(a) The owner or operator of the facility resubmits the operations manual within 90 calendar days of notification of reasons for noncompliance, responding to the reasons and incorporating any suggested modifications.

(b) The Facility does not continue oil storage, transfer, production, or other operations until the agencies approve an operations manual for that facility.

8. Approval of a manual by the agencies does not constitute an express assurance regarding the adequacy of the operations manual nor constitute a defense to liability imposed under state law.
9. A facility conducts operations if the Facility properly submitted an operations manual to the agencies, and they have not provided the Facility with a formal response.

28. List of Acronyms and Abbreviations

API: American Petroleum Institute

ATB: articulated tub barge

bbl: oil barrel and barrels

BOV: bottom oil valve

CFR: Code of Federal Regulations

City: City of Vancouver

Company: Tesoro Savage Petroleum Terminal LLC

DWT: deadweight tonnage

Ecology: Washington State Department of Ecology

EFSEC: Energy Facility Site Evaluation Council

E-house: electrical house

EPA: U.S. Environmental Protection Agency

Facility: Vancouver Energy

H_2S: hydrogen sulfide

LEL: lower explosive limit

MSRC: Marine Spill Response Corporation

MT: metric ton

MVCU: marine vapor combustion unit

NFPA: National Fire Protection Association

NRC: National Response Center

O_2: oxygen

OSCP: Operations Spill Contingency Plan

PLC: predetermined pipeline connection

Port: Port of Vancouver USA

RCW: Revised Code of Washington

SPCCP: Spill Pollution, Control, and Countermeasures Plan

TPIC: Terminal Person-in-Charge

USCG: U.S. Coast Guard

VPIC: Vessel Person-in-Charge

WAC: Washington Administrative Code

WDFW: Washington Department of Fish and Wildlife

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Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix A
Facility and Dock Plot Plans

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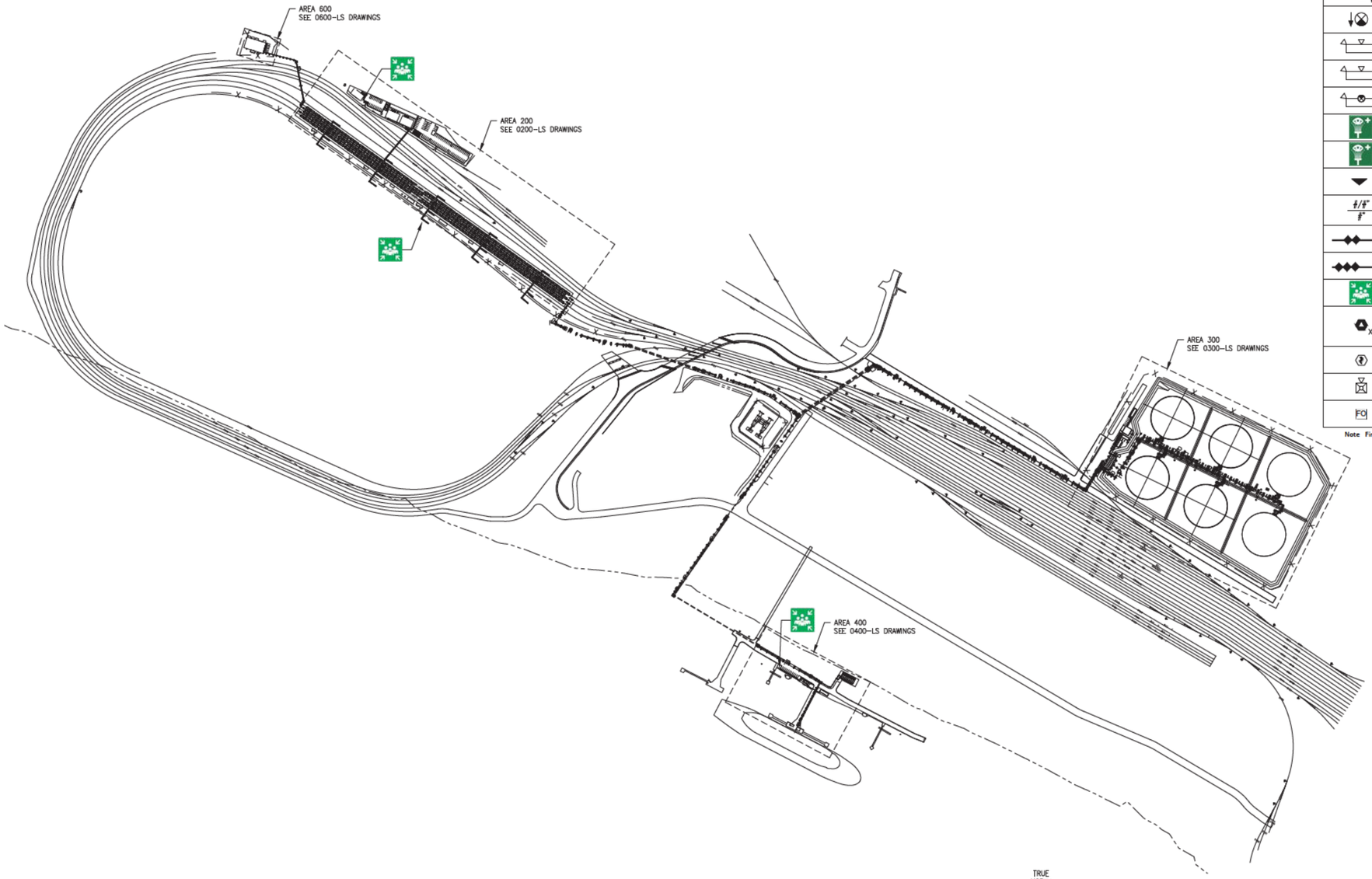
OFF-SITE EVACUATION:
ALONG NW OLD LOWER RIVER
RD, APPROX. 500 FEET
NORTHWEST OF THE MAIN OFFICE



SYMBOLS LEGEND	DESCRIPTION	PROTECTIVE ELEMENTS
	DRY CHEMICAL EXTINGUISHER – ABC TYPE	
W	DRY CHEMICAL EXTINGUISHER – ABC TYPE – WHEELED	
	ILLUMINATED EXIT SIGN	
	EMERGENCY LIGHT – BATTERY POWERED	
EP	EMERGENCY LIGHT – BATTERY POWERED – EXPLOSION PROOF	
	COMBINED BATTERY POWERED EMERGENCY LIGHT AND ILLUMINATED EXIT SIGN	
	EYE WASH STATION – HEATED	
P	EYE WASH STATION – PORTABLE	
	EXIT – EXTERIOR	
#/#" / #"	ACCUMULATED EXIT WIDTH AT REQUIRED EXIT (CLEAR WIDTH)	OCCUPANTS / REQUIRED WIDTH PROVIDED WIDTH (BASED ON MOST RESTRICTIVE EXIT COMPONENT)
	2 HOUR FIRE BARRIER	
	3 HOUR FIRE BARRIER	
	MUSTER POINT	
X	GAS DETECTOR	GAS DETECTOR SETTINGS: CH4: LOW/10%LEL HIGH/30%LEL H2S: LOW/10ppm HIGH/15ppm 02: LOW/19% HIGH/24%
	SMOKE DETECTOR	
	HORN/STROBE	
FO	FOAM RELEASE MANUAL SWITCH	

Note Final drawings will include locations of windsocks, first aid kits, automated external defibrillators, and spill response materials.

GENERAL NOTES:

1. THESE DRAWINGS ARE CONCEPTUAL IN NATURE AND ARE ONLY MEANT TO SHOW THE DESIGN INTENT.
2. THE EQUIPMENT PLACEMENT SHOWN IS FOR DIAGRAMMATIC PURPOSES ONLY. THE ENGINEER RESPONSIBLE FOR THE INSTALLATION SHALL MAKE ANY FINAL DETERMINATIONS ON DEVIATIONS FROM THIS LAYOUT.
3. ALL EQUIPMENT TO BE INSTALLED SHALL BE IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE (2012), INTERNATIONAL FIRE CODE (2012), NFPA 10 (2010), NFPA 30 (2012), ANSI Z358.1 (2009), AND OTHER APPLICABLE CODES AND STANDARDS, OR AS REQUIRED BY THE "AHJ".
4. EXTINGUISHERS LOCATED IN E-HOUSES ARE ALLOWED TO BE CO_2.
5. FIRE EXTINGUISHERS LOCATED OUTSIDE OR EXPOSED TO WEATHER SHALL BE PROTECTED BY AN ENCLOSURE OR PROTECTIVE COVER.

1 LIFE SAFETY SITE PLAN
SCALE: 1" = 300'

TRUE NORTH
0 300' 600'

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www.poolefire.com
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JOHN W. POOLE III
STATE OF WASHINGTON
14993
REGISTERED
PROFESSIONAL ENGINEER

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NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/31/2014	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
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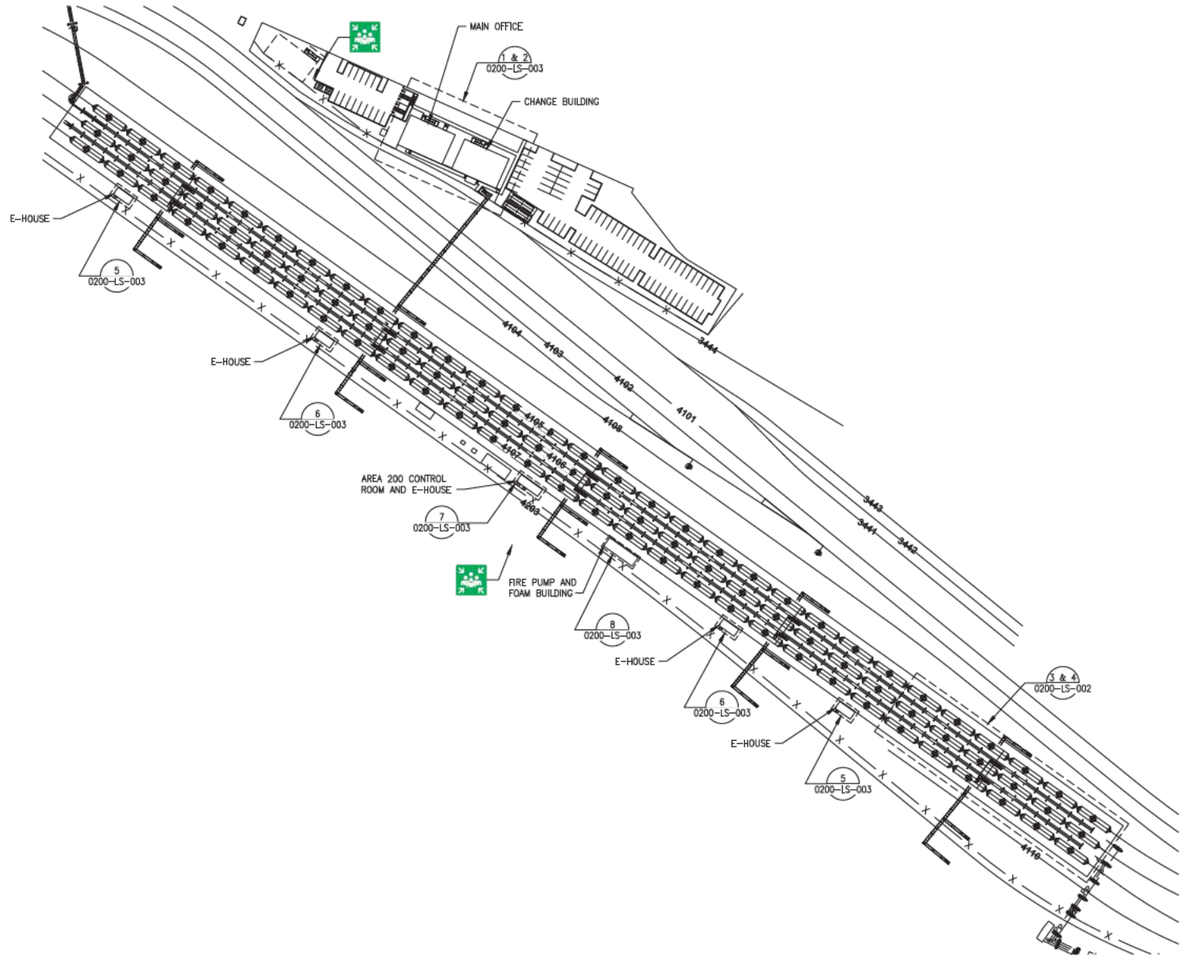

1 AREA 200 – LIFE SAFETY SITE PLAN
SCALE: 1" = 100'

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(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
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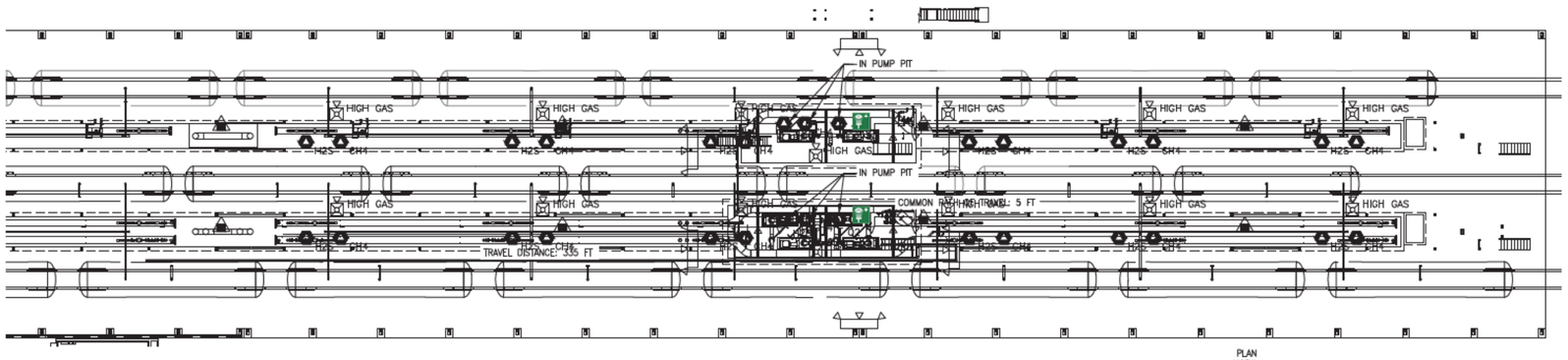
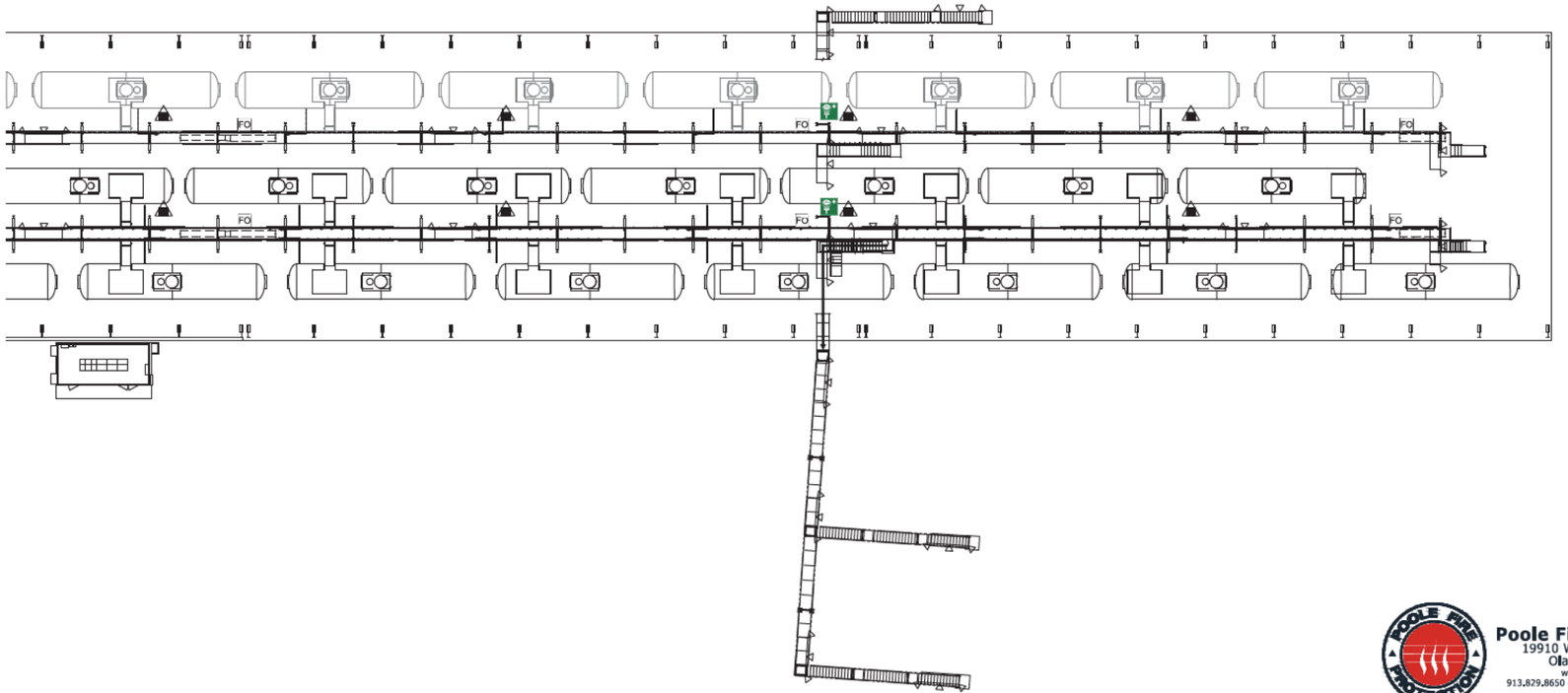


3 AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLAN @ T/RAIL EL 32'–6"

SCALE: 1" = 20'

0 20' 40'

PLAN TRUE NORTH



4 AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLAN @ EL 57'–8"

SCALE: 1" = 20'

0 20' 40'

PLAN TRUE NORTH

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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLANS

DESIGN:	R. BENNETT	START DATE:	4/29/2015	SCALE:	AS NOTED
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CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

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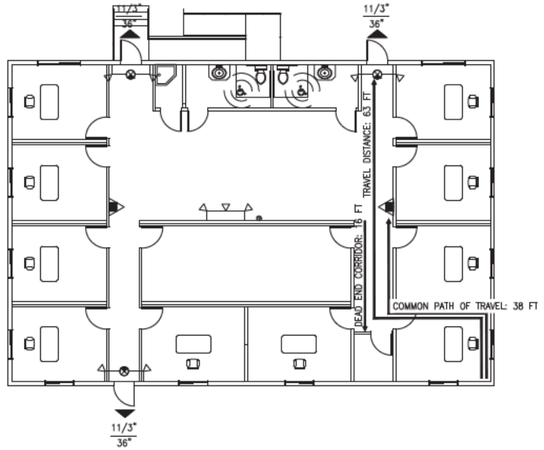
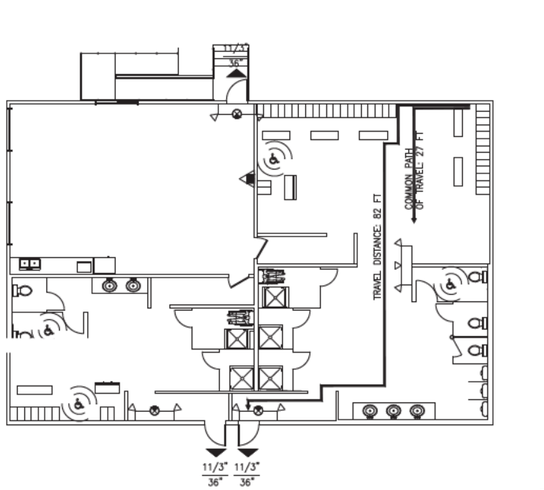
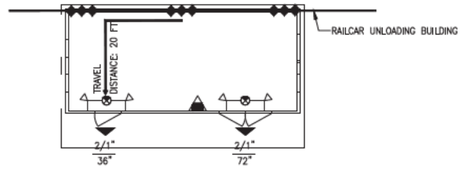


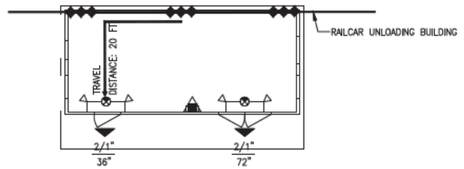
1 AREA 200 – LIFE SAFETY OFFICE BUILDING PLAN
SCALE: 1" = 10'
PLAN TRUE NORTH
0 10' 20'



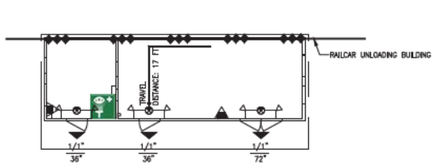
2 AREA 200 – LIFE SAFETY CHANGE BUILDING PLAN
SCALE: 1" = 10'
PLAN TRUE NORTH
0 10' 20'



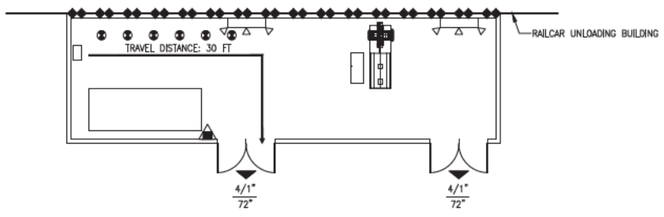
5 AREA 200 – LIFE SAFETY E-HOUSE 1 & 5 PLAN
SCALE: 1/8" = 1'-0"
PLAN TRUE NORTH
0 4' 8' 16'



6 AREA 200 – LIFE SAFETY E-HOUSE 2 & 4 PLAN
SCALE: 1/8" = 1'-0"
PLAN TRUE NORTH
0 4' 8' 16'



7 AREA 200 – LIFE SAFETY CONTROL ROOM/E-HOUSE 3 PLAN
SCALE: 1/8" = 1'-0"
PLAN TRUE NORTH
0 4' 8' 16'



8 AREA 200 – LIFE SAFETY FIRE PUMP AND FOAM BUILDING PLAN
SCALE: 1/8" = 1'-0"
PLAN TRUE NORTH
0 4' 8' 16'

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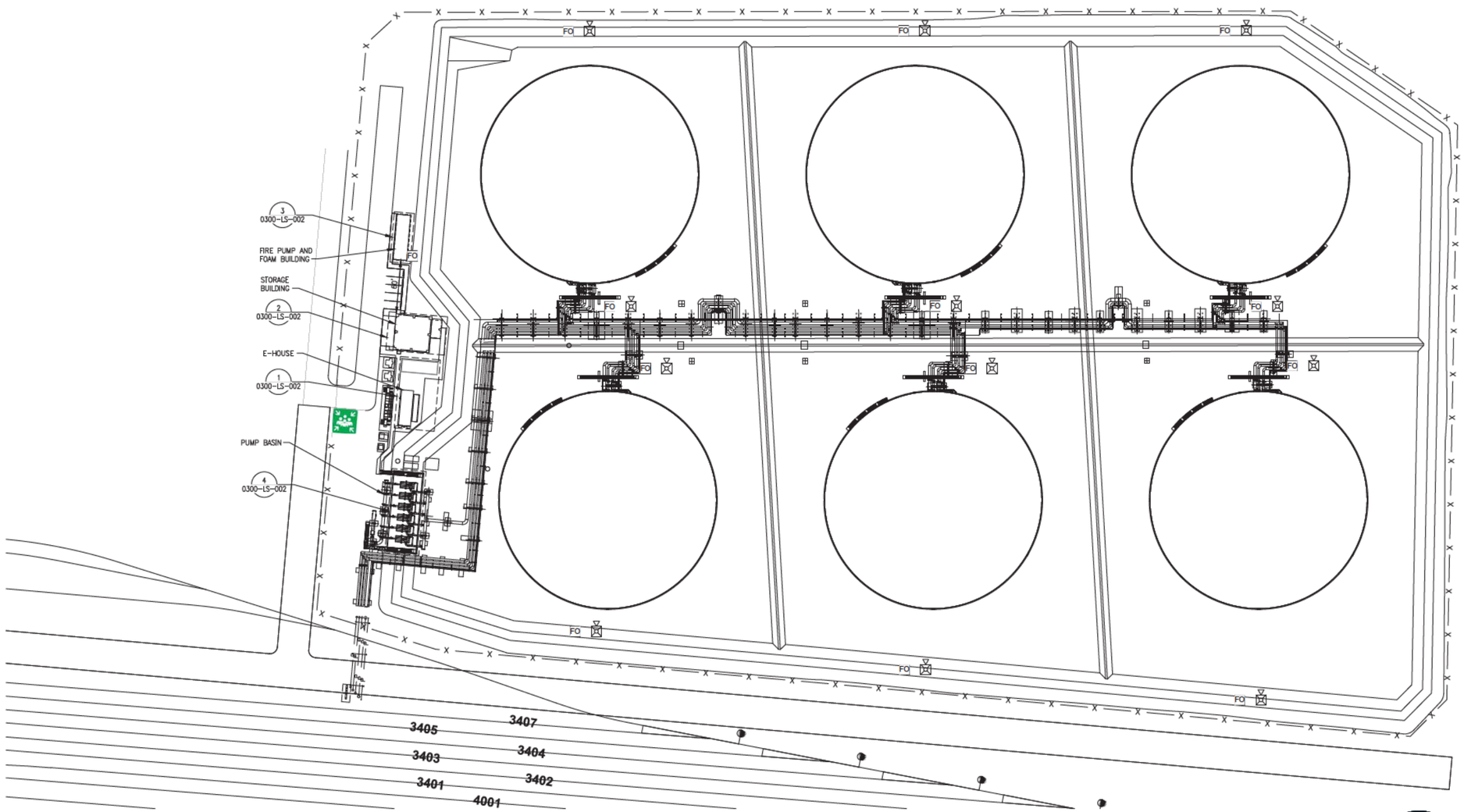
Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200 – LIFE SAFETY PLANS

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER: 0200-LS-003 | SHEET: 1/1 | REV.: A



1 AREA 300 – LIFE SAFETY SITE PLAN
SCALE: 1" = 60'

PLAN NORTH
TRUE NORTH
0 60' 120'

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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

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PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04–30–2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
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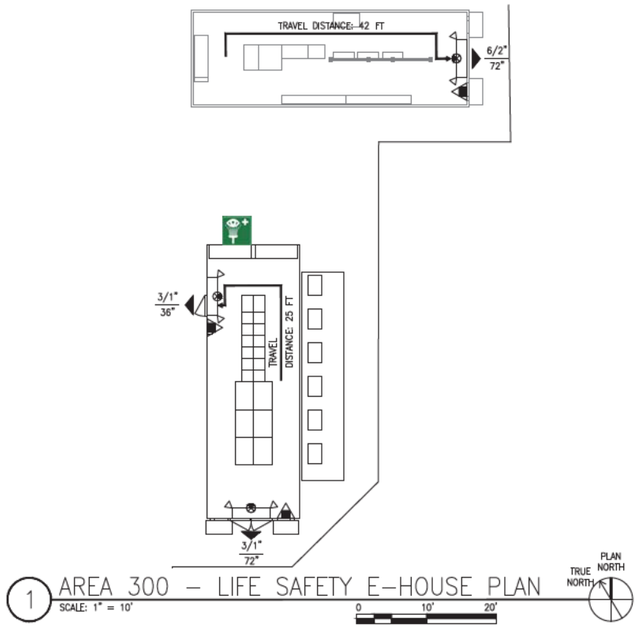
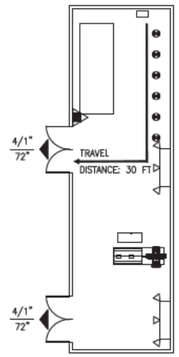
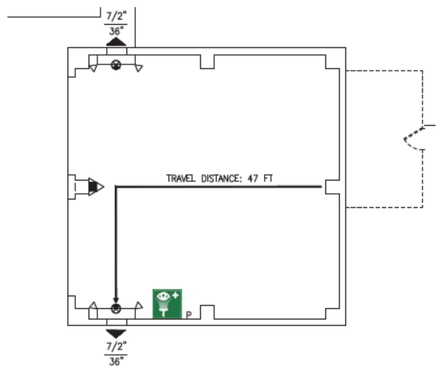


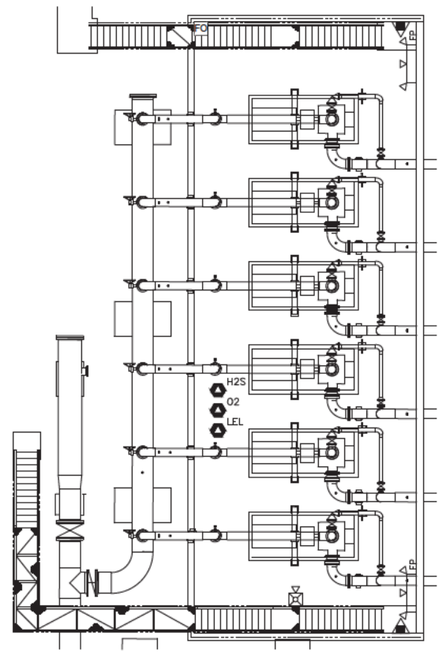
1 AREA 300 – LIFE SAFETY E-HOUSE PLAN
SCALE: 1" = 10'
0 10' 20'
TRUE NORTH
PLAN NORTH



3 AREA 300 – LIFE SAFETY FIRE PUMP AND FOAM BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
TRUE NORTH
PLAN NORTH



2 AREA 300 – LIFE SAFETY STORAGE BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
TRUE NORTH
PLAN NORTH



4 AREA 300 – LIFE SAFETY PUMP BASIN PLAN
SCALE: 1" = 10'
0 10' 20'
TRUE NORTH
PLAN NORTH

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Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300 – LIFE SAFETY PLANS

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

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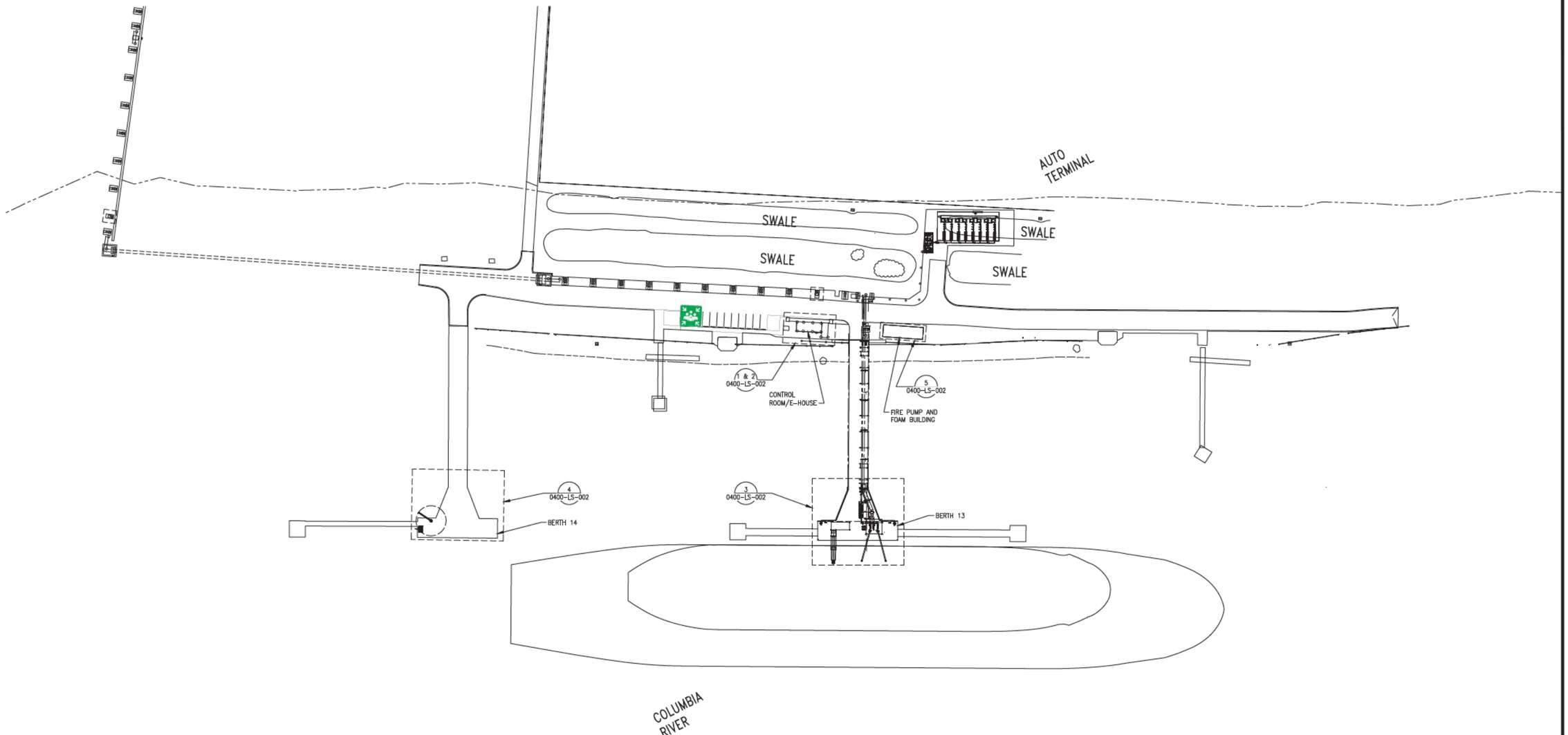
SHEET: 1/1
REV.: A



1 AREA 400 – LIFE SAFETY SITE PLAN
SCALE: 1" = 60'

PLAN NORTH
TRUE NORTH
0 60' 120'

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Portland, Oregon 97232-4189
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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 400 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	4/29/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0400-LS-001	1/1	A

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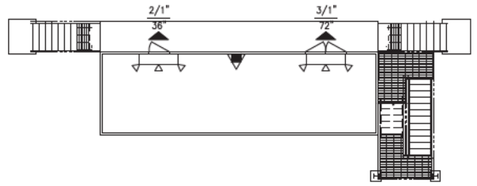
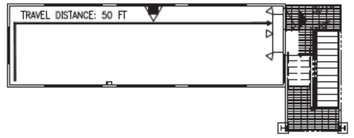
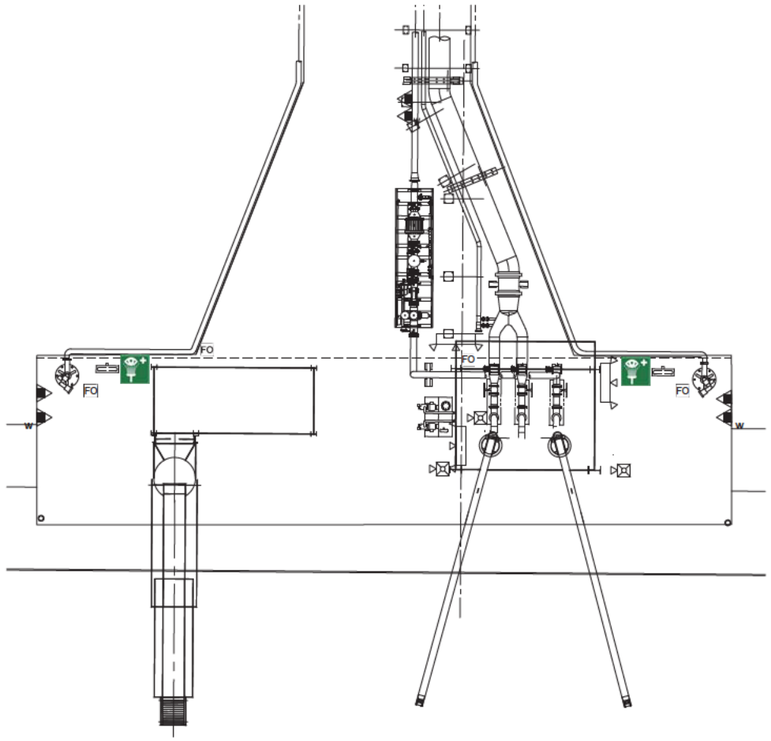


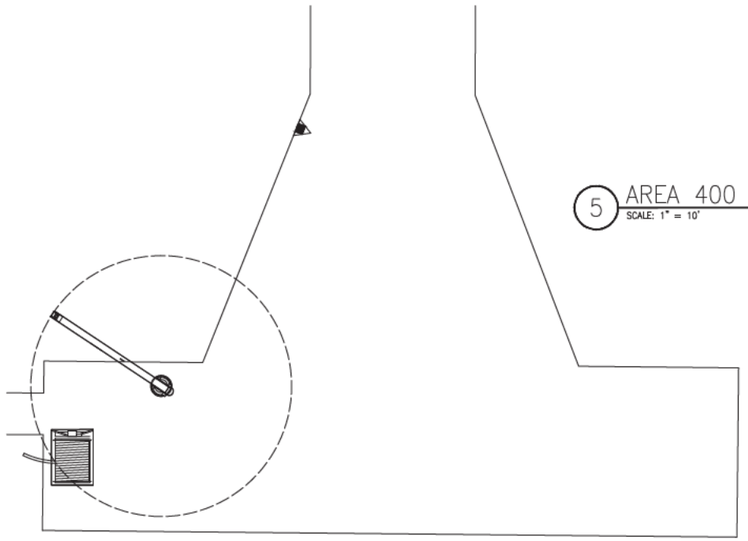
1 AREA 400 – LIFE SAFETY CONTROL ROOM/E-HOUSE BOTTOM FLOOR PLAN
SCALE: 1" = 10'



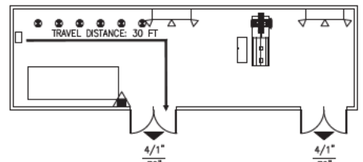
2 AREA 400 – LIFE SAFETY CONTROL ROOM/E-HOUSE UPPER FLOOR PLAN
SCALE: 1" = 10'



3 AREA 400 – LIFE SAFETY BERTH 13 PLAN
SCALE: 1" = 10'



4 AREA 400 – LIFE SAFETY BERTH 14 PLAN
SCALE: 1" = 10'



5 AREA 400 – LIFE SAFETY FIRE PUMP AND FOAM BUILDING PLAN
SCALE: 1" = 10'

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Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

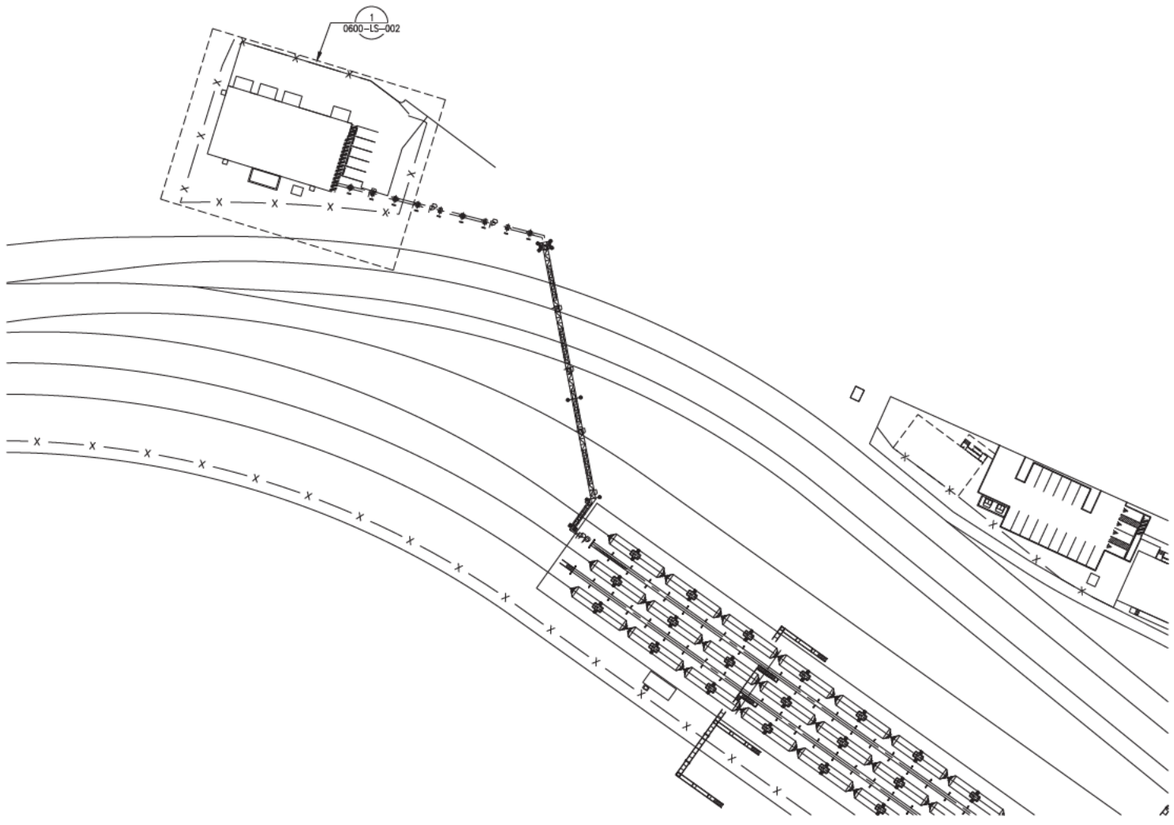
Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 400 – LIFE SAFETY PLANS

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0400-LS-002	1/1	A



1 AREA 600 – LIFE SAFETY SITE PLAN
SCALE: 1" = 60'

TRUE NORTH

0 60' 120'

Poole Fire Protection
19910 West 161st Street
Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 600 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0600-LS-001	1/1	A

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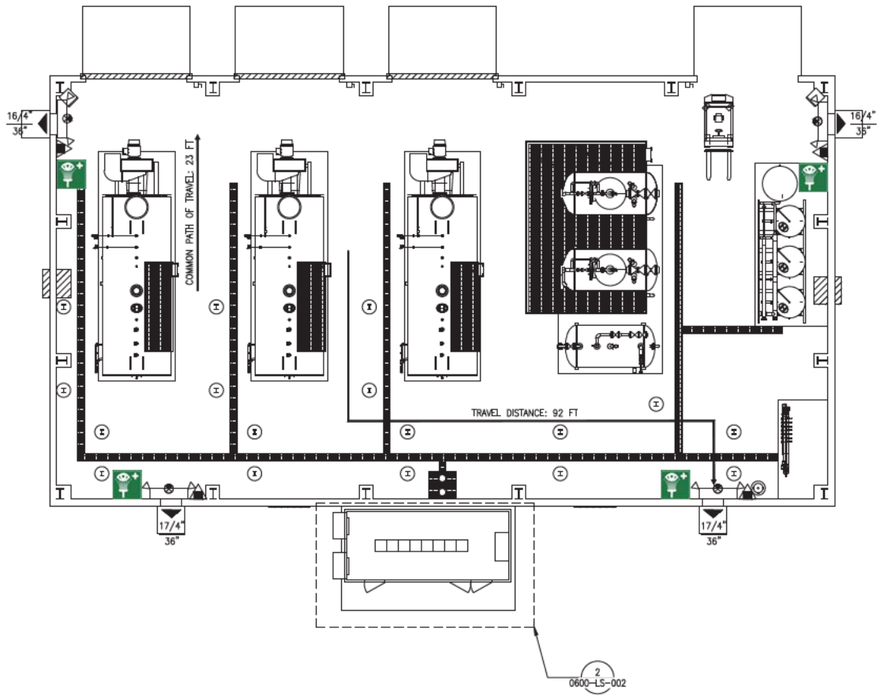

EVACUATE TO AREA 200
ASSEMBLY AREA

1 AREA 600 – LIFE SAFETY BOILER HOUSE PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN TRUE NORTH
PLAN NORTH

2 AREA 600 – LIFE SAFETY E-HOUSE PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH
PLAN NORTH

Poole Fire Protection
19910 West 161st Street
Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

JOHN W. POOLE III
STATE OF WASHINGTON
24993
REGISTERED
PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
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DESCRIPTION: AREA 600 – LIFE SAFETY PLANS

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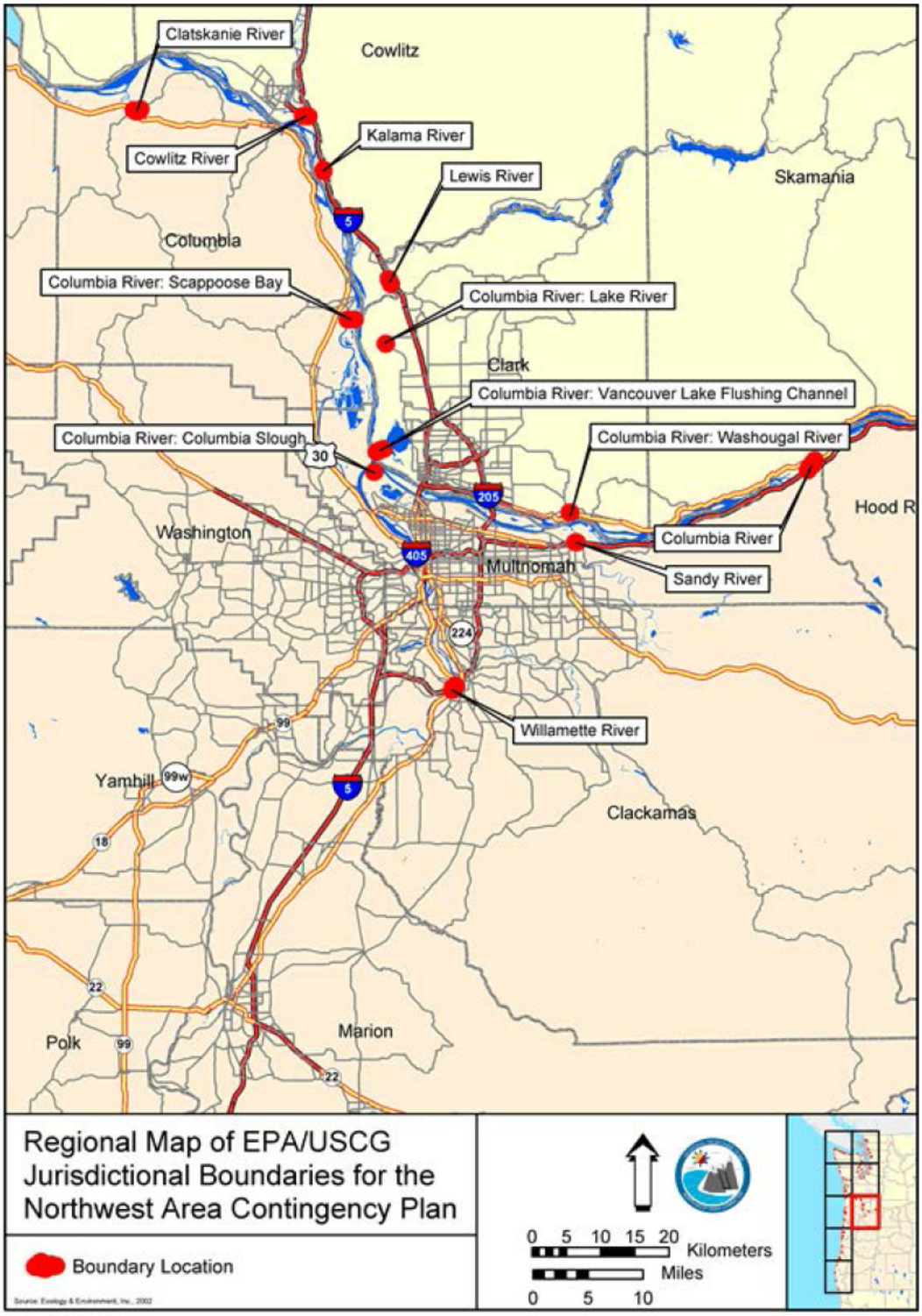
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER: 0600-LS-002
SHEET: 1/1
REV: A

Appendix B
USCG Jurisdiction Map

Appendix B
USCG Jurisdiction Map



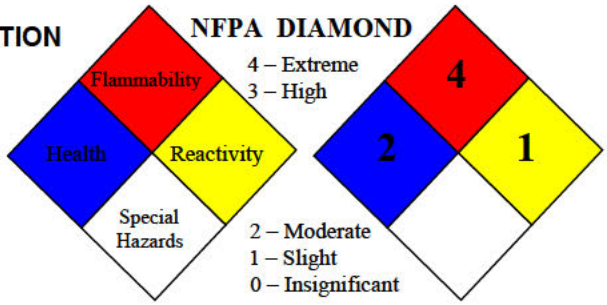
Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix C
Material Safety Data Sheets

Material Safety Data Sheet

1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION



Manufacturer/Supplier: Enbridge Pipelines Inc.
10201- Jasper Avenue
Edmonton, Alberta T5J 3N7
CANADA
Product Name: Bakken Crude Oil
Synonyms: Hydrocarbons of Petroleum

General Information: 780-420-5306
Emergency Telephone Number (24 hrs): CHEMTREC 800-424-9300 USA
CANUTEC 613-996-6666 Canada

Date Prepared: 06/08/2011

2 – PRODUCT COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS Number	Normal % * by Wt./Vol.	Occupational Exposure Limits (ppm)		
			OSHA	ACGIH	NIOSH
Petroleum Hydrocarbons	68919-39-1	100	N/A	N/A	N/A
1t,2-dimethylcyclopentane	28729-52-4	1.8	None	None	None
2-methylhexane	591-76-4	1.0	None	None	None
2-methylpentane	107-83-5	1.8	None	500	100
3-methylhexane	589-34-4	1.6	None	None	None
3-methylpentane	96-14-0	1.3	None	500	100
2-methylheptane	592-27-8	1.4	None	300	None
Benzene	71-43-2	0.4	1	0.5	0.1
cyclohexane	110-82-7	1.0	300	100	300
i-pentane	109-66-0	1.8	1000	600	120
methylcyclohexane	108-87-2	2.3	500	400	400
methylcyclopentane	96-37-7	2.2	None	None	None
n-butane	106-97-8	1.9	800	1000	800
n-heptane	142-82-5	3.4	500	400	85
n-Hexane	110-54-3	3.4	50	50	50
n-Pentane	109-66-0	3.4	600	600	120
n-octane	111-65-9	3.0	500	300	75

n-nonane	111-84-2	2.2	None	200	200
n-decane	124-18-5	2.0	None	None	None
n-undecane	1120-21-4	1.7	None	None	None
n-dodecane	112-40-3	1.5	None	None	None
n-tridecane	629-50-5	1.3	None	None	None
Toluene	108-88-3	0.9	100	20	100
Hydrogen sulfide	7783-06-4	<0.00001	$20^{Ceiling}$	1	$10^{Ceiling}$
Ethylbenzene	100-41-4	0.6	100	20	100
Xylenes	1330-20-7	0-5	100	100	100

* Values do not reflect absolute minimums and maximums; those values may vary from time to time.
N/A - Not Available

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3 – HAZARDS IDENTIFICATION

Flammability: Flammable liquid and vapor. Keep away from heat, sparks, flames or other sources of ignition (such as static electricity, pilot lights, mechanical/electrical equipment).
HMIS Classification for Flammability: 4

Stability: Stable under normal conditions. Avoid all sources of ignition.
HMIS Classification for Reactivity: 1

Potential Health Effects from Overexposure

Acute Effects:

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and central nervous system depression. Aspiration of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin Contact: Prolonged and repeated contact may cause defattting and drying of the skin and can lead to irritation and/or dermatitis.

Eye Contact: Liquid or vapor contact may cause mild eye irritation, including stinging, watering, redness and swelling. Hydrogen sulfide (H_2S) may cause burning or tearing and visual disturbances at repeated exposures above the TLV.

Inhalation: Prolonged or excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract and may lead to headache, nausea, drowsiness, fatigue, pneumonitis, pulmonary edema, CNS depression, coma and respiratory arrest.

Chronic Health Effects from Overexposures:

Skin and eye irritation. May affect the respiratory and central nervous systems.

Special Toxic Effects:

n-Hexane (CAS 110-54-3)

Target Organs – Excess exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesia of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone. Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Benzene (CAS 71-43-2)

Carcinogenicity: Benzene is a known animal carcinogen and is known to produce leukemia in humans. Benzene has been identified as a human carcinogen by NTP, IARC and OSHA.

---

4 – FIRST AID MEASURES

Ingestion: Aspiration hazard. Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe damage. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration.

Skin Contact: Wipe material from skin and remove contaminated clothing. Cleanse affected areas thoroughly by washing with mild soap and water and, if necessary, a waterless skin cleanser. If irritation or redness develops, seek medical attention.

Eye Contact: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water for 15 minutes, with eyelids held open. If symptoms persist, seek medical attention.

Inhalation: If respiratory symptoms or other symptoms of exposure develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, qualified personnel should administer oxygen. Seek immediate medical attention.

Notes to Physician: Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.

---

5 – Exposure Controls/ Personal Protection

Eye Protection: Safety glasses or goggles are recommended when there is a possibility of splashing or spraying.

Skin Protection: The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation. Depending on conditions, the use of an apron or chemical protective clothing may be necessary.

Respiratory Protection: A NIOSH certified air purifying respirator with an organic vapor cartridge may be used under conditions where airborne concentrations of hydrocarbons are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known or any other circumstances where air purifying respirators

may not provide adequate protection. A respiratory protection program that meets US OSHA's 29 CFR 1910.134, Canadian Labour Code Part II and ANSI Z88.2 requirements must be followed when workplace conditions warrant a respirator's use.

Engineering Controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

---

6 – FIRE FIGHTING MEASURES

Flash Point:	< 40 °C	Lower Explosive Limit:	Not Established
Auto Ignition Temperature:	Not data available	Upper Explosive Limit:	Not Established

Basic Fire Fighting Procedures: Long-duration fires involving diluent stored in tanks may result in a boilover. The contents of the tank may be expelled beyond the containment dikes or ditches. All personnel should be kept back a safe distance when a boilover is anticipated (reference NFPA 11). For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces or when explicitly required by DOT, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant. Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Water spray may be useful in minimizing or dispersing vapors. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

Extinguishing Media: Any extinguisher capable of handling Class B fires is recommended, including extinguishing media such as CO_2, dry chemical or foam. Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Firefighting should be attempted only by those who are adequately trained and equipped with proper personal protective equipment.

Unusual Fire and Explosion Hazards: This material is flammable and may be ignited by heat, sparks, flames or other sources of ignition (such as static electricity, pilot lights, or mechanical/electrical equipment). Vapors may travel considerable distances to a source of ignition where they can ignite, flashback or explode. May create vapor/air explosion hazard indoors, outdoors or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

---

7 – ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources.

Spill management: Wear appropriate breathing apparatus (if applicable) and protective clothing. A vapor suppressing foam may be used to reduce vapors. Try to work upwind of spill. Dike and contain land spills; contain water spills by booming. For large spills remove by mechanical means such as vacuuming or pumping and place in containers. All equipment used when

handling the product must be grounded. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids. Do not wash spills into sewers or other public water systems.

Reporting: Report spills to local or federal authorities as appropriate or required.

8 – HANDLING AND STORAGE

The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Do not enter confined spaces such as tanks or pits without following proper entry procedures. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.

Use appropriate grounding and bonding practices. Stores in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to hear, open flames, strong oxidizers or other sources of ignition. Do not cut drill, grind or weld on empty containers since they may contain explosive residues.

Harmful concentrations of hydrogen sulfide (H_2S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments. Stay upwind and vent open hatches before uploading.

Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear to brown liquid
Physical Form:	Liquid
Substance type (Pure/Mixture):	Mixture
Boiling Temperature:	94 to 1330 ºF
Melting Temperature:	Not determined
Vapor Pressure:	about 7.47 psi
Vapor Density:	1.0 - 3.9
Evaporation Rate:	(Ethyl ether =1) >1
Specific Gravity:	0.82
Water Solubility:	Negligible
pH:	Not determined
Viscosity:	5.43 mm^2/s
Color:	Clear to brown
Odor:	Rotten egg, petroleum like odor

10 – STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity.
CHEMICAL STABILITY:	Stable at 70 °F, 760 mmHg pressure.
HAZARDOUS DECOMPOSITION PRODUCTS:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
HAZARDOUS POLYMERIZATION:	Will not occur
INCOMPATIBILITY:	Strong oxidizers such as nitrates, chlorates, peroxides.

11 – TOXICOLOGICAL INFORMATION– CHRONIC AND ACUTE HEALTH HAZARDS

This product contains aliphatic naphatha at a level of >0.1%. Lifetime skin painting studies in mice with similar naphthas have shown wither negative or very weak dermal carcinogenic activity following prolonged and repeated skin contact. Some other petroleum fractions that show carcinogenic activity when tested at nonirritating dose levels did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chromic irritation and not dose. Some components of aliphatic naphthas, i.e., paraffins and olefins, have been shown to produce a species specific, sex hormonal dependent kidney damage develops via the formation of alpha-2u-globulin, a mechanism unique to the male rat. Humans do not for alpha-2u-globulin; therefore, the kidney effects resulting from this mechanism are not relevant in humans.

This product contains benzene at a level of 0.1%. Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in man. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.

Hydrogen sulfide gas (H_2S) is toxic by inhalation. Prolonged breathing of 50-100 ppm H_2S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of >1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H_2S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H_2S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H_2S, respectively. Over the years a number of acute cases of H_2S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

This product may contain hexane at a level of >1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.

This product may contain xylenes at a level of >1.0%. Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals, Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.

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12 – DISPOSAL INFORMATION

Container contents should be completely used and containers should be emptied prior to discard. Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities. This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law

requires disposal at a licensed hazardous waste disposal facility. This product could also contain benzene at >0.5 ppm and could exhibit the characteristic of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.

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13 – ENVIRONMENTAL INFORMATION

Spill or Release to the Environment: Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended. Stay upwind and away from spill/release. Notify persons downwind of spill/release, isolate immediate hazard area and keep unauthorized personnel out. Product may release large amounts of flammable vapors (e.g., methane, ethane and propane) at or below ambient temperature depending on source and process conditions. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory equipment as conditions warrant. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment drainage systems and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors. Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state (provincial) and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount into navigable waters, notify appropriate federal, state (provincial) and local agencies.

Sara Title III Information: This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Toluene	CAS – 108-88-3	Weight % - 0 – 2%
n-Hexane	CAS – 110-54-3	Weight % - up to 11%
Benzene	CAS – 71-43-2	Weight % - 0 – 2%

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14 – REGULATORY INFORMATION

USA: All of the components of this product are on the Toxic Substances Control Act (TSCA) Chemical Inventory.

Canada: All the components of this product are on the Canadian Domestic Substances List (DSL), or have been notified under the New Substances Notification Regulations, but have not yet been published in the Canada Gazette.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Classification:	Class B2 Flammable Liquids Class D2B Other Toxic Effects - Skin Irritant Class D2A Other Toxic Effects – Embryotoxic/Fetotoxic
US EPA Reportable Quantity:	The estimated reportable quantity (RQ) for this material is based on the weight % shown below:
RQ based on benzene –	The RQ for benzene is 10 pounds, which equals 3,333 pounds of natural gas condensate (556 gallons). The RQ is based on 0.3 wt. % benzene.
RQ based on n-Hexane –	The RQ for n-Hexane is 5000 pounds, which equals 50,000 pounds of natural gas condensate (8,333 gallons). The RQ is based on 10 wt. % n-Hexane.
RQ based on toluene –	The RQ for toluene is 1000 pounds, which equals 50,000 pounds of natural gas condensate (8,333 gallons). The RQ is based on 2 wt. % toluene.

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15 – SPECIAL PRECAUTIONS / SUPPLEMENTAL INFORMATION

Keep containers tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces and all sources of ignition. Post area “No Smoking or Open Flame”. Store only in approved containers. Keep away from any incompatible material. Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet US OSHA standards, Canadian Labour Codes and other appropriate fire codes.

Depending on the source of natural gas condensate, there could be some amount of NORM (naturally occurring radioactive materials) in the scale, deposit and sludge associated with this material. Proper measurements should be taken prior to handling this material or any equipment contaminated with this material. If NORM is indicated, refer to API Bulletin E2, “Bulletin on Management of Naturally Occurring Radioactive Materials in Oil and Gas Production,” for additional information.

Empty Containers: “Empty” containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks or other sources of ignition. They may explode and cause injury or death. “Empty” drums should be completely drained, properly bunged and promptly shipped to the supplier or a drum re-conditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1 and other governmental and industrial references pertaining to cleaning, repairing, welding or other contemplated operations.

---

16 – TRANSPORTATION REQUIREMENTS

General Transportation Information:

DOT Proper Shipping Name (49 CFR 172.101):	Petroleum Crude Oil
DOT Hazard Classes (49 CFR 172.101):	3
UN/NA Code (49 CFR 172.101):	UN1267
Packing Group (49 CFR 172.101):	II
Bill of Lading Description (49 CFR 172.202):	Petroleum Crude Oil
DOT Labels Required (49 CFR 172.101):	Flammable Liquid

Please note that the actual shipping name and associated data can vary due to the properties of the product. Other acceptable shipping names may include Petroleum Distillate n.o.s. 1268, Gasoline UN1203, Flammable liquids, n.o.s. (pentane) UN1993 or Hydrocarbons, Liquid n.o.s. (condensate) UN3295.

PREPARED BY: Enbridge Pipelines Inc.

Disclaimer

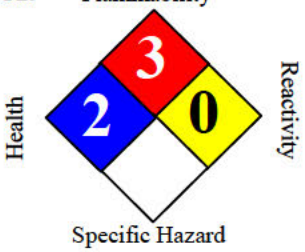
The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet (MSDS). However, MSDS’s may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
m^3	Cubic meter
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
n.o.s.	Not Otherwise Specified
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
REL	Recommended Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average

Safety Data Sheet
Crude Oil

NFPA:



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude Oil			
Synonyms	:	Sour Crude Oil, Sweet Crude Oil, Light Crude Oil, Heavy Crude Oil, Generic Crude Oil, 888100008800			
SDS Number	:	888100008800	**Version**	:	1.7
Product Use Description	:	Refining feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications

Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word

Danger

Hazard Statements

Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.

Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
N-hexane	110-54-3	0 - 1.5%
Hydrogen Sulfide	7783-06-4	Variable

Sulfur	7704-34-9	Trace - 5%
Benzene	71-43-2	0.1 - 3%
Cumene	98-82-8	Variable Trace < 1%
Naphthalene	91-20-3	Variable Trace < 1%
Xylene	1330-20-7	Variable Trace < 1%
Ethylbenzene	100-41-4	Variable Trace < 1%
Polycyclic Aromatic Compounds		Variable
Toluene	108-88-3	Variable Trace < 1%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_AL	0.5 ppm
	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
	Cumene	98-82-8	TWA	50 ppm
	Ethylbenzene	100-4-4	TWA	100 ppm
	Naphthalene	91-20-3	TWA	10 ppm
	Toluene	108-88-3	TWA	200 ppm
	Xylenes	1330-20-7	TWA	100 ppm

			Ceiling	300 ppm
	Polycyclic Aromatic Compound (Benzene Soluble)		TWA	0.2 mg/m3
ACGIH	N-hexane	110-54-3	TWA	50 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Cumene	98-82-8	TWA	50 ppm
	Ethylbenzene	100-4-4	TWA	50 ppm
		100-4-4	STEL	125 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Toluene	108-88-3	TWA	20 ppm
	Xylenes	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Polycyclic Aromatic Compound (Benzene Soluble)		TWA	0.2 mg/m3

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection : Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures	:	Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Typical is a thick, dark yellow to brown or greenish black liquid
Odor		Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold		Odor threshold varies with the composition of the crude oil
pH		Not applicable
Melting point/freezing point		-30° to 30°C has been reported as a pour point
Initial boiling point & range		Distillation is typically not performed above 300°C at atmospheric pressure
Flash point		-7 to 75°C
Evaporation rate		Higher initially and declines if lighter components evaporate
Flammability (solid, gas)		Flammable gas or vapors released by liquid
Upper explosive limit		Varies with composition but typical is approximately 7%
Lower explosive limit		Varies with composition but typical is approximately 0.7%
Vapor pressure		6 to 45 kPa
Vapor density (air = 1)		No data available
Relative density (water = 1)		0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)		1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)		2 to > 6 as log Pow
Auto-ignition temperature		Varies with composition
Decomposition temperature		Will evaporate or boil and possibly ignite before decomposition occurs
Kinematic viscosity		5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.

Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	: May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.
Ingestion	Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.
Skin irritation	Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.
Eye irritation	Irritating to eyes.
Chronic exposure	This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.
Target organs	Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component:

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg

		Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

		Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h

Skin irritation: Classification: Irritating to skin.
Result: Skin irritation

Eye irritation: Classification: Irritating to eyes.
Result: Mild eye irritation

Teratogenicity: N11.00418960

Carcinogenicity

NTP : Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)

IARC Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9)
Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)
Ethylbenzene (CAS-No.: 100-41-4)

OSHA Benzene (CAS-No.: 71-43-2)

CA Prop 65 WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Toluene (CAS-No.: 108-88-3)
Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h
Sulfur	7704-34-9	Acute and prolonged toxicity for aquatic invertebrates: EC0 Species: Daphnia magna (Water flea) Dose: > 10,000 mg/l Exposure time: 24 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 353
Packing instruction (passenger aircraft)	: Y341

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Fire Hazard Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
Xylene	1330-20-7

Components	CAS-No.
hydrogen sulfide	7783-06-4

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
Xylene	1330-20-7

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	
Xylene	

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

Benzene	71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Benzene	71-43-2
Toluene	108-88-3

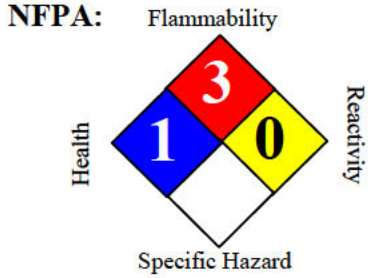
SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 12/07/2012

Safety Data Sheet
Crude oil, sour heavy



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, sour heavy			
Synonyms	:	Sour Crude, Crude Oil Sour, RS294, 0000002670, 888100005182			
SDS Number	:	888100005182	**Version**	:	1.8
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.

May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	80 - 85%
Benzene	71-43-2	5 - 7%
Toluene	108-88-3	5 - 7%
Ethylbenzene	100-41-4	5 - 7%
Xylene	1330-20-7	5 - 7%

Hydrogen Sulfide	7783-06-4	< 0.5%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. If not breathing, give artificial respiration. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Seek medical advice if symptoms persist or develop. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Do not give liquids. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO_2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Dangerous fire and explosion hazard when exposed to heat, sparks or flame. Do not allow liquid runoff to enter sewers or public waters.

Special protective equipment for fire-fighters : Firefighters should wear self-contained breathing apparatus and full protective clothing as need for protection from heat and airborne combustion products. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.

Further information : Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Additional advice : Inform the responsible authorities in case of leakage, or of entry into waterways, soil or drains.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". Hydrogen sulfide may accumulate in tanks and bulk transport compartments. Consider appropriate respiratory protection (see Section 8). Stand upwind. Avoid vapors when opening hatches and dome covers. Confined spaces should be ventilated and gas tested prior to entry.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Toluene	108-88-3	TWA	50 ppm
	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Xylene	1330-20-7	TWA	100 ppm

		1330-20-7	STEL	150 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended.

Skin and body protection : Chemical protective clothing such as DuPont Tyvek QC, TyChem® or equivalent, recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection : If hydrogen sulfide concentration may exceed permissible exposure limit, a positive-pressure SCBA or Type C supplied air respirator with escape bottle is required as respiratory protection. If hydrogen sulfide concentration is below H2S permissible exposure limit a NIOSH/ MSHA-approved air-purifying respirator with acid gas cartridges may be acceptable for odor control, but continuous air monitoring for H2S is recommended. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures : Emergency eye wash capability should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Consider disposal of contaminated clothing rather than laundering to prevent the formation of flammable vapors which could ignite via washer or dryer.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Typical is a thick, dark yellow to brown or greenish black liquid

Odor Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.

Odor threshold Odor threshold varies with the composition of the crude oil

pH Not applicable

Melting point/freezing point -30° to 30°C has been reported as a pour point

Initial boiling point & range Distillation is typically not performed above 300°C at atmospheric pressure

Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)	2 to > 6 as log Pow
Auto-ignition temperature	Varies with composition
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5

minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.

Ingestion

Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Skin irritation

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact

Eye irritation

Irritating to eyes.

Chronic exposure

This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs

Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit

Dose: 2,001 mg/kg
Acute inhalation toxicity: LC50 rat
Dose: 171.6 mg/l
Exposure time: 4 h
Skin irritation: Classification: Irritating to skin.
Result: Skin irritation
Eye irritation: Classification: Irritating to eyes.
Result: Mild eye irritation
Teratogenicity: N11.00418960

Carcinogenicity :

NTP Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)

IARC Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9)
Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)
Ethylbenzene (CAS-No.: 100-41-4)

OSHA Benzene (CAS-No.: 71-43-2)

CA Prop 65 WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Toluene (CAS-No.: 108-88-3)
Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene 108-88-3

Toxicity to fish:
LC50
Species: Carassius auratus (goldfish)
Dose: 13 mg/l
Exposure time: 96 h

Acute and prolonged toxicity for aquatic invertebrates:
EC50
Species: Daphnia magna (Water flea)
Dose: 11.5 mg/l
Exposure time: 48 h

Toxicity to algae:
IC50
Species: Selenastrum capricornutum (green algae)
Dose: 12 mg/l
Exposure time: 72 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 366
Packing instruction (cargo aircraft)	: Y344

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 355
Packing instruction (passenger aircraft)	: Y344

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 118 lbs

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Xylene	1330-20-7
Ethylbenzene	100-41-4
Toluene	108-88-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

California Prop. 65 : WARNING! This product contains a chemical known in the State of California to cause cancer.

Ethylbenzene	100-41-4
Benzene	71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

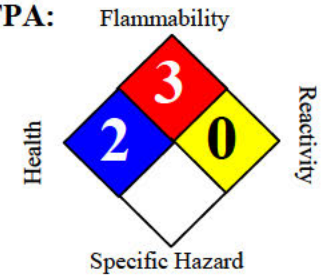
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude oil, sour light

NFPA:



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, sour light			
Synonyms	:	Hydrogen sulfide crude; hydrogen sulfide oil; crude oil; sealed oil; separator crude; sour crude; sour oil, petroleum, RS294, 0000002670, 888100005161			
SDS Number	:	888100005161	**Version**	:	1.3
Product Use Description	:	Refining feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.

Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H_2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO_2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
N-hexane	110-54-3	0 - 1.5%
Hydrogen Sulfide	7783-06-4	Highly Variable

Sulfur	7704-34-9	1 - 1.5%
Benzene	71-43-2	0.1 - 3%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_AL	0.5 ppm
OSHA Z1	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
OSHA Z1	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	N-hexane	110-54-3	TWA	50 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1ppm
		7783-06-4	STEL	5 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection	:	Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.
Respiratory protection	:	A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Hygiene measures	:	Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Typical is a thick, dark yellow to brown or greenish black liquid
Odor	Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold	Odor threshold varies with the composition of the crude oil
pH	Not applicable
Melting point/freezing point	-30° to 30°C has been reported as a pour point
Initial boiling point & range	Distillation is typically not performed above 300°C at atmospheric pressure
Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
	2 to > 6 as log Pow

Partition coefficient (n-octanol/water)	Varies with composition
Auto-ignition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Decomposition temperature	5 to > 1300 mm^2/s at 38°C
Kinematic viscosity	

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.
Ingestion	Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.
Skin irritation	Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been

reported from prolonged or repeated skin contact.

Eye irritation Irritating to eyes.

Chronic exposure This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component:

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

		Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	Benzene (CAS-No.: 71-43-2)
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h
Sulfur	7704-34-9	Acute and prolonged toxicity for aquatic invertebrates: EC0 Species: Daphnia magna (Water flea) Dose: > 10,000 mg/l Exposure time: 24 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 353
Packing instruction (passenger aircraft)	: Y341

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Fire Hazard Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 104 lbs

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.
hydrogen sulfide	7783-06-4

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

Benzene 71-43-2

WARNING! This product contains a chemical known to the State of California to

cause birth defects or other reproductive harm.

Benzene	71-43-2

SECTION 16. OTHER INFORMATION

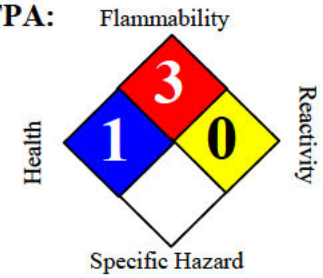
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude Oil, Sweet Heavy

NFPA:



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude Oil, Sweet Heavy			
Synonyms	:	Sweet Heavy Crude Oil, RS295, 888100005156			
SDS Number	:	888100005156	**Version**	:	1.3
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway Drive, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See

Section 11.

Precautionary statements

Prevention : Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses,
if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
Toluene	108-88-3	0 - 7%
N-hexane	110-54-3	0 - 5%
Benzene	71-43-2	0.1 - 3%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. If symptoms persist, seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers..

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Toluene	108-88-3	TWA	50 ppm
	N-hexane	110-54-3	TWA	50 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Hydrogen Sulfide	7783-06-4	PEL	1 ppm
			STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection : Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or

		canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Hygiene measures	:	Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Typical is a thick, dark yellow to brown or greenish black liquid
Odor		Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold		Odor threshold varies with the composition of the crude oil
pH		Not applicable
Melting point/freezing point		-30° to 30°C has been reported as a pour point
Initial boiling point & range		Distillation is typically not performed above 300°C at atmospheric pressure
Flash point		-7 to 75°C
Evaporation rate		Higher initially and declines if lighter components evaporate
Flammability (solid, gas)		Flammable gas or vapors released by liquid
Upper explosive limit		Varies with composition but typical is approximately 7%
Lower explosive limit		Varies with composition but typical is approximately 0.7%
Vapor pressure		6 to 45 kPa
Vapor density (air = 1)		No data available
Relative density (water = 1)		0.9 to 1.0 g/mL is typical at 15°C
Solubility (in water)		1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)		2 to > 6 as log Pow
Auto-ignition temperature		Varies with composition
Decomposition temperature		Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity		5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability		Stable under normal conditions.
Possibility of hazardous reactions		Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid		Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products		Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	:	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.
Ingestion		Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.
Skin irritation		Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.
Eye irritation		Irritating to eyes.
Chronic exposure		This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.

Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity :

NTP
Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)

IARC
Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9)
Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)
Ethylbenzene (CAS-No.: 100-41-4)

OSHA
Benzene (CAS-No.: 71-43-2)

CA Prop 65
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Toluene (CAS-No.: 108-88-3)
Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h
N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: III

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: III

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: I1I
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 366
Packing instruction (cargo aircraft)	: Y344

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: III
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 355
Packing instruction (passenger aircraft)	: Y344

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: III
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Fire Hazard Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 111 lbs

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

benzene 71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

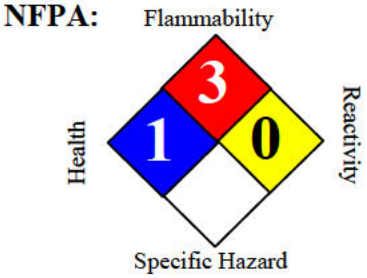
SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude oil, light sweet



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, light sweet			
Synonyms	:	Petroleum Crude Oil, Crude Sweet, 888100005188			
SDS Number	:	888100005188	**Version**	:	1.3
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See

Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	80 - 85%
Benzene	71-43-2	5 - 7%
Toluene	108-88-3	5 - 7%
Ethylbenzene	100-41-4	5 - 7%

Xylene	1330-20-7	5 - 7%
Hydrogen Sulfide	7783-06-4	< 0.5%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. If not breathing, give artificial respiration. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Seek medical advice if symptoms persist or develop. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Do not give liquids. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO_2, water spray, fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Dangerous fire and explosion hazard when exposed to heat, sparks or flame. Do not allow liquid runoff to enter sewers or public waters.

Special protective equipment for fire-fighters : Firefighters should wear self-contained breathing apparatus and full protective clothing as need for protection from heat and airborne combustion products. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.

Further information : Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Do not flush down sewer or drainage systems, unless system is designed and permitted to

handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Additional advice : Inform the responsible authorities in case of leakage, or of entry into waterways, soil or drains.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". Hydrogen sulfide may accumulate in tanks and bulk transport compartments. Consider appropriate respiratory protection (see Section 8). Stand upwind. Avoid vapors when opening hatches and dome covers. Confined spaces should be ventilated and gas tested prior to entry.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Toluene	108-88-3	TWA	50 ppm

	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended.

Skin and body protection : Chemical protective clothing such as DuPont Tyvek QC, TyChem® or equivalent, recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection : If hydrogen sulfide concentration may exceed permissible exposure limit, a positive-pressure SCBA or Type C supplied air respirator with escape bottle is required as respiratory protection. If hydrogen sulfide concentration is below H2S permissible exposure limit a NIOSH/ MSHA-approved air-purifying respirator with acid gas cartridges may be acceptable for odor control, but continuous air monitoring for H2S is recommended. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures : Emergency eye wash capability should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Consider disposal of contaminated clothing rather than laundering to prevent the formation of flammable vapors which could ignite via washer or dryer.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Typical is a thick, dark yellow to brown or greenish black liquid

Odor Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.

Odor threshold Odor threshold varies with the composition of the crude oil

pH Not applicable

Melting point/freezing point	-30° to 30°C has been reported as a pour point
Initial boiling point & range	Distillation is typically not performed above 300°C at atmospheric pressure
Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)	2 to > 6 as log Pow
Auto-ignition temperature	Varies with composition
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of

reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.

Ingestion

Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Skin irritation

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.

Eye irritation

Irritating to eyes.

Chronic exposure

This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs

Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component :

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation

		Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	Benzene (CAS-No.: 71-43-2)
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 353
Packing instruction (passenger aircraft)	: Y341

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 118 lbs

SARA III US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Xylene	1330-20-7
Ethylbenzene	100-41-4
Toluene	108-88-3
Benzene	71-43-2

SARA III US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

MASS RTK US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

NJ RTK US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

California Prop. 65 : WARNING! This product contains a chemical known in the State of California to cause cancer.

Ethylbenzene 100-41-4

Benzene	71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.
- Substance may be transported hot.
- For UN3166, if Lithium ion batteries are involved, also consult GUIDE 147.
- **If molten aluminum is involved, refer to GUIDE 169.**

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL EMERGENCY RESPONSE Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

CAUTION: For mixtures containing alcohol or polar solvent, alcohol-resistant foam may be more effective.

Small Fire

- Dry chemical, CO_2, water spray or regular foam.

Large Fire

- Water spray, fog or regular foam.
- **Do not use straight streams**.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix D
Response Equipment

APPENDIX D
RESPONSE EQUIPMENT

D.1 COOPERATIVES AND CONTRACTORS

- Facility and Tesoro are members of the Clean Rivers Cooperative, Inc. (CRCI) As a member of Clean Rivers, Vancouver Energy/Tesoro may also have access to equipment and personnel resources from NRC.

- The Clean Rivers contractor response time to the facility is estimated as two hours. Mobilization times for CRCI equipment resources are summarized in **Figure 7.2**.

- Clean Rivers is classified as a "W3" OSRO by USCG. The response organization for Clean Rivers and their relationship with the Company and with subcontractors, NRCES, described in **Section 7.1.4**.

- Ecology has approved CRCI as a Primary Response Contractor (PRC). CRCI's response time to the Facility is 1 hour. Primary Response Contractors are private companies or cooperatives that are in partnership with plan holders to act as required response support teams. The PRCs have equipment and crews that are trained and equipped to mitigate leaks and spills when they occur. CRCI's equipment lists can be found in **Figure D.2** and **Figure D.3**. CRCI's Equipment Map can be found in **Figure D.4**.

  CRCI's contact information is as follows:
  Clean Rivers Cooperative, Inc.
  Address: 9420 NW St. Helens Rd.
  Portland, Oregon 97231
  24-hour hotline: (503) 220-2040
  Office: (503) 735-1687

D.1.1 OSRO Classification

- An OSRO Classification process was developed by the USCG to evaluate an OSRO's potential to respond to and recover oil spills. Plan holders who arrange for USCG classified OSRO services do not have to list their response resources in their plans.

- CRCI is classified by the USCG as a category W3 OSRO for the inland/nearshore operating area in the Columbia River Captain of the Port (COTP).

D.1.2 Other Oil Spill Response Organizations

- Facility and Tesoro are also members of MSRC. A letter of intent to respond can be found in **Figure D.1**. The Company has also obtained permission from Global Diving & Salvage Inc., a PRC in the State of Washington, to list its respond resources for the Washington facilities. See **Figure D.1** for documentation. **Figure D.1** summarizes contractor contact information. **Figure D.2** contains evidence of contracts **Figure D.3** contains response contractor equipment maps.

D.2 NON-DEDICATED VESSELS

- Through contractual agreements, non-dedicated work boats and operators will be available to deploy geographic response plans, enhance skimming, provide platforms as vessel of opportunity skimming systems, logistical support, or other uses during a spill. Such resources could arrive on scene beginning at 48 hours.

- In addition to Clean Rivers, MSRC may also provide non-dedicated vessels to support spill response.

Figure D.1 – Facility Response Action Contractors

CONTRACTOR AND POINT OF CONTACT	ADDRESS	PHONE/FAX NUMBERS	CONTRACTOR CERTIFICATION	CONTRACT IN PLACE WITH FACILITY?	RESPONSE TIME
Clean Rivers Cooperative Inc. Ernie Quesada	200 SW Market Street, Suite 190 Portland, OR 97201	(503) 220-2040 (24 hr.) (503) 295-3660 (fax)	• USCG classification W3, River/Canal, Inland and Oceans • State of Washington approved primary response contractor	YES	2 hours
MSRC	455 Spring Park Place Suite 200 Herndon, VA 20170	(703) 326-5600 (Office) (703) 326-5660 (Fax) (800) 645-7745 (24 hr.) (425) 252-1300 (Everett)	• USCG classification W3, River/Canal, Inland and Oceans • State of Washington approved primary response contractor	YES	2 hours

FIGURE D.2 – EVIDENCE OF CONTRACTS

EVIDENCE OF CONTRACTS
CLEAN RIVERS COOPERATIVE INC. [pending]
MARINE SPILL RESPONSE CORPORATION

CLEAN RIVERS COOPERATIVE INC. [pending]

MSRC
Marine Spill Response Corporation®

Judith A. Roos
Vice President
Marketing, Customer Services & Corporate Relations
(703) 326-5617

April 30, 2015

Mr. Eric Haugstad
Tesoro Corporation Inc.
5501 NW Lower River Road
Vancouver, WA 98660

Re: Letter of Intent

Dear Mr. Haugstad:

This letter certifies that Tesoro Corporation has entered into an Agreement with the Marine Spill Response Corporation (MSRC). Pursuant to this Agreement the Tesoro Vancouver Energy facility and its accompanying facilities are (1) entitled by contract to MSRC response services, and (2) have the right to cite the capability of MSRC in its Facility Response Plan, in accordance with the terms and conditions of the Standard Form MSRC Service Agreement.

The enclosed Execution Instrument to the MSRC Service Agreement dated February 18, 2013 between Tesoro Corporation and MSRC is proof that such a contract exists. In addition, MSRC's contract is an evergreen contract and continues automatically until such time that Tesoro Corporation ceases to be a member of the Marine Preservation Association (MPA).

Please let me know if I may provide further assistance to you in the future.

Sincerely,

Judith A. Roos

Enclosure

220 Spring Street | Suite 500 | Herndon, VA 20170 | Telephone 703.326.5600 | Fax 703.326.5660

MARINE SPILL RESPONSE CORPORATION
SERVICE AGREEMENT

EXECUTION INSTRUMENT

The MSRC SERVICE AGREEEMENT attached hereto (together with this execution instrument, the "Agreement"), a standard form of agreement amended and restated as of September 27, 1996, as amended, is hereby entered into by and between

Tesoro Corporation
[Name of COMPANY]

a Delaware Corporation
[Type of entity and place of organization]

with its principal offices located at 19100 Ridgewood Parkway, San Antonio, TX 78259 (the "COMPANY"), and MARINE SPILL RESPONSE CORPORATION, a nonprofit corporation organized under the laws of Tennessee ("MSRC"), and shall be identified as

SERVICE AGREEMENT No. GMPA 346 [This is to be provided by MSRC.]

IN WITNESS WHEREOF, the parties hereto each have caused this Agreement to be duly executed and effective as of Feb. 18, 2013

Tesoro Corporaiton [COMPANY]

By: _____ [signature]

Daniel R. Romasko [print name]

Title: Executive Vice President, Operations

Address: 19100 Ridgewood Parkway
San Antonio, TX 78259

Telephone: 210/626-6881 Fax: 210/626-4051

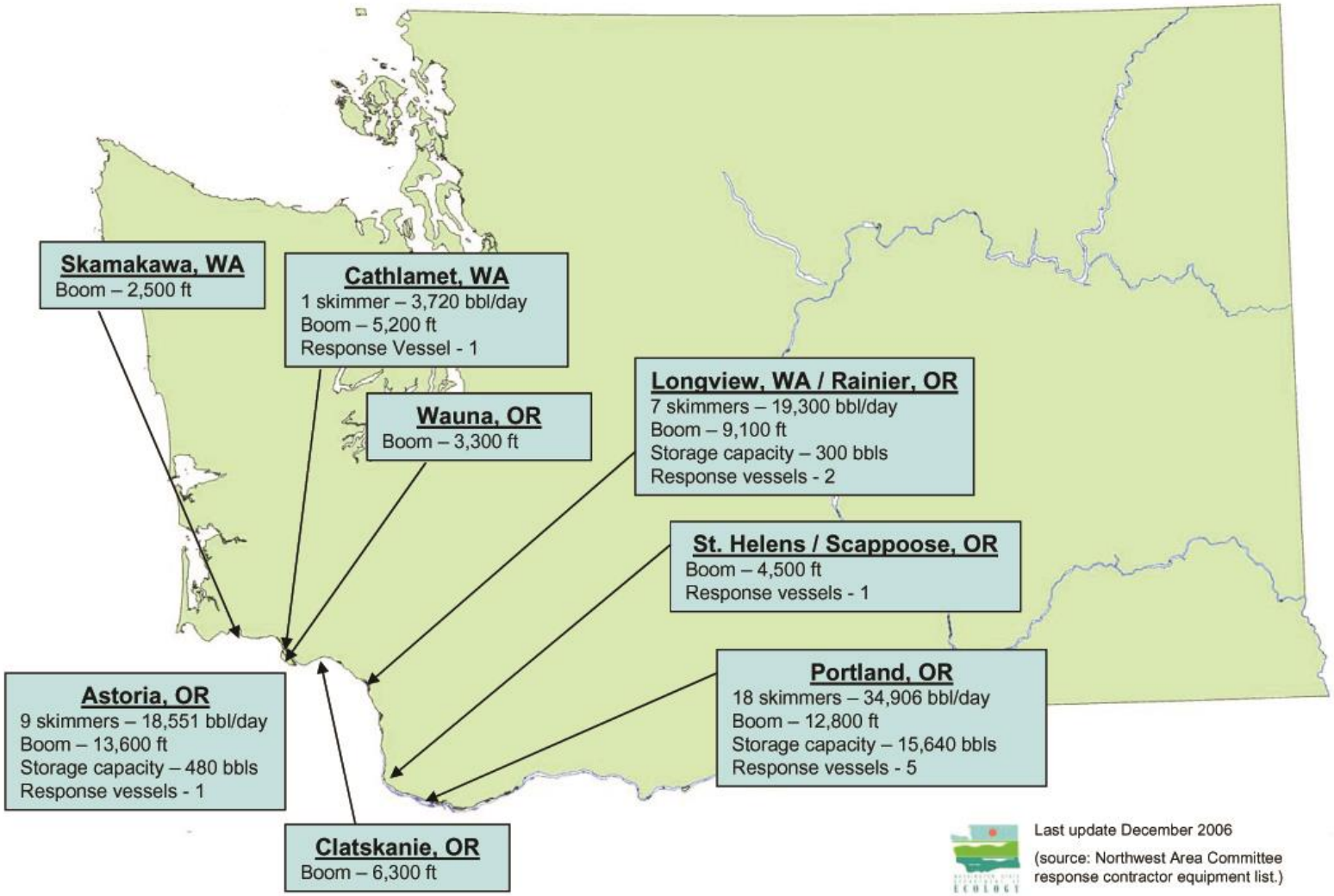
MARINE SPILL RESPONSE CORPORATION:

By: _____
Judith A. Roos
Vice President
Marketing, Customer Services & Corporate Relations
220 Spring Street, Suite 500
Herndon, VA 20170
(703) 326-5617; Fax: (703) 326-5660

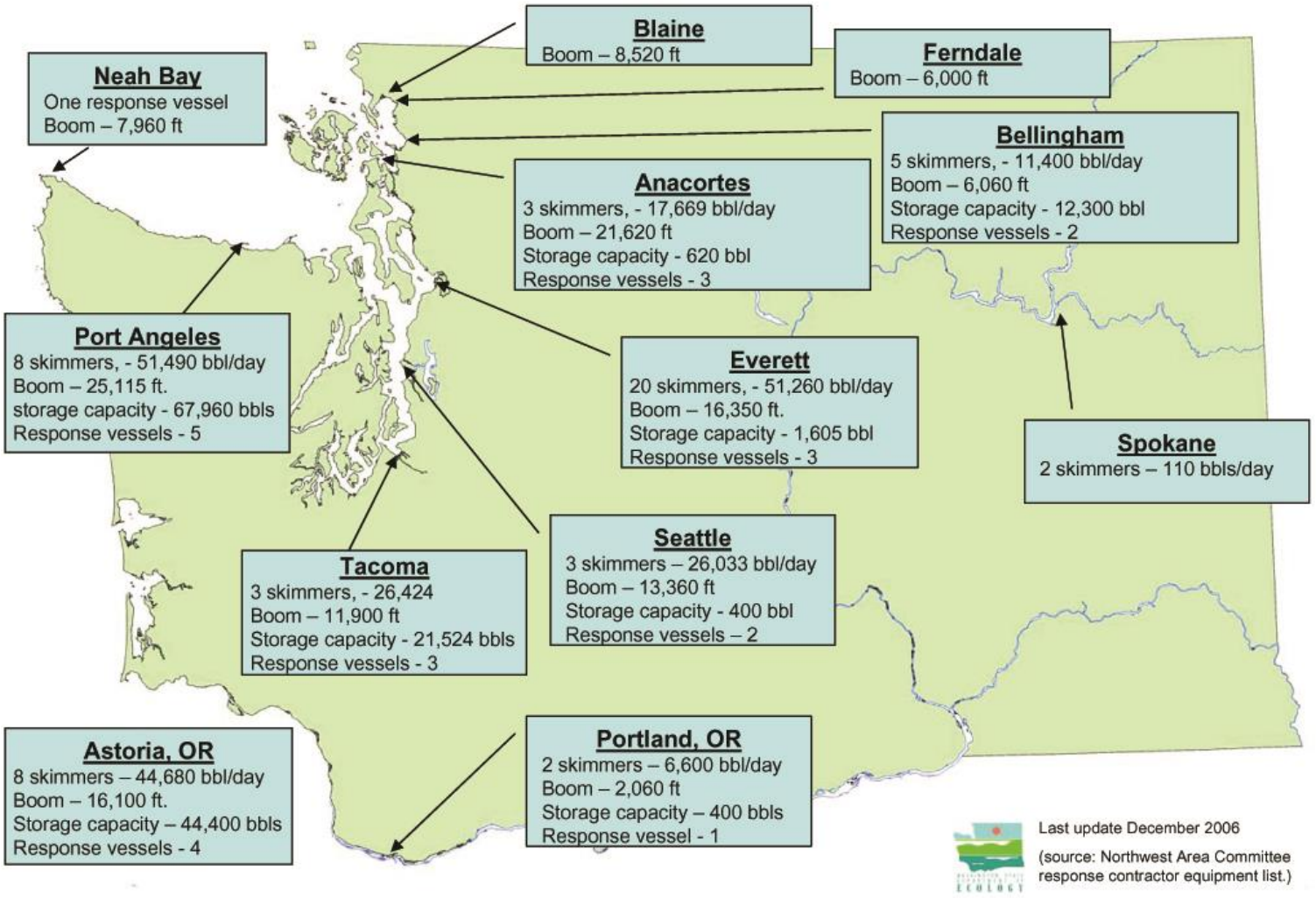
Figure D.3 Equipment Maps

EQUIPMENT MAPS
CLEAN RIVERS COOPERATIVE INC. MARINE SPILL RESPONSE CORPORATION NATIONAL RESPONSE CORPORATION (Equipment available through Clean Rivers' Contract with NRC)

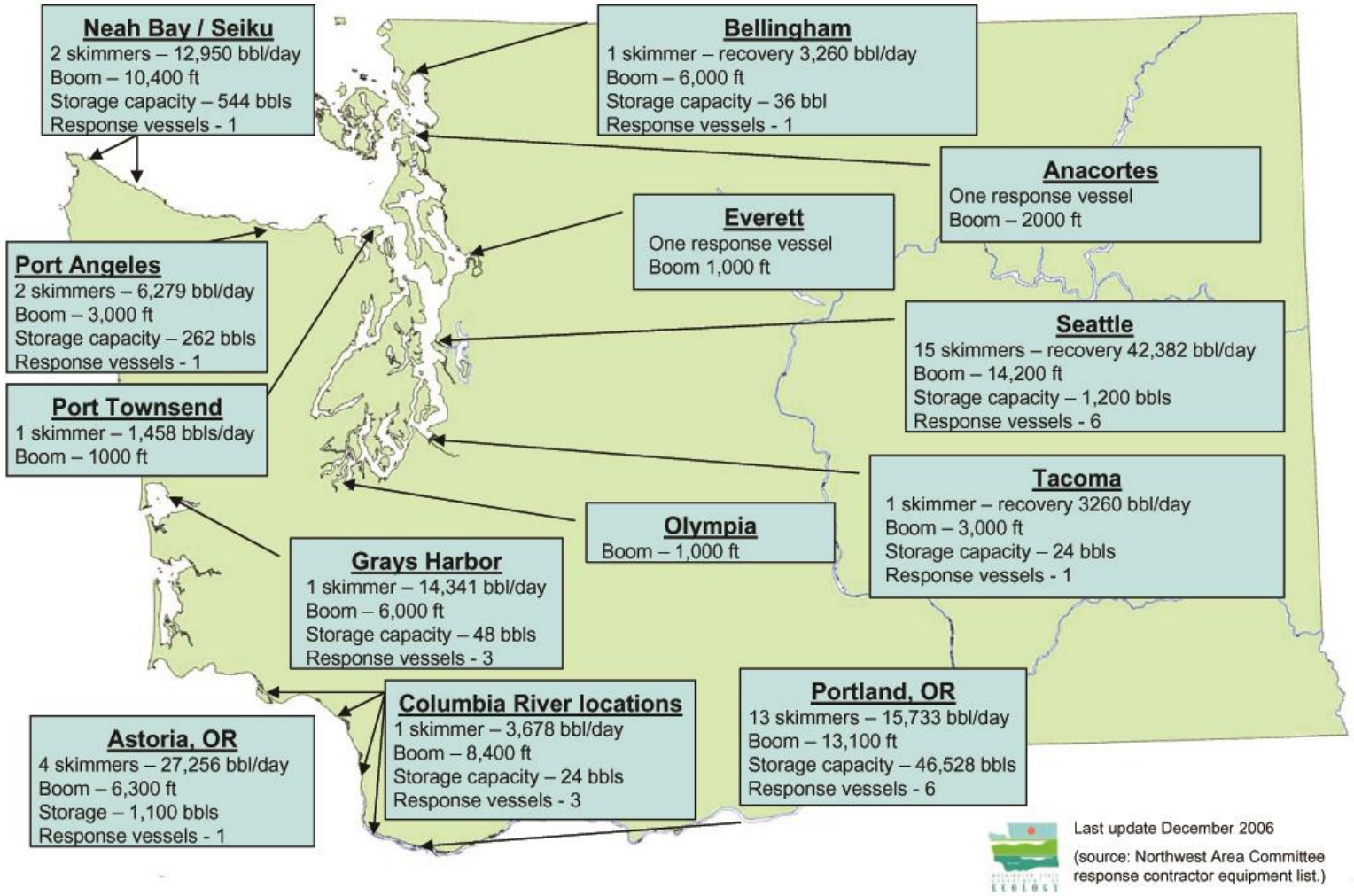
Clean Rivers Cooperative



Marine Spill Response Corporation



National Response Corporation



Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix E
Response Equipment Instructions

Appendix E
Response Equipment Instructions

Instructions for Use of Response Boat

- Use boathouse key to unlock boathouse.
- Put on life jackets. Ensure all proper PPE is in good service and in use.
- Open garage door.
- Remove boat well stabilizers, from beneath response boat.
- Lower boat via electric winches.
- Check fuel level.
- Turn on batteries.
- Start engine.
- Back boat out of boathouse.
- Operate boat in accordance with safe boating practice.

Instructions for Use of Boom

- Attach bridal leader to boat cleat.
- Deploy boom slowly, in a straight line.
- When boom is fully deployed, response boat is to turn north and deploy boom according to the Facility's Contingency Plan.

Instructions for Use of Anchors

- Secure anchor line to boom.
- Stretch line until taut and deploy anchor.

Instructions for Use of Sorbents

- Place sorbents within boomed area to absorb oil.

Instructions for Use of Fire Extinguishers

- Position yourself 8 to 10 feet from the blaze.
- Hold unit upright, pull pin.
- Squeeze lever, aim at base of flame, and sweep the foam spray from side to side.
- Advance toward flames over area that has been extinguished, while maintaining 8- to 10-foot distance.

Instructions for Use of Radios

- Turn on.
- Key microphone to talk.
- Refer to Northwest Area Contingency Plan, Tab labeled "Radio Frequencies" for proper frequencies to utilize when using the Motorola MT 2000 radios.
- When using Motorola CT 250, Channel 2 is to be used to communicate between oil companies. Channel 1 is for Facility use only.

Appendix F
Example Declaration of Inspection Form

DECLARATION OF INSPECTION

LOCATION & NAME OF FACILITY

NAME OF VESSEL | DATE TRANSFER OPERATIONS STARTS

An oil transfer operation may not commence to or from a vessel unless the following requirements are met and agreed upon by the respective transferring and receiving persons in charge.
Persons in charge indicate by a check (√), in the appropriate spaces, that the specific requirement has been met.

VESSEL		FACILITY
_____	A. The mooring lings are adequate for all anticipated conditions.	_____
_____	B. Cargo hoses and/or loading arms are long enough for intended use.	_____
_____	C. Cargo hoses are adequately supported to prevent undue strain on the couplings.	_____
_____	D. The transfer system is properly lined up for discharging or receiving oil. (Additional checks shall be performed each time a valve is repositioned.)	_____
_____	E. Each flange connection on the cargo system not being used during the transfer operation is blanked or shut off.	_____
_____	F. The cargo hoses and/or loading arms are connected to the manifolds using gaskets and a bolt in every other hole, (minimum of 4 bolts). Exception: Tanks without fixed loading systems per waiver from the Captain of the Port.	_____
_____	G. The overboard or sea suction valves are sealed or lashed in the closed position.	_____
_____	H. Adequate spill containments have been provided for couplings.	_____
_____	I. All scuppers or other overboard drains are closed or plugged.	_____
_____	J. A communications system is provided between the facility and the vessel.	_____
_____	K. Emergency shutdown system is available and operable.	_____
_____	L. Communication procedures are established and understood between persons in charge.	_____
_____	M. Qualified and designated personnel are in charge and on duty at the terminal and vessel control stations. .	_____
_____	N. One person at the vessel control station is present who fluently speaks the language of the terminal control station.	_____
_____	O. The owner of the cargo hoses will insure test requirements have been met and that the hose has no loose covers, kinks, bulges, soft spots or gouges, cuts and slashes which penetrate the hose reinforcement and that hoses are marked for identification and test data is maintained in a test log.	_____
_____	P. Adequate lighting of the vessel and terminal work areas and manifold areas is provided.	_____
	Q. Persons in charge have held a conference to assure the mutual understanding of the following transfer operations:	
_____	. . .1. Product identity to be transferred.	_____
_____	. . .2. Sequence of transfer operation.	_____
_____	. . .3. Transfer rate of flow	_____
_____	. . .4. Name or title and location of each person participating in the transfer operation	_____
_____	. . .5. Particulars of the transferring and receiving systems	_____
_____	. . .6. Starting, stripping, topping and shutdown have been discussed and understood	_____
_____	. . .7. Emergency procedures including notification, containment and cleanup of spills	_____
_____	. . .8. Watch and shift arrangements	_____
_____	. . .9. Notification before leaving stations	_____

The following items are to be filled out by Vessel personnel only.

_____ . . .1. Warning signs and read warning signals (35.35-30).
_____ . . .2. Repair work authorization (35.35-30).
_____ . . .3. Boiler and galley fires safety (35.35-30).
_____ . . .4. Fires or open flames (35.35-30).
_____ . . .5. Safe smoking space (35.35-30).

I certify that I have read, understand and agree with the foregoing as marked and agree to begin/continue the transfer operation.

PERSON IN CHARGE OF VESSEL	Signature	PERSON IN CHARGE OF FACILITY	Signature
	Title		Title
	Time Date		Time Date

The operator of each facility and the operator of each vessel shall retain a signed copy for at least a month.

Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix G
Example Maintenance and Inspection Forms

Appendix G
Example Maintenance and Inspection Forms

Vancouver Energy
Daily Gauging and Terminal Inspection Sheet

Date:

Temperature	Gravity	Tank	Gauge Feet	Gauge Inches
		001		
		002		
		003		
		004		
		005		
		006		

Terminal Inspection Form	Initial
Discharge accumulated storm water from dikes	
Look at Fire Extinguishers and Hydrants	
Check Warehouse and Office	
Check for Valve, Line and Pump Leaks	
Visual check for Leaks at Rail Rack	
Inspect Vapor Recovery Units	
Inspect all Tanks for Leaks or Damage	
Inspect Diked area for Spills, Leaks, or Damage	
Inspect Terminal Lights and Security Fencing	
Check overall Terminal Status	
Walk Buried Pipeline Routes in Terminal	
Inspect Oily Water Separators	

Comments

CATHODIC PROTECTION READINGS

Location	Test Point Reading		Change from Previous Reading, Comments, Etc.	Rectifier Reading	
	Volts			Volts	Amps
Comments:					
Date:			Signed:		

SPILL PREVENTION AND RESPONSE
TRAINING ACTIVITY REPORT

DATE OF TRAINING: _____

LOCATION: _____

INSTRUCTOR/COMPANY: _____

COURSE/TOPICS/HOURS: _____

SOURCE/TYPE OF TRAINING MATERIALS _____

NAME OF PARTICIPANTS

LAST NAME	FIRST NAME	SIGNATURE

This form shall be completed for all spill prevention and response related training except for monthly safety/prevention meetings, which are documented on a separate form.

OPA 90 “PREP” training shall be recorded on this form and on the documentation form provided by the Coast Guard.

To comply with State requirements, annual training will include a practice exercise on spill prevention during abnormal operations.

This form shall be maintained at the Terminal for a period of five years.

OIL SPILL RESPONSE DRILLS AND INSPECTIONS

Monthly Equipment Inspection (Date)	IS Inventory Complete?	Start & Run Boat Motor	Inspection Completed by:

Drill Type	Date Completed	By:
Quarterly QI Drill		
Annual Unannounced Drill		
Annual Tabletop Drill		
Semi-Annual Equipment Deployment		
Semi-Annual Equipment Deployment		

MONTHLY, QUARTERLY, AND YEARLY INSPECTION FORM

Monthly Events Year:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Check Cathodic Protection System												
Check Spill Response Equipment												
Check Fire System & Extinguishers												
Check All Tank High Level Arms												
Hold Safety & Spill Prevention Meeting												

Quarterly Events	January	April	July	October
Grease Valves, Truck & Rail Rack				
Review Oil Spill Contingency Plan				
Inspect Vapor Recovery Unit				
Quarterly Safety Inspection				

Yearly Events	Year:
Pressure Test Pipelines and Hoses	
Inspect Cathodic Protection System	
Check Fire Extinguisher and Foam System	
Check Back-Flow Preventor Valve	

Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix H
General Inspection, Maintenance, and Product Control Procedures

Appendix H
General Inspection, Maintenance, and Product Control Procedures

Daily Inspections and Product Inventory Control Documentation

1. Gauges tanks and record temperature and meter readings on all tanks. While performing gauging duties, visually inspect tanks, product lines, pumps, valves, and other equipment. Complete Daily Gauging and Terminal Inspection Sheet.
2. Input gauge, temperature, and meter data into the computer control system.
3. Input receipts or deliveries into the computer.
4. Distribute bills of lading to the appropriate offices.
5. Generate daily delivery and inventory report. Compare computer calculations with manual totals on delivery sheet.
6. Monitor schedule for pending receipts.
7. Input meter readings into the computer system, generate meter report. Distribute appropriate copies. Record copy to terminal file.
8. Compare movement and inventory data with daily delivery information to verify that inventories are accurate.
9. Send daily reports to appropriate offices and file one report locally.

Weekly Procedures

1. Back up computer system on disk and put into a secured storage.
2. Inspect any Dangerous (Hazardous) Waste accumulation drum(s), record inspection results on posted inspection form.

Monthly Procedures

1. Take physical inventory by hand gauging all tanks.
2. Inspect tank roofs and rooftop equipment while doing hand gauging.
3. Check all valve packing for leaks. Correct per Manufacturer's Service Manual. Stroke each valve five turns to assure operational readiness.
4. Check all flanges and fittings for leaks and repair/replace as necessary.
5. Complete wharfage report. Send copy to Port of Vancouver.
6. Complete terminal exchange reports and balance with movement and inventory report.
7. Monitor cathodic protection readings and record in log.
8. Hold safety meeting.
9. Conduct SPCC Monthly Inspection of area and record in log.

Quarterly Procedures and Preventative Maintenance

1. Conduct safety inspection and record in log.
2. Perform MVCU maintenance and adjustments (contract maintenance).
3. Pump and motor inspection and maintenance (see following guidelines).

Annual Procedures

1. Test foam fire protection system(s) (contract maintenance and inspection).
2. Test back flow preventor valve (contract maintenance and inspection).
3. Test fire extinguishers (contract maintenance and inspection).
4. Pressure test dock hose, shoreline and all underground product lines for leaks per Coast Guard pressure requirements. Stencil latest hydrotest date on hose and pipes.
5. Coast Guard dock inspection (scheduled by Coast Guard).
6. Port of Vancouver facility environmental inspection (scheduled by Port of Vancouver).

Quarterly Pump and Motor Inspection and Maintenance Checks

1. Inspect Pumps and Motors for Leaks and Proper Lube Oil Level.
    a. Mechanical Seals: If seal is leaking, replace per manufacturers recommendations.
    b. Bolted Joints: Inspect case, seal flush lines, and suction and discharge connections for leakage. Tighten bolts or replace gaskets as required.
    c. Lube Oil Leaks: Inspect motor and pump bearings for oil leaks and proper oil level.
2. Pump and Motor Noise and Vibration Checks
    a. Roller Bearings: Damaged bearings may emit a high-pitched squealing or a lower pitched growling noise. Bearing housings may get warm or even hot to touch. Roller bearings with these indications are either worn or damaged and should be replaced.
    b. Cavitation: Cavitation may sound like rocks in the pump and will produce erratic discharge pressure. Prolonged cavitation will result in damage to the impeller and possible bearing damage. Throttling the discharge of the pump or increasing pressure to the suction can reduce cavitation. A plugged suction screen will also cause cavitation.
    c. High Overall Vibration: Excessive vibration may be caused by cavitation, bearing damage, misalignment, bent shafts, looseness, or out of balance. Pumps and motors must not be run with excessive vibrations. If vibration is occurring, check each of the above possible causes and correct.
3. High Temperature at Pumps and Motors
    a. Pump Casing High Temperature: High temperature of the pump case may be caused by low flow through the pump. Check for blocked or throttled discharge and signs of cavitation. High temperatures may be evident by seal or gasket failure and/or a vapor lock.
    b. Pump and Motor Bearing High Temperature: High temperature in pumps or motor bearings usually is caused by loss of cooling (no product in line) or damaged bearings. Check for both if pump or motors are running hot.
    c. Motor Frame: High temperatures can be caused by overload on the motor. If this is suspected, contact electrician and check amperage draw against nameplate ratings.
4. Fittings and Mount Looseness at Pumps and Motors
    a. Normal operating conditions can loosen fittings with time. Check all guards, motor and pump base plates, mounting bolts, and all appurtenances for bolt tightness. Replace bolts, washers, nuts, etc. as appropriate.
5. External Corrosion at Pumps and Motors
    a. Exposed pumps and motors, valves and flanges, and pipe work can corrode. Check exposed metal in base plates as well as equipment for signs of corrosion. Paint, re-enforce or replace as needed.

Appendix I
Example Oil Transfer Load Plan

DEPARTMENT OF ECOLOGY
State of Washington

Oil Transfer Load Plan

Meets preloading and cargo transfer plan requirements of WAC 173-180-230.

Receiving Vessel: _____ **PIC:** _____

Delivering Facility/Barge: _____ **PIC:** _____

Date: _____ **Transfer Location:** _____

Oil Delivery Rate Recommended: _____ Maximum: _____ Topping Off: _____

Types and Volume of All Oil to be Taken: _____

Fill Sequence	ALL FUEL OR CARGO TANKS INVOLVED IN OIL TRANSFER		Product Name	☐ SOUNDING ☐ SIGHT GLASS ☐ ULLAGE		☐ FEET & INCHES ☐ METERS & TENTHS		
	Number/Name	Total Capacity Units: _____ @ 100% Full		Starting		Planned Final		Percent Full at Planned Final
				Sounding	Volume*	Sounding	Volume*	

Person Monitoring Tank Levels*: _____

Person Aligning Valves*: _____

Procedures to regularly monitor tank levels and valve alignments or location where the information can be found:

Notes, special instructions, or procedures:

* These items are NOT required to be on this form but are recommended best practices. This form must be kept for 30 days following the transfer.

If you need this publication in an alternate format, call the Spills Program at 360-407-7455. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

Appendix J
Example Advance Notice of Oil Transfer

Advance Notice of Oil Transfer

To: Prevention Section
Dept. of Ecology, Spills Program

FAX: **1-800-664-9184** or **E-mail** to OilTransferNotifications@ecy.wa.gov

*** - Indicates required fields by rule** Questions about Advance Notice of Transfers can be answered by calling 360-407-7390	
*Delivering Company Name:	
*Company Address:	
*Company Contact Name:	*Contact Phone Number: ( )
*Start Date: (mm/dd/yy)	*Start Time: (hhmm)(24-hr clock)
*Duration (hh.mm): (decimal hours)	
Deliverer Type: (Check one)	Vessel ☐ Fixed Facility ☐ Mobile ☐
*Name of Deliverer:	
Receiver Type: (Check one)	Vessel ☐ Fixed Facility ☐
*Name of Receiver:	
Berth Location:	Anchor Location:
*Address or Location of Transfer:	
*City of Transfer:	

*Product or Type of Oil(s): 1 2 3 / /	*Quantity: Gallons ☐ or Barrels ☐ 1 2 3 / /

Purpose of Transfer: ☐ Cargo ☐ Fueling ☐ Lube/Hydraulic ☐ Waste Oil ☐ Bilges

*Pre-boomed? Yes: ☐ No ☐

Comments:

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Vancouver Energy
Appendix K, Safe and Effective Threshold Determination Report

Plan No. OP.05, Operations Facility Oil Handling Manual | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 26 June 2015

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Vancouver Energy

Appendix K, Safe and Effective Threshold Determination Report

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
26 June 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	26 June 2015	Submittal for Application Review

Vancouver Energy
Appendix K, Safe and Effective Threshold Determination Report

Table of Contents

Section

1. Summary 3
1.1 Safety and Environmental Conditions 4
1.1.1 Personnel Safety 4
1.1.2 Primary Environmental Conditions 4
1.1.3 Other Conditions 5
1.1.4 Efficacy of Oil Boom under Environmental Conditions 5
1.2 Safe and Effective Threshold Values 5
1.2.1 Personnel Safety Threshold Values 5
1.2.2 Environmental Conditions Threshold Values 5
2. Introduction 6
2.1 Purpose 6
2.2 Objectives 6
2.3 Location of Terminal Dock 6
2.4 Background 8
3. Site-Specific Safety and Environmental Conditions 8
3.1 Personnel Safety 8
3.2 Primary Environmental Conditions 8
3.2.1 Sea State (Wave Height and Period) 8
3.2.2 Water Currents 9
3.2.3 Weather (Wind and Precipitation) 12
3.2.4 Other Conditions that Influence Oil Transfer Operations 19
4. Safe and Effective Threshold Values 19
4.1 Priority of Safe and Effective Threshold Values 19
4.2 Personnel Safety 19
4.3 Efficacy of Oil Boom under Range of Environmental Conditions 20
4.4 Effective Threshold Conditions for Oil Boom 21
4.4.1 Surface Water Currents 21
4.4.2 Sea State (Wave Height and Period) 21
4.4.3 Wind 22

List of Tables

Table 1. Pre-Boom Decision Tool 3
Table 2. Summary of Environmental Data for Vancouver Energy Terminal Region. 10
Table 3. Thirty-year Average (1961-1990) Wind Speed and Predominant Direction 12
Table 4. Advisory for Oil Transfer Operation Actions Related to Wind Speed 20

List of Figures

Figure 1. Aerial View of Berths 13 and 14 7
Figure 2. Columbia River Current Velocity near Vancouver, Washington 11
Figure 3. PIA, Portland, Oregon: Historical monthly average winds (Jan and Feb 1961-1990) 13
Figure 4. PIA, Portland, Oregon: Historical monthly average winds (March and April 1961-1990) 14
Figure 5. PIA, Portland, Oregon: Historical monthly average winds (May and June 1961-1990) 15
Figure 6. PIA, Portland, Oregon: Historical monthly average winds (July and August 1961-1990) 16
Figure 7. PIA, Portland, Oregon: Historical monthly average winds (Sept and Oct 1961-1990) 17
Figure 8. PIA, Portland, Oregon: Historical monthly average winds (Nov and Dec 1961-1990) 18

1. Summary

This safe and effective threshold determination report has been prepared for Tesoro Savage Petroleum Terminal LLC's (Company) Vancouver Energy (Facility). The report provides the Facility's Terminal Person-In-Charge (TPIC) of pre-booming for oil transfer operations at the dock for the Facility terminals with the threshold values for environmental conditions that allow the safe and effective deployment of oil boom around vessels prior to and during oil transfer operations.

As of 26 October 2006, Washington State rules were adopted for Facility Oil Handling Standards (Washington Administrative Code [WAC] 173-180) and Vessel Oil Transfer Advance Notice and Containment Requirements (WAC 173-184). These rules require that Class 1 facilities, such as the Facility's terminals, develop guidance on criteria and threshold values for the safe and effective deployment of oil boom for pre-booming operations.

Table 1. Pre-Boom Decision Tool

Note: This table is the key decision-making tool for deploying or not deploying boom. It is part of the form that is filled out by the Boom Boat Captain. Keep the Shift Supervisor (Shift SUP) informed of weather changes that may trigger the use of this form. Note that the Shift Sup = TPIC.

Environmental Conditions		GREEN		ORANGE		RED	
		If ALL conditions are GREEN		If ONE condition is ORANGE		If ONE condition is RED	
		BOOM?	YES	BOOM?	Shift SUP	BOOM?	NO
		REMOVE BOOM?	NO	REMOVE BOOM?	Shift SUP	REMOVE BOOM?	NO
				NO GO or EARLY TERMINATION: Shift SUP submits DOE Boom Reporting Form.		EARLY TERMINATION: Shift SUP determines if safe for boom removal.	
1.	WINDS	0 - 10 knots		10 - 20 knots		> 20 knots	
2.	WAVE HEIGHT	0 -1 foot		1 - 3 feet		> 3 feet	
3.	WAVE TYPE	Low swells, ripples, or flat calm		Slight chop, steep swells, white caps		Steep choppy breaking waves	
4.	CURRENTS	0 - 0.5 knot		0.5 - 1.0 knot		>1.0 knot	
5.	VISIBILITY	Unlimited		< 2 miles		< 1,000 feet	

Shift Supervisor (Shift SUP) decision to boom or terminate booming early will be based on Operational Factors.

For any conditions within the ORANGE range, the Shift SUP, in consultation with the Boom Boat Captain, must make a case-by-case determination of whether conditions are safe and will promote effective booming. The Shift SUP and Boom Boat Captain will also consider whether conditions are forecast to degrade such that they decrease safety or boom effectiveness below acceptable thresholds based upon the following Operational Factors.

- Ability of boom boat to operate safely in present and forecast conditions; the new style is rated up to 5 knots whereas the older style is only rated to 2 to 3 knots and is part of the effective stance.
- If boom boat freeboard and present/forecasted wave conditions could put personnel at risk of pinch point or other injuries when making boom connection or operation over the side or stern.
- The ability of the boom to contain any potential oil.

1.1 Safety and Environmental Conditions

1.1.1 Personnel Safety

Safety of personnel is the first and overriding priority for the Facility's pre-booming and oil transfer operations at the Facility dock. The Facility TPIC at the dock has the ultimate responsibility and authority to determine if it is safe for personnel to deploy oil boom to meet the pre-booming requirement. That is, the TPIC may determine that, even though the environmental threshold values described later in this report are not exceeded, there are other factors that render the pre-booming operation unsafe for personnel and, therefore, the TPIC may terminate the pre-booming operation. In this situation and any other situation where the TPIC determines that pre-booming is not safe and/or effective, the TPIC will document the circumstances supporting the decision to not pre-boom.

Personnel safety during pre-booming may be compromised by one or more of the following conditions.

- High winds
- Waves, especially high, choppy (i.e., short period) waves
- Large floating/barely submerged debris carried by strong currents
- Icy conditions
- Heavy fog, rain, or other conditions that reduce visibility to unsafe levels
- Other conditions as determined and documented by the TPIC or contractor responsible for deploying the boom

1.1.2 Primary Environmental Conditions

1.1.2.1 Sea State (Wave Height and Period)

In the Port of Vancouver USA (Port) area, wave height and period (i.e., time between wave crests passing a fixed point) do not appear to have been continuously recorded. Under most wind and wave regimes, the location of the Facility dock is sheltered from significant wind-driven wave action. However, the Facility terminal manager reports that southeasterly and northwesterly winds exceeding 25 knots (~29 miles per hour [mph]) may occur and result in waves greater than 2 to 2.5 feet high that could affect pre-booming safety and effectiveness during the oil transfer operations.

Bow waves and wakes from large commercial and recreational vessels passing on the Columbia River occasionally may be large enough (e.g., >2 to 2.5 feet) to limit the effectiveness of the boom and affect the safety of the contractors deploying or maintaining it. This effect is temporary (e.g., on the order of a minute) but does require visual monitoring for safety reasons.

1.1.2.2 Water Currents

Continuous and long-term recorded current data for the surface currents in the Columbia River at the Port apparently are not available or do not exist. The Facility terminal manager and response contractor personnel note that, based on their experience, the estimated current speed in the vicinity of the Facility dock is usually on the order of 1 to 3 knots (~1.2 to 3.5 mph) and, in flood flows, may exceed 5 knots (~6 mph) at the dock face. Modeled current flow data for the project area from the National Oceanic and Atmosphere Administration (NOAA) Northwest River Forecast Center (Portland, Oregon) indicates that the monthly average current velocity ranged from 0.7 to 1.8 knots (~0.8 to 2 mph), with maximum currents occurring in May and June and ranging from 1.6 to 2.1 knots (~1.8 to 2.3 mph). In all months, maximum current speed exceeds 1 knot part of the time.

1.1.2.3 Weather (Wind and Precipitation)

Wind velocity and precipitation data were available from the National Weather Service (NWS) for Pearson Field Airport (about 2 miles east of Vancouver, Washington). The wind direction data were obtained from a long-term dataset (30-year monthly averages) maintained on the U.S. Department of Agriculture (USDA) National Water and Climate Center website for the Portland International Airport (PIA). The PIA is

located across and about 5 miles upriver from the Port. Based on the PIA dataset, the wind in this area averages 8 to 11 mph (~7 to 10 knots) from the east-southeast during the months of October through March and approximately 8 mph from the northwest for April through September. The Vancouver NWS data, however, indicate that maximum sustained winds can occasionally exceed more than twice these averages and the Facility terminal manager's observations support this assessment. Rainfall is greatest from about late September through April but rain does occur in all months of the year. Rainfall is seldom heavy enough to, by itself, pose a safety hazard to the personnel involved in pre-booming.

1.1.3 Other Conditions

- According to the Facility terminal manager and dock personnel, other conditions that might affect pre-booming are
  - Large floating/barely submerged debris carried by strong currents.
  - Low visibility due to heavy fog, rainfall, or snowfall.
  - Freezing conditions from a combination of high winds, cold weather, and rain/sleet/snow fall may cause ice buildup on the dock and/or vessel used for deploying boom.
  - Other commercial vessel traffic in the immediate vicinity of the dock typically will not restrict pre-booming.
  - Recreational activities are very limited in the vicinity of the terminal dock and should not affect pre-booming.

1.1.4 Efficacy of Oil Boom under Environmental Conditions

Ideal performance conditions for booms used by the Facility are

- Surface current speeds < 1.0 knot perpendicular to the long axis of the boom
- Surface current speeds < 3 to 5 knots at increasingly acute angles to the long axis of the boom
- Wave heights < 1.5 to 2 feet
- Wind speeds < 20 knots (~23 mph)

Generally accepted rules among the response industry are:

- Current speeds > 0.8 to 1.0 knot perpendicular to the long axis of the boom begin to result in product loss
- Current speed > 1.5 knots perpendicular to the long axis of the boom will result in significant or complete product loss; i.e., boom efficacy approaches zero
- Waves > 18 to 24 inches high will result in splash-over of product reducing boom effectiveness by 10 to 20 percent
- Waves 24 to 30 inches in height will dramatically decrease the effectiveness of the boom
- Waves > 30 inches will render the boom essentially useless for retaining oil, even if the water current speeds are essentially zero
- Large debris entangled in the boom or lines will render the boom largely to completely ineffective

1.2 Safe and Effective Threshold Values

1.2.1 Personnel Safety Threshold Values

Because safety of personnel is the first and overriding priority for the Company pre-booming and oil transfer operations at the Facility dock, the TPIC may determine that, even though the environmental threshold values described following are not exceeded, there are other factors that render the pre-booming operation unsafe for personnel and, therefore, the TPIC may terminate the pre-booming operation.

1.2.2 Environmental Conditions Threshold Values

The following are threshold values for environmental conditions above which the TPIC will consider it not safe and/or effective to pre-boom.

- Water current speed > 1.5 knots will be the effective threshold value
- Wave heights > 2 to 2.5 feet will be the safe and effective threshold value

- Sustained wind speed greater than 30 knots (~35 mph) will be the safe and effective threshold value
- Low visibility resulting from fog, heavy precipitation, or snow at the dock and/or boom deployment vessel that, in the opinion of the TPIC, jeopardizes the safety of personnel involved in pre-booming
- Freezing and icy conditions that, in the opinion of the TPIC, jeopardize the safety of personnel involved in pre-booming
- Presence of large floating/barely submerged debris that, in the opinion of the TPIC, jeopardizes the safety of personnel involved in pre-booming

2. Introduction

2.1 Purpose

The purpose of this report is to provide the TPIC of oil transfer operations at the Facility terminal with the threshold values for environmental conditions that allow the safe and effective deployment of oil boom around vessels prior to and during oil transfer operations (also referred to as pre-booming).

2.2 Objectives

The objectives of the analysis and report are to

- Comply with the Safe and Effective Threshold Determination Report requirements of the Washington State Facility Oil Transfer Regulations (WAC 173-180-224)
- Identify personnel safety conditions and provide guidance on threshold criteria and values
- Identify oil boom oil-retention efficacy under a range of environmental conditions
- Provide guidance on criteria and threshold values for environmental conditions affecting personnel safety and oil-retention efficacy

2.3 Location of Terminal Dock

The Facility is located at the Port within the City of Vancouver in Clark County, Washington. The site is located on the Washington shore of the Columbia River. State Route 501 (Lower River Road) is located immediately to the north of the site and is available from the east. The site is located in the SE 1/4 of Section 18, NW 1/4 of Section 19, and the NW and NE 1/4 of Section 20, Township 2 North, Range 1 East W.M. Berths 13 and 14 are located at approximately Columbia River Mile 103.5.

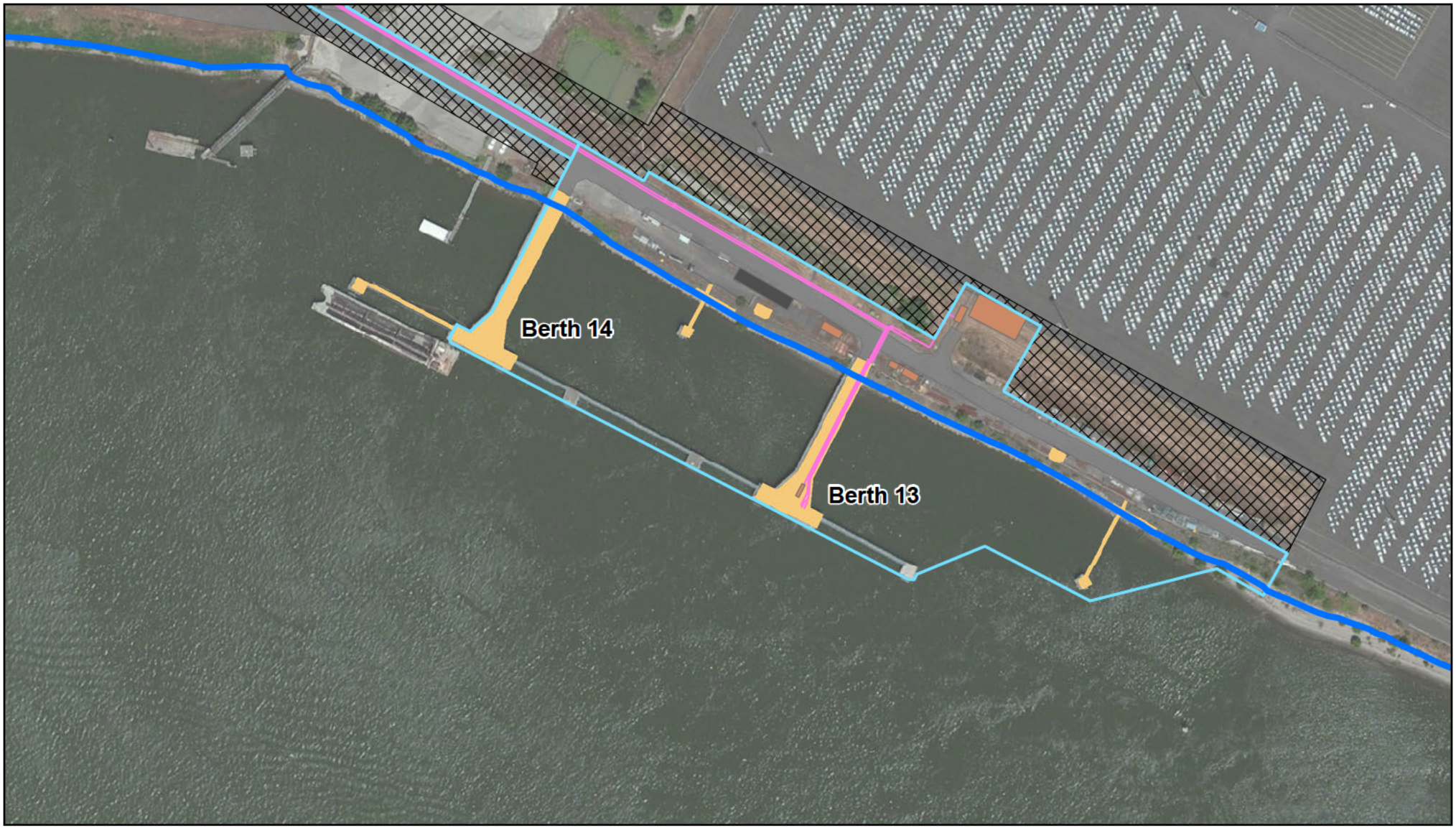


Figure 1 - Aerial View of Berths 13 and 14

LEGEND

Proposed Project Facilities

- Lease Boundary
- Construction Boundary
- Parking
- Building
- Roads
- Marine Terminal
- Transfer Pipeline
- Ordinary High Water

0 100 200 400 Feet

N

Tesoro Savage Petroleum Terminal LLC

Date: May 2015

Map Notes: Aerail photo dated July 2010, courtesy of ESRI World Imagery service

2.4 Background

As of 26 October 2006, Washington State rules were adopted for Facility Oil Handling Standards (WAC 173-180) and Vessel Oil Transfer Advance Notice and Containment Requirements (WAC 173-184). These rules require that Class 1 facilities, such as the Facility, develop guidance on criteria and threshold values for the safe and effective deployment of oil boom around vessels during oil transfer operations.

The rule requires pre-booming of: (a) any bulk oil transfer operation greater than 500 gallons per minute from a vessel to a non-recreational vessel or facility, or (b) oil transfer from a Class 1 facility to a vessel, "… when it is safe and effective to do so…." The rule provides guidance on the determination of when it is, and is not, safe and effective to pre-boom the oil transfer vessel and facility.

This report provides the personnel safety and environmental criteria and threshold values for determination of when it is safe and effective to pre-boom at the Facility's dock. The analyses are based on data available from a variety of sources, including NOAANWS; weather stations at the terminal; boom manufacturers' technical specifications for their products; experience of the oil spill response contractors retained by the Facility for the terminal; other contractors retained by the Facility to handle normal docking and oil transfer operations at the dock; and on-site observations and experience of the dock operators and other Facility personnel.

3. Site-Specific Safety and Environmental Conditions

3.1 Personnel Safety

Facility TPIC at the terminal dock has the ultimate responsibility and authority to determine if it is safe for personnel to deploy oil boom to meet the pre-booming requirement. That is, the TPIC may determine that, even though the threshold values described later in this report are not exceeded, there are other factors that render the pre-booming operation unsafe for personnel and, therefore, the TPIC may terminate the pre-booming operation. In this situation and any other situation where the TPIC determines that pre-booming is not safe and/or effective, the TPIC will document the circumstances supporting the decision to not pre-boom and to proceed with alternative measures as required in WAC 173-180-221 and WAC 173-180-222.

Personnel safety may be compromised by one or more of the following conditions.

- High winds that affect the docking of the vessel or maintaining its position at the dock during transfer operations, even if these winds do not result in large waves (e.g., sustained wind speeds greater than 30 knots).
- Waves, especially high, choppy (i.e., short period) waves that affect the stability and maneuverability of the vessels deploying the boom.
- Icy conditions that make the dock and/or boom deployment vessel slippery.
- Heavy fog, rain, or other conditions that reduce visibility to unsafe levels for the boom deployment crew.
- High river flow (e.g., flood conditions) carrying large debris, flotsam, and jetsam that could make small vessel operations unsafe (and likely render the boom ineffective if not completely inoperative).
- Other conditions as determined and documented by the TPIC or designee, or Facility response or other contractor responsible for deploying the boom.

3.2 Primary Environmental Conditions

3.2.1 Sea State (Wave Height and Period)

Under most wind and wave regimes, the location of the Facility dock is sheltered from significant wind-driven wave action. Except from southeasterly and northwesterly wind directions, the fetch (i.e., straight

line distance in a specified direction over water from the dock to land or large structure. such as the Interstate 5 bridge) is short and waves usually are not an environmental factor for oil transfer operations. Even from the southeasterly and northwesterly directions (which is approximately parallel to the Columbia River channel in this area), the dock location is partially sheltered from wind-generated waves. The upstream and downstream structures, such as bridges and shoreline structures, partially break up the wind-driven waves.

In the Port area, wave height and period (i.e., time between wave crests passing a fixed point) do not appear to have been continuously recorded or are not publicly available if they were. However, the Facility terminal manager reports that southeasterly and northwesterly winds exceeding 25 knots (~29 mph) [1] may occur and result in waves greater than 2 to 2.5 feet high that could affect pre-booming safety and effectiveness during the oil transfer operations.

Bow waves and wakes from large commercial and recreational vessels passing on the Columbia River occasionally may be large enough (e.g., > 2 to 2.5 feet) to limit the effectiveness of the boom and affect the safety of the contractors deploying or maintaining it. This effect is temporary (e.g., on the order of a minute) but does require visual monitoring for safety reasons.

3.2.2 Water Currents

Continuous and long-term recorded current data for the surface currents in the Columbia River at the Port were not identified despite Internet and literature searches, and contacts with the United States Geological Survey (USGS), NOAA, NWS, U.S. Army Corps of Engineers (USACE), Port, and cleanup contractors. Based on these efforts, it appears unlikely that long-term, continuous recorded data of current velocity data for the Port exist.

Based on experience at the nearby Tesoro Dock, the estimated current speed in the vicinity of the Facility dock is usually on the order of 1 to 3 knots (~1.2 to 3.5 mph) and, in flood flows, may exceed 5 knots (~6 mph) at the dock face. They reported that the current generally flows downriver (e.g., east to west) indicating that the tidal influence that reaches the Port has little effect on currents and does not impact booming operations or effectiveness.

Modeled current flow data (channel average) for the project area was obtained from the NOAA Northwest River Forecast Center (Portland, Oregon). The NOAA model uses certain “real-time” inputs (i.e., tide state and dam releases) to forecast flooding events. Given the apparent lack of recorded data, the modeled data represent a reasonable estimate of river channel current conditions at the Port over the period of 2003 to 2006 although it did not include the entire 2003 to 2006 time period. The results are summarized in Table 2 and Figure 2. Only the average, maximum, and minimum values for each month are included in Table 2 and Figure 2. Over the four-year period, the monthly average current velocity ranged from 0.7 to 1.8 knots (~0.8 to 2 mph), with maximum currents occurring in May and June and ranging from 1.6 to 2.1 knots (~1.8 to 2.3 mph). In all months, maximum current speed exceeds 1 knot part of the time. However, because of the structure of the dataset obtained, it was not practical to estimate the percentage of time over the four-year period that the current exceeded any specified value (e.g., 1 knot).

[1] Wind speed is typically reported in miles per hour by the weather service databases accessed for this report and the Facility. Weather station wind speed readout is in statute miles per hour. Marine operations typically report wind speed and water current speed in nautical miles per hour (knots). For this report, wind speed is presented in knots with speed in miles per hour provided in parentheses where appropriate. Also, for comparison, a statue mile is 5,280 feet and a nautical mile is 6,076 feet long.

Table 2. Summary of Environmental Data for Vancouver Energy Terminal Region

		Precipitation (in)[1]				Wind (mph)[1]			Current (kts)[2]		
YEAR	MONTH	Avg	Max	Min	Total	Avg	Max	Min	Avg	Max	Min
2003	Jan	0.26	2.15	0	8.16	4	26	0	na[3]	na	na
	Feb	0.11	0.81	0	2.24	3	23	0	na	na	na
	March	0.17	0.88	0	5.44	5	16	0	na	na	na
	April	0.16	0.73	0	4.89	4	17	0	na	na	na
	May	0.09	0.34	0	1.28	2	17	0	na	na	na
	June	0	0.1	0	0.25	3	18	0	na	na	na
	July	0	0	0	0	3	15	0	na	na	na
	Aug	0	0.03	0	0.04	3	15	0	na	na	na
	Sept	0.06	0.5	0	0.95	3	16	0	na	na	na
	Oct	0.11	0.88	0	2.88	4	18	0	na	na	na
	Nov	0.15	1.48	0	4.02	5	20	0	na	na	na
	Dec	0.25	1.59	0	8.02	5	31	0	0.9	1.4	0.1
2004	Jan	0.2	0.78	0	5.89	4	21	0	0.9	1.3	0.3
	Feb	0.13	0.61	0	4.16	4	22	0	0.9	1.3	0.4
	March	0.08	0.34	0	1.83	4	21	0	1.0	1.4	0.4
	April	0.05	0.31	0	0.83	4	23	0	1.1	1.6	0.5
	May	0.08	0.36	0	1.67	4	20	0	1.4	2.0	0.9
	June	0.07	0.36	0	0.93	5	24	0	1.4	1.9	0.7
	July	0	0.01	0	0.02	5	17	0	1.2	1.5	0.7
	Aug	0.13	0.84	0	2.68	5	18	0	1.0	1.2	0.7
	Sept	0.09	0.63	0	1.68	4	18	0	0.9	1.1	0.4
	Oct	0.13	0.69	0	3.54	4	23	0	na	na	na
	Nov	0.11	0.85	0	2.48	3	18	0	na	na	na
	Dec	0.14	0.59	0	4.3	5	30	0	na	na	na
2005	Jan	0.1	0.71	0	2.09	5	29	0	na	na	na
	Feb	0.07	0.66	0	1.24	4	23	0	na	na	na
	March	0.18	1.38	0	4.19	4	23	0	1.0	1.3	0.5
	April	0.13	0.58	0	3.59	5	29	0	0.9	1.5	0.4
	May	0.14	0.79	0	4.39	5	23	0	1.2	1.7	0.7
	June	0.09	0.45	0	2.12	5	17	0	1.2	1.6	0.6
	July	0.04	0.23	0	0.36	6	18	0	1.2	1.6	0.6
	Aug	0.03	0.8	0	0.81	6	17	0	0.9	1.2	0.4
	Sept	0.06	1.67	0	1.73	5	18	0	0.7	1.1	-0.1
	Oct	0.12	1.08	0	3.37	4	21	0	0.7	1.2	0.0
	Nov	0.18	1.23	0	5.23	4	24	0	0.8	1.2	0.2
	Dec	0.25	1.35	0	7.9	6	30	0	0.8	1.3	0.2

		Precipitation (in)[1]				Wind (mph)[1]			Current (kts)[2]		
YEAR	MONTH	Avg	Max	Min	Total	Avg	Max	Min	Avg	Max	Min
2006	Jan	0.37	1.35	0	11.42	7	26	0	1.0	1.4	0.5
	Feb	0.1	0.63	0	2.33	6	31	0	1.1	1.5	0.6
	March	0.15	0.39	0	3.06	6	25	0	1.0	1.4	0.4
	April	0.1	0.48	0	2.38	5	22	0	1.6	2.0	0.5
	May	0.1	0.54	0	2.67	4	22	0	1.8	2.1	1.1
	June	0.08	0.45	0	1.18	5	18	0	1.8	2.1	1.1
	July	0.02	0.23	0	0.25	5	17	0	1.2	1.8	0.7
	Aug	0	0.11	0	0.12	5	17	0	1.0	1.4	0.4
	Sept	0.03	0.25	0	0.69	4	23	0	0.7	1.2	0.0
	Oct	0.08	0.42	0	1.41	3	22	0	0.7	1.1	-0.1
	Nov	0.55	2.9	0	13.31	6	29	0	0.8	1.3	-0.1
	Dec	0.1	0.64	0	7.16	5	23	0	0.9	1.5	0.2

1. Precipitation and Wind Data: taken from the Weather Underground website (www.wunderground.com), which archives NWS data.
2. Velocity Data: Calculated for Vancouver, WA by NOAA NW River Forecast Center
3. na = not available, usually because one or more of the input data were not available to NOAA

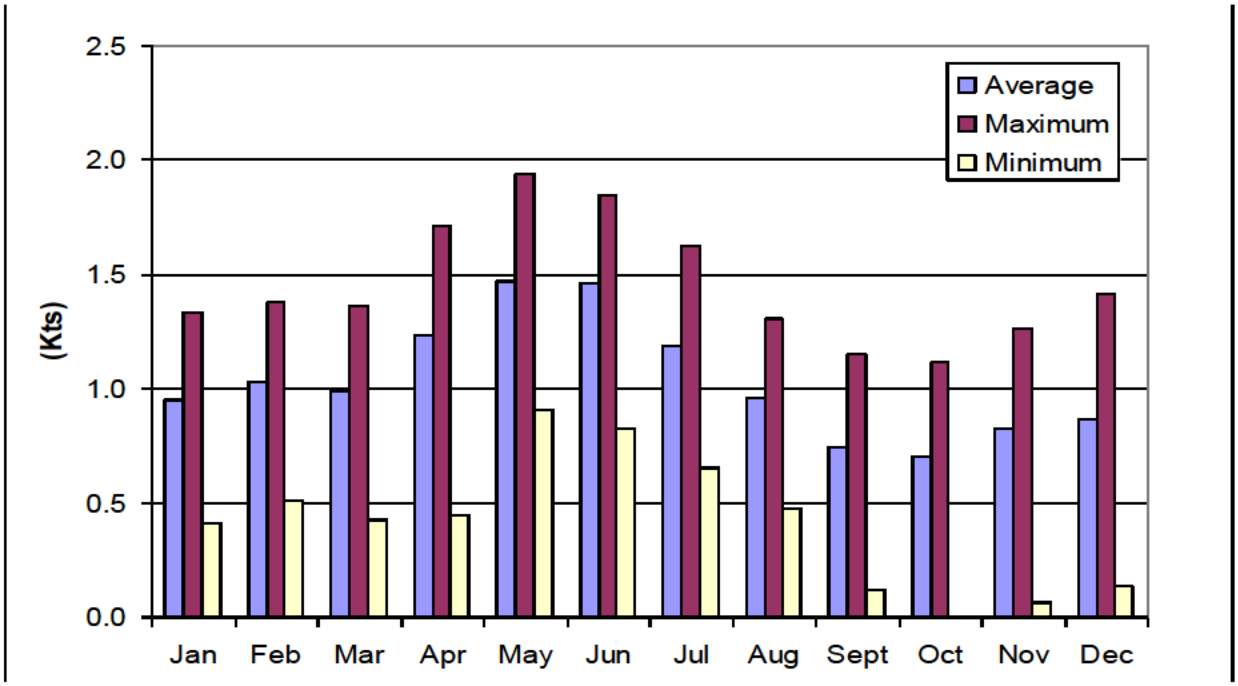


Figure 2. Columbia River Current Velocity near Vancouver, Washington (based on the 4 years of data provided in Table 2)

3.2.3 Weather (Wind and Precipitation)

The wind velocity and precipitation data presented in the summary Table 2 were collected at Pearson Field Airport (about 1.5 miles upriver of the dock and in southeast Vancouver, Washington) by NWS.

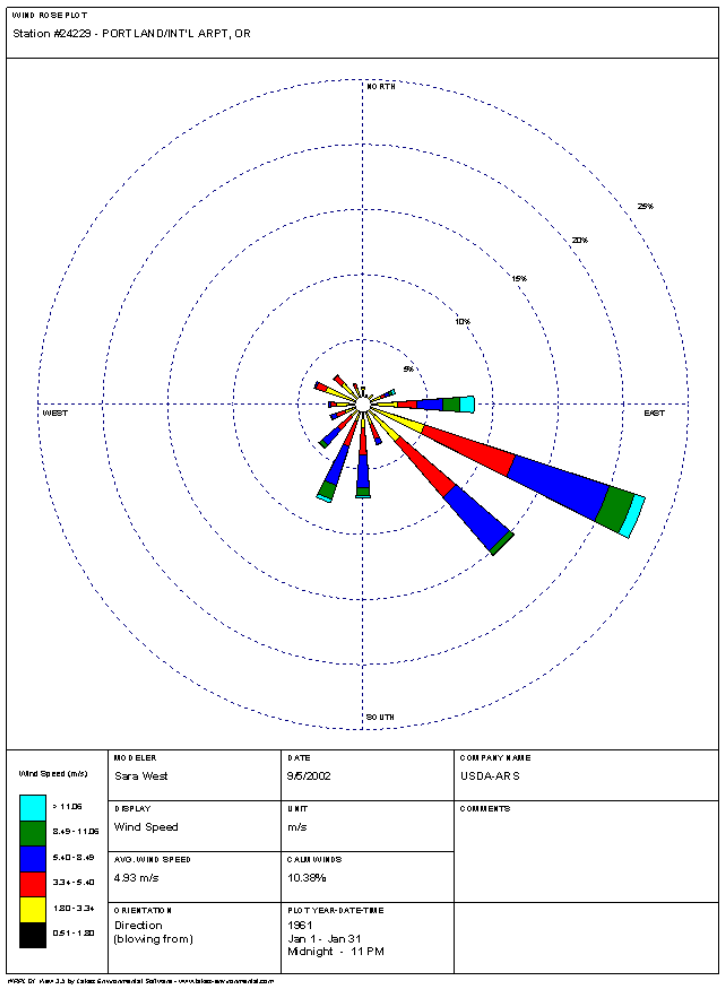
Because the wind direction information required was not available as a part of this dataset, these direction data were obtained from a long-term dataset (30-year monthly averages) maintained on the USDA National Water and Climate Center website for the PIA. The PIA is located across and about 5 miles upriver from the Port. The wind roses created by the USDA for this site are provided in Figures 3 to 8 and the information is summarized in Table 3. Based on the Portland USDA data, it appears that the wind in this area averages 8 to 11 mph (~7 to 10 knots) from the east-southeast during the months of October through March and approximately 8 mph from the northwest for April through September. The Vancouver NWS data (Table 2), however, indicate that maximum sustained winds can occasionally exceed more than twice these averages.

Most precipitation in the area is rainfall though occasional snowfall and rare hail or sleet storms occur in winter. Rain does occur in all months of the year and is greatest from about late September through April. Rainfall can be heavy but is usually not heavy enough for long enough duration to affect safety of the pre-booming operations.

Table 3. Thirty-year Average (1961-1990) Wind Speed and Predominant Direction Recorded at the Portland International Airport (Portland, Oregon)*

	Average Speed (MPH)	Primary Direction	Time From Primary Direction (%)
Jan	11	ESE	23
Feb	10.5	ESE	22
March	9.5	ESE	14
April	8.6	NW	11
May	8.1	NW	14
June	8.2	NW	17
July	8.3	NNW	23
Aug	7.9	NW	21
Sept	7.7	NW	14
Oct	7.9	ESE	11
Nov	10.1	ESE	19
Dec	10.6	ESE	24

* Long-term wind data obtained from the USDA National Water and Climate Center website http://www.wcc.nrcs.usda.gov/climate/windrose.html. Data are also presented in Figures 3 to 8 of this report.



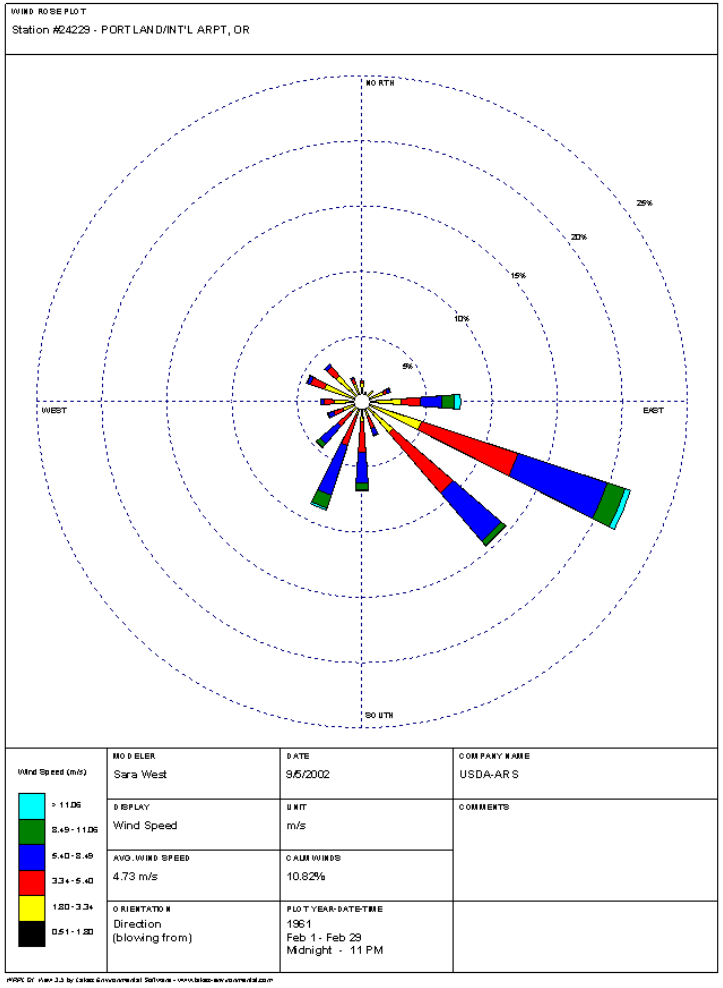
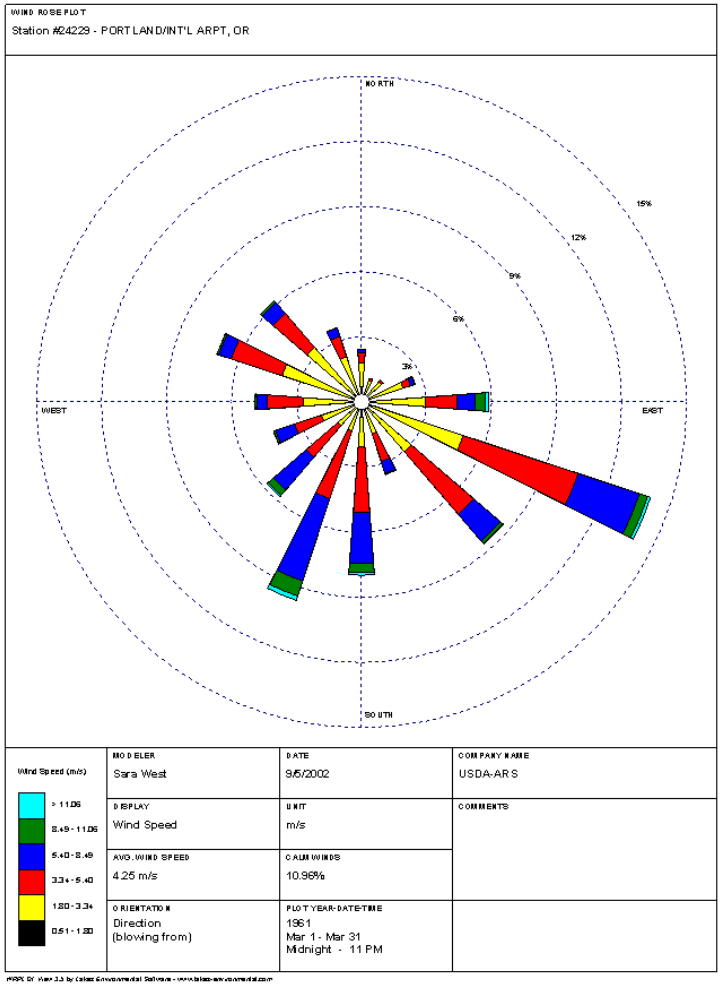


Figure 3. PIA, Portland, Oregon: Historical monthly average winds (Jan and Feb 1961-1990)



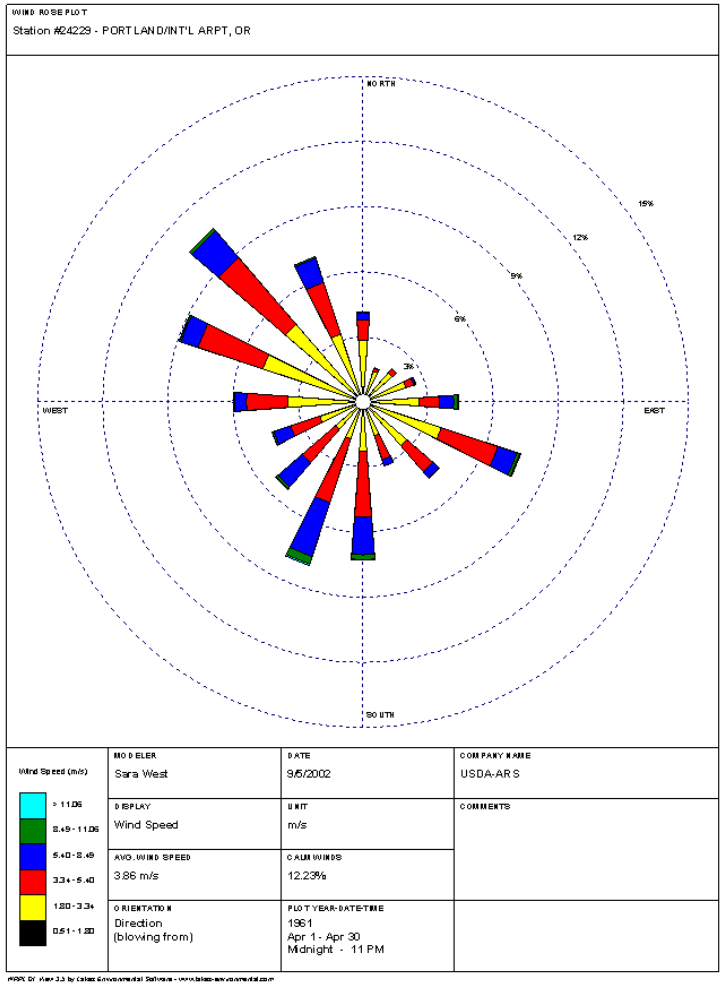
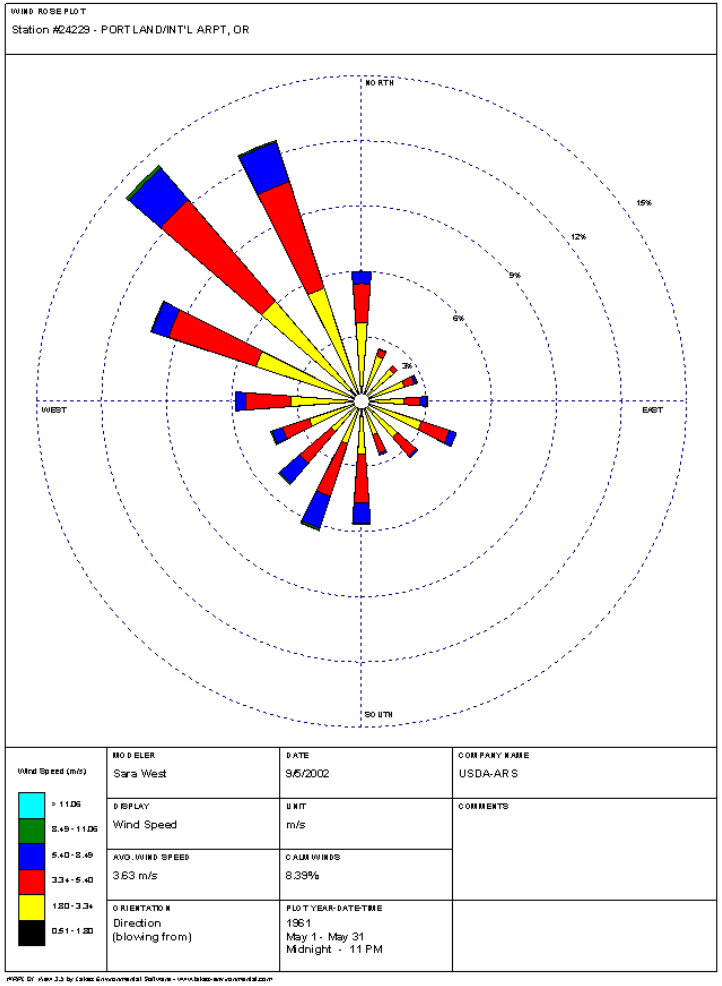


Figure 4. PIA, Portland, Oregon: Historical monthly average winds (March and April 1961-1990)



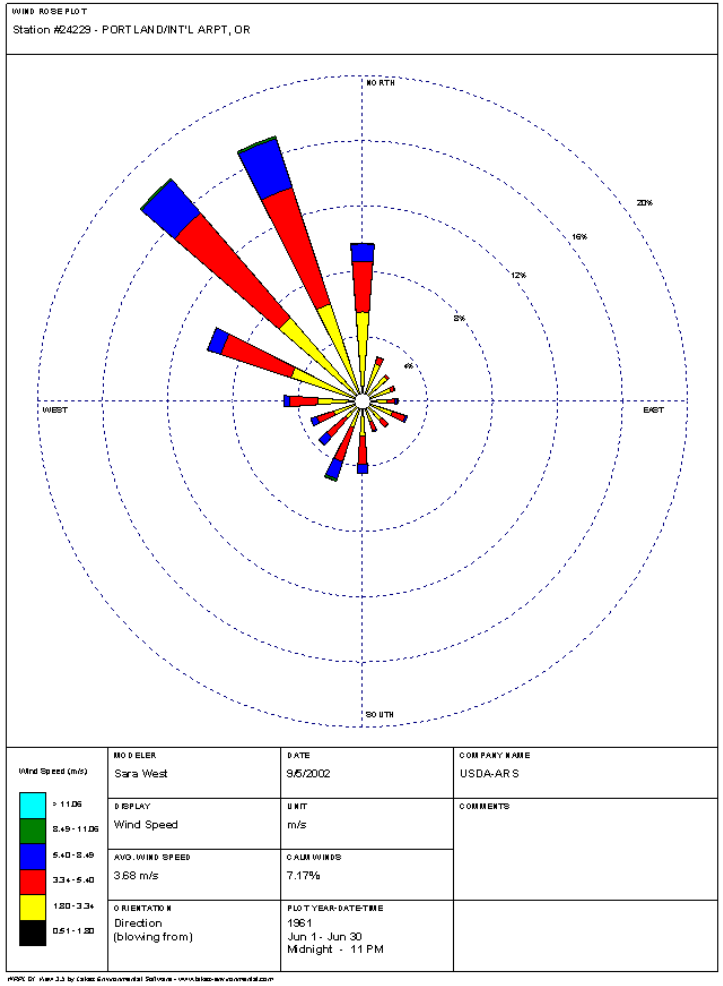
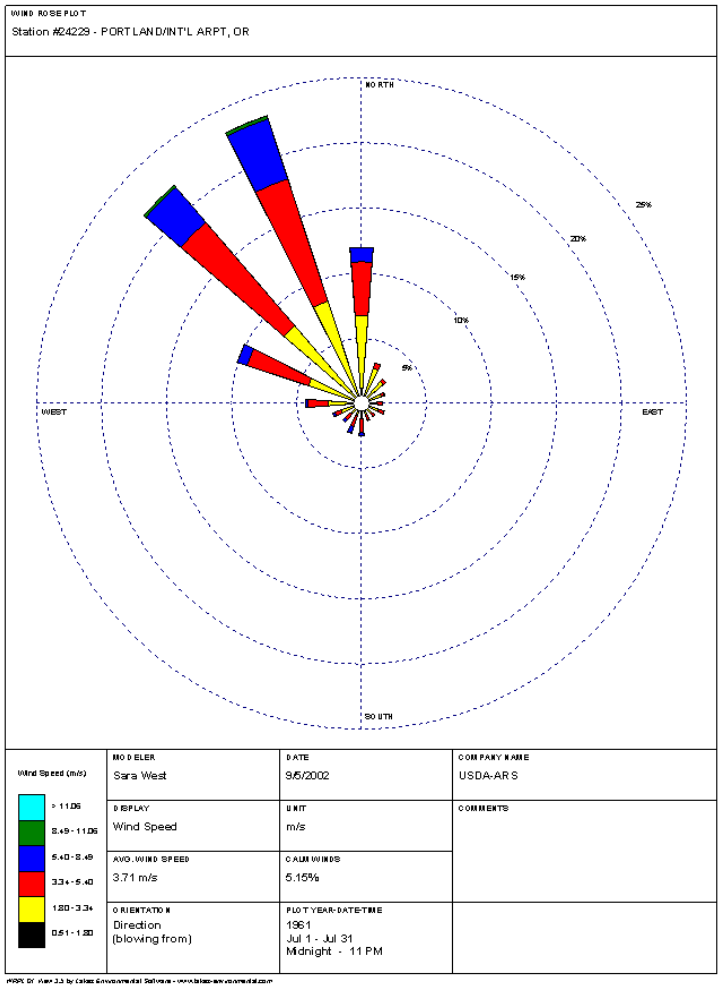


Figure 5. PIA, Portland, Oregon: Historical monthly average winds (May and June 1961-1990)



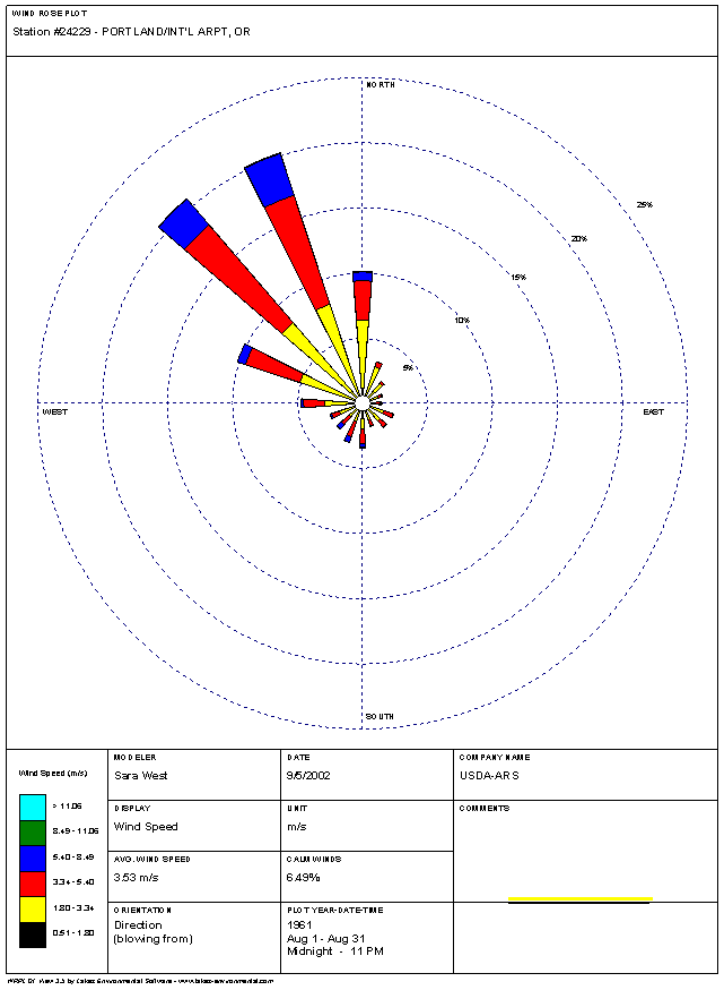
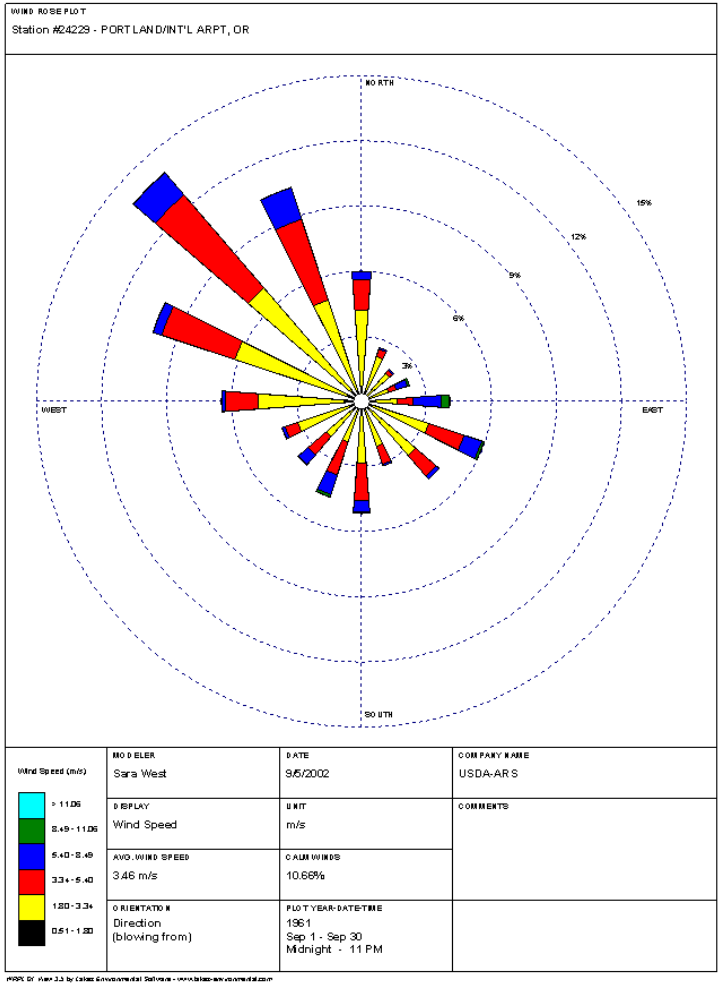


Figure 6. PIA, Portland, Oregon: Historical monthly average winds (July and August 1961-1990)



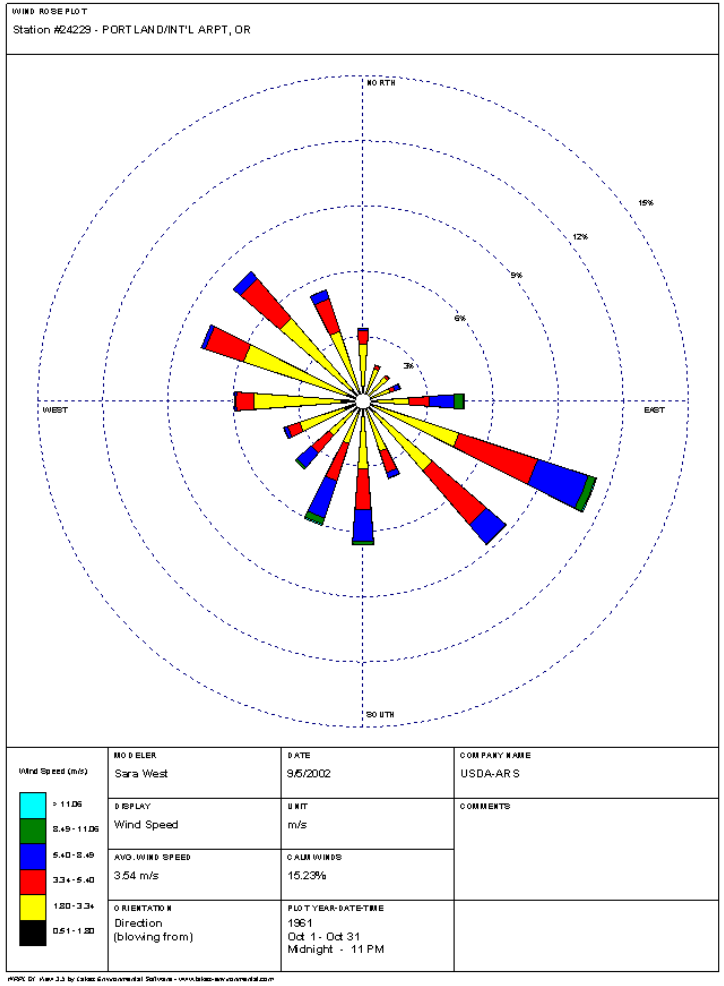
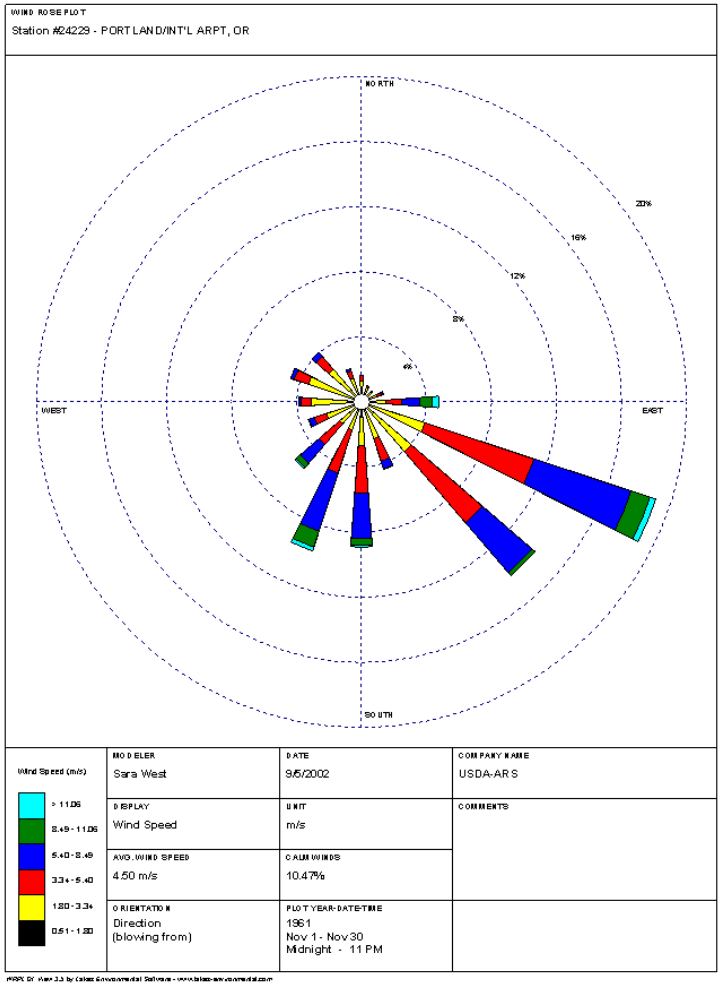


Figure 7. PIA, Portland, Oregon: Historical monthly average winds (Sept and Oct 1961-1990)



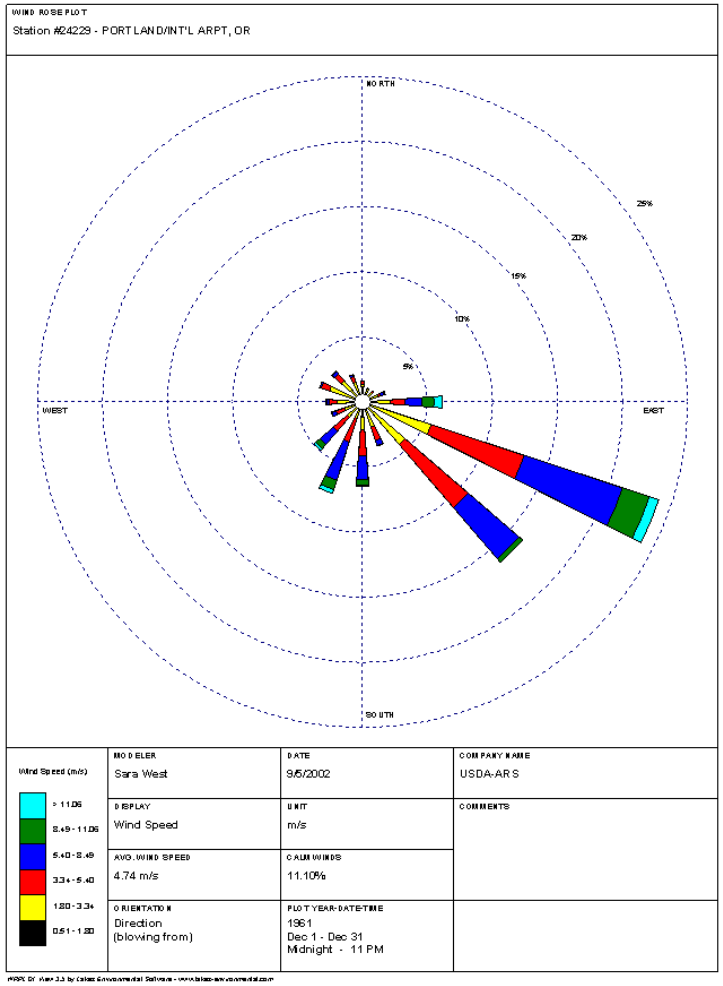


Figure 8. PIA, Portland, Oregon: Historical monthly average winds (Nov and Dec 1961-1990)

3.2.4 Other Conditions that Influence Oil Transfer Operations

Large floating or barely submerged debris (e.g., logs, tree stumps, pieces of buildings, lumber, etc.) carried by high river flow (e.g., spring flood conditions) is a relatively common occurrence according to personnel at the Port. The debris could make small boat operations unsafe and likely render the boom ineffective if not completely inoperative.

Low visibility due to fog or, rarely, heavy rainfall or snowfall may occur at the dock.

Freezing conditions from some combination of high winds, cold weather, and rain/sleet/snow fall may cause ice buildup on the dock and/or vessel used for deploying boom (as well as on the vessel being loaded or unloaded). This could result in unsafe operating conditions for the personnel.

Other commercial vessel traffic in the immediate vicinity of the dock during an oil transfer operation will typically not restrict the ability of the Facility contractor to deploy boom around the vessel. However, passing large vessels (e.g., freighters, tugs, and tug/barge combinations) may create a wake that briefly impacts the safety of pre-booming operations.

Recreational activities are limited in the immediate vicinity of the dock and should not present a limitation to oil transfer operations. Passing large recreational vessels may create wakes that briefly impacts the safety of pre-booming operations.

4. Safe and Effective Threshold Values

4.1 Priority of Safe and Effective Threshold Values

Safety of the personnel assigned to the pre-booming of barges or ships prior to oil transfer operations is the first and highest priority for the Facility TPIC. This priority, whatever the reason, will supersede all environmental threshold values (though it may be influenced by one or more of these environmental conditions).

Once the safety of the personnel is assured to the TPIC's satisfaction, the TPIC will then evaluate the environmental factors that affect the efficacy of oil-retention by the deployed boom. If these conditions, primarily surface water currents or sea state (e.g., wave height and period), exceed the threshold values provided here as guidance, the TPIC will make and document the decision to pre-boom or not.

Though other factors may affect the TPIC's determination to pre-boom or not, the environmental conditions that have the greatest potential to affect personnel safety are described in the following sections.

4.2 Personnel Safety

The primary environmental conditions that generally influence personnel safety at the Facility dock during oil transfer operations are high winds, sea state, and presence of large debris. Low visibility or ice formation is infrequent but possible limitations from a safety perspective.

High winds may be detrimental to the pre-booming and other oil transfer operations at the dock. For the safety of dock personnel and the contractor deploying the boom, the Facility PIC may use Small Craft Advisory (SCA) conditions as an initial guide in the PIC's determination to authorize the launch or use of company-owned and operated oil spill response equipment for pre-boom deployment. These SCA conditions may either be present or forecasted. By definition, the NWS SCA conditions reference sustained winds under 33 knots (~38 mph) that may pose a hazard for small vessel operators. The Facility recognizes that, even if the SCA is issued or SCA conditions are applicable for the region, certain local conditions or combinations thereof may occur that could allow the TPIC to proceed with pre-

booming. Pre-booming may occur only after conditions are documented and agreed to between TPIC and the contractor.

The following wind guidelines will be applied to all vessels at the Facility dock. The wind speeds are sustained as opposed to winds gusting up to these speeds. Sustained winds are determined when the speed is constant for more than 5 minutes. The following chart provides guidance as to the appropriate action to consider when wind speeds are high and sustained.

Table 4. Advisory for Oil Transfer Operation Actions Related to Wind Speed

Wind Speed (mph)	Wind Speed (knots)	Action Required
0-35	0-30	Monitor vessel tie-up lines and hose connections as normal.
35-40	30-35	Shutdown oil transfer operations and drain hoses.
Over 40	Over 35	Disconnect and stow hoses, if safe to do so.
Over 45	Over 39	Request vessel to prepare and sail if the vessel or dock is in jeopardy of sustaining damage. If safe to do so, sail the vessel.

Sea state (e.g., wave height and period) at the Facility dock are almost entirely a function of wind speed and direction, with southeasterly or northwesterly winds resulting in the highest waves. The vessel used to deploy the boom in the pre-booming operation is to be determined, but is likely to be a stable platform in most wave conditions expected at the dock. In the case when wave heights exceed about 2 to 2.5 feet in a "choppy" sea (i.e., short-period wind chop on top of the larger, longer-period swells), the PIC may consider it unsafe for personnel to deploy the boom, regardless of the potential efficacy of the boom to retain oil.

Low visibility resulting from fog, heavy precipitation, or snow at the dock and/or boom deployment vessel may jeopardize the safety of personnel involved in transfer operations. Close consultation between the TPIC and Vessel Person-In-Charge (VPIC) will be undertaken to determine if conditions are unsafe for personnel to pre-boom the vessel.

Freezing conditions that result in ice buildup on the dock and/or boom deployment vessel may jeopardize the safety of personnel involved in pre booming operations. Close consultation between the Facility TPIC and VICP will be undertaken to determine if conditions are unsafe for personnel to pre-boom the vessel.

Large floating/barely submerged debris is generally associated with high water flows and strong currents. The combination may pose a safety hazard to the pre-booming vessel, as well as to the boom and lines used to secure the boom. Close consultation between the TPIC and personnel on the contractor's pre-booming boat will be undertaken to determine if conditions are unsafe for personnel to pre-boom the vessel.

4.3 Efficacy of Oil Boom under Range of Environmental Conditions

The Facility will deploy up to 1,600 feet of 18-inch fence boom, and 3,000 feet of 12- by 6-inch containment boom (1,000 feet with 36-inch floats and 2,000 feet with 72-inch floats). The fence boom is best suited for use in semi-protected environments. Having a high freeboard and a flat flotation device, fence booms are less effective in rough water, where wave and wind action can cause the boom to twist. Ideal performance conditions for the fence boom are

- Surface current speeds < 1.0 knot perpendicular to the boom and up to 5 knots depending upon the angle of the boom relative to the current direction
- Wave heights < 1.5 to 2 feet
- Wind speeds < 20 knots (~23 mph)

The containment booms have a more circular flotation device and a continuous skirt. They perform well in rough water, but are more difficult to clean and store than fence booms.

As currents pushing against the boom increase beyond ideal operating conditions, the boom becomes subject to hydraulic failure, commonly referred to as entrainment, and the oil product may begin to slip under the boom skirt. Entrainment is common to all types of booms regardless of size or design. Entrainment does not indicate a complete failure of the boom but does impact the efficacy of the boom.

It is difficult to establish exact limits of current speed to boom efficacy. A generally accepted rule among the response industry is that current speeds > 0.8 to 1.0 knot perpendicular to the long axis of the boom will begin to result in product loss, and current speed > 1.5 knots will result in significant or complete product loss. As the boom angle is adjusted toward parallel with the current direction, the entrainment is reduced for a given current speed. However, as current speed approaches 5 knots, boom effectiveness approaches zero regardless of boom configuration.

Modifying the boom configuration under different current regimes can have a dramatic impact on efficacy and in many cases can improve the capability to control product into a collection point. However, for oil transfer pre-booming where the boom needs to surround a vessel, the opportunity to develop alternative configurations is limited. In the pre-booming configuration, some portion of the downstream end of the boom will be at or near perpendicular to the current thereby reducing overall effectiveness of oil retention at high current velocity at that location.

Another generally accepted rule among the response industry is that waves > 18 to 24 inches high will result in splash over of water or product causing the boom effectiveness to be reduced by 10 to 20 percent. Waves > 24 inches in height will dramatically decrease the effectiveness of the boom through wash over, and waves > 30 inches high will render the boom essentially useless for retaining oil, even if the water current speeds are essentially zero.

Large debris that gets entangled in the boom or in the lines attaching boom to shore, other fixed points or vessels generally presents a large surface to the water currents. The resulting force drags the boom underwater or otherwise compromises the boom configuration to the extent the boom no longer retains oil. Large debris is typically present when current velocity is high, and the combination will almost always result in the boom efficacy being essentially zero.

4.4 Effective Threshold Conditions for Oil Boom

4.4.1 Surface Water Currents

Based on Tesoro's years of experience at their nearby dock and data presented in previous sections of this document, the Facility expects surface current speed to exceed 1.0 knot on a frequent basis all months of the year and occasionally to exceed 3 to 5 knots during spring flood flows of the Columbia River. The Facility anticipates that current speed will be a deterrent to effective pre-booming at this terminal for a substantial portion of the year. Therefore, the effective threshold value for current speed will be 1.5 knots at this terminal.

4.4.2 Sea State (Wave Height and Period)

Sea state will occasionally be a factor limiting pre-booming during oil transfer operations at this terminal, based on the long-term experience and observations of the terminal manager, dock operations personnel, and contractors supporting the Facility in oil transfer operations.

Wave action may be a factor on those occasions when sustained southeasterly or northwesterly winds exceed about 15 knots (~17 mph) and may cause waves from 1.5 to 2 feet high. Under these conditions, sea state will begin to exceed the capabilities of the boom to retain oil. At sustained easterly wind speeds

greater than about 20 to 25 knots (~23 to 29 mph), wave height may exceed 3 feet, which will render the oil boom almost completely ineffective in retaining oil. Therefore, wave heights greater than 2 to 2.5 feet will be the effective threshold value for waves at this terminal.

4.4.3 Wind

As noted in Section 3.2, if SCA conditions (i.e., sustained winds up to 33 knots [~38 mph]) that may pose a hazard for small vessel operators are posted or similar winds are measured at the Facility, the TPIC will evaluate potential for impacts to personnel safety and to effectiveness of boom deployment. The TPIC may make a real-time determination that, because of the wind direction and shelter at the dock, it is safe to pre-boom the vessel and continue with oil transfer operations.

Also, as noted in Section 3.2, wind speed > 30 knots (~35 mph) for longer than 5 minutes will exceed the personnel safe operating limit and booming, as well as oil transfer operations, will be terminated. Therefore, sustained wind speed greater than 30 knots (~35 mph) will be the effective wind at this terminal.

5. Acronyms and Abbreviations

Company: Tesoro Savage Petroleum Terminal LLC

Facility: Vancouver Energy

mph: miles per hour

NOAA: National Oceanic and Atmosphere Administration

NWS: National Weather Service

PIA: Portland International Airport

PIC: Person-in-Charge

Port: Port of Vancouver USA

SCA: Small Craft Advisory

Shift SUP: Shift Supervisor

USDA: U.S. Department of Agriculture

WAC: Washington Administrative Code

Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix L
Unsafe Operating Conditions

Appendix L
Unsafe Operating Conditions

High Winds

Arrangements to be made and precautions to be taken will depend upon the direction and intensity of the storm. In any case, time permitting, close consultation between the Terminal Representative, Master of the vessel and the Coast Guard should lead to informed and balanced decision-making. If weather conditions exist that may create unsafe docking conditions, the vessel may be instructed to stand off until conditions moderate.

High winds are detrimental to the Wharf operations. The following wind guidelines will be applied to all vessels at the Facility dock. The wind speeds are sustained opposed to winds gusting up to these speeds. Sustained winds are determined when the speed is constant for more than 5 minutes. Use the following chart to determine what action is required when wind speeds are very high and sustained.

Wind Speed	Action Required
0-35 MPH	Monitor Vessel tie-up lines and hose connections as normal.
35-40 MPH	Shutdown cargo operations and drain hoses.
Over 40 MPH	Disconnect and stow hoses, if safe to do so.
Over 45 MPH	Request Vessel to prepare and sail if the vessel or wharf is in jeopardy of sustaining damage. If safe to do so, sail the vessel.

Wind Guidelines

Safe to sail is determined by assist vessels attached to the vessel, and assist vessels having the ability to handle the vessel weight in the weather.

In emergencies where vessel and wharf are in jeopardy of heavy damage, the vessel may request to sail without an assist vessel.

Electrical Storms

In the event of an electrical storm in the immediate vicinity of the dock, transfer operations will be shut down until such time it is deemed safe to resume operations.

Freezing Conditions

When freezing conditions exist (high winds and ice build-up on the wharf and/or vessel), the safety of personnel involved in transfer operations is the first priority. Close consultation between the Dock PIC and Vessel PIC should lead to informed and balanced decision making.

Small Craft Advisory

For the safety of dock personnel, the Vancouver Dock PIC will consider a Small Craft Advisory issued by the National Weather Service (NWS) for the area of operation to be the upper limit for personnel safety and shall not authorize the launch or use of company owned and operated oil spill response equipment. These conditions may either be present or immediately forecasted.

By definition the NWS Small Craft Advisory conditions reference sustained winds of over 21 mph (less in certain dangerous waters) and under 38 mph that may pose a hazard for small vessel operators.

Other

When it is determined that pre-booming is not safe or effective according to conditions listed within the safe and effective threshold limits, the Dock PIC will complete and return Ecology's boom reporting form via e-mail or fax and proceed under Alternative Measures requirements detailed in WAC-173-180-221 and WAC 173-180-222. Currently, requirements for Rate A transfers under the Alternative Measures requirement are being met for Vancouver Energy Dock through MSRC owned and operated equipment. Vancouver Energy operators have been trained to retrieve and deploy initial response equipment owned by MSRC.

Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix M
Pre-booming Oil Transfer

Appendix M
Pre-booming Transfer Plan

Pre-booming System

At such time that a vessel becomes finally moored at the Vancouver Energy dock, and prior to line connections being made, deployment of boom sufficient to maximize recovery of spilled product from the vessel or the dock shall occur in such manner as to allow a minimum of 5 feet standoff along the vessel waterline.

The standard pre-booming system used at the dock consists of

- Approximately 500 feet of 18-inch fence boom, which will remain stowed at the dock.
- Anchor points located port, starboard mid-ship, and/or aft sufficient to allow a spill during transfer to be fully contained at the downriver location.
- An 18-foot aluminum workboat equipped with a 130 hp outboard and functional communications equipment.
- A contracted 2-person crew to operate the boat and deploy and retract the boom upon request. This crew will also provide standby during transfer.

Pre-booming Process

Decision-making prior to pre booming a vessel at this facility will be dependent upon the following factors.

- Current wind and wave actions in and around the docking area as observed by the Terminal Person-in-Charge (TPIC).
- Forecasted weather information from local weather stations, as well as Yahoo Weather online are radioed hourly to the dock. This information includes local temperature, barometric pressure, wind speed and direction.
- When necessary to check river current information terminal operators will refer to the following web page: http://www.flypdx.com/Nvgt_Rvr_Frcst.aspx

With the safety of personnel remaining an unconditional priority, it is Vancouver Energy's position that prior to pre-booming a vessel at the Facility, there must be agreement between the TPIC and boom boat captain that existing and predicted weather and sea conditions are such that pre booming can occur in a safe and effective manner. Should weather or forecasted weather deteriorate during a transfer, a joint decision between Vancouver Energy and the booming contractor will be made as to the safety of continuing with or removing the pre-booming system from the vessel. During decision making it is expected that Vancouver Energy personnel will refer to both the "Safe and Effective Threshold Evaluation" and the "Unsafe Operating Conditions" located within the Oil Handling Operations Manual as part of the final decision process.

Any time it is determined that pre-booming is neither safe nor effective for any reason, the "Rate A Deliverer's Boom Reporting Form" will be filled out in detail and forwarded immediately to Ecology.

Pre-booming Procedure

The standard pre-booming procedure used at Vancouver Energy is as follows.

- After a tanker or ATB (vessel) is moored in position at the dock, the booming contractor will be notified to begin preparing for deployment of the oil spill prevention boom.
- When the TPIC has communicated with the booming contractor that the mooring lines are in place and the vessel is finished mooring (all fast), the boom anchors and anchor buoys will be positioned and set in three locations on the offshore side of the ship in order to secure the boom; one on the starboard quarter, one midship on the starboard side, and one on the starboard bow. The boom will then be towed into position and secured to the anchors with the necessary standoffs to keep the boom off the side of the vessel. The trailing or downriver side of the boom on the starboard quarter of the ship will then be connected to the permanent fence boom that runs on the inboard (port side) of the vessel and the section of boom anchored on the starboard bow will be connected to the upriver side of the fence boom permanently installed on the inboard (port side of the vessel). This process will ensure that the vessel is fully encircled by boom.
- With both ends of the boom connected, the booming contractor will contact the TPIC by radio to verify boom placement and the TPIC will then initiate hose connection and transfer operations.
- During transfer, the boom boat will remain in the water and on site to tend to and provide standby inspection of the boom.

Vancouver Energy
Operations Facility Oil Handling Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix N
Regulatory Cross Reference

Appendix N
Regulatory Cross Reference

Ecology Regulation	U.S. Coast Guard Regulation	Description	Location Where Addressed in Manual
WAC 173-180-415(1)		Table of contents	Table of contents
173-180-415(3)		Log sheet for changes	Inside front cover
WAC 173-180-420(1)		Overall requirements for manual	Entire document
173-420(2)(a)-(d)		Submittal agreement	Section 1.2
173-420(3)(a)(i) and (ii)	33 CFR 154.310(a)(1) and (2)	General facility information	Sections 2.1 through 2.3, Figures 1 and 2, Attachment A
173-420(3)(a)(iii)	33 CFR 154.310(a)(3)	Hours of operation	Section 3
173-420(3)(a)(iv)	33 CFR 154.310(a)(19)	Summary of applicable federal and state oil pollution laws and regulations	Section 19
173-420(3)(a)(v)		Recordkeeping	Section 25, Appendices F, G, and J
173-420(3)(a)(vi)		Overfill protection	Section 17
173-420(3)(a)(vii)		Maintenance schedules	Section 24, Appendix H
173-420(3)(a)(viii) through (x)	33 CFR 154.310(a)(5)	Oil transferred, physical properties, and safe handling	Section 5, Appendix C
173-420(3)(a)(xi)	33 CFR 154.310(a)(9)	Communications systems	Section 9, Appendix E
173-420(3)(a)(xii)(A)	33 CFR 154.310(a)(17)(i)	Hose and loading arm procedures	Section 17.1
173-420(3)(a)(xii)(B)	33 CFR 154.310(a)(17)(ii)	Oil transfer procedures	Section 17.2
173-420(3)(a)(xii)(C)	33 CFR 154.310(a)(17)(iii)	Completion of pumping	Section 17.3
173-420(3)(a)(xii)(D)	33 CFR 154.310(a)(13)	Monitoring devices	Section 13
173-420(3)(a)(xiii)		Leak detection	Sections 2.2.2 and 2.2.4
173-420(3)(a)(xiv)	33 CFR 154.310 (a)(10)	Shelters	Section 10
173-420(3)(a)(xv)	33 CFR 154.310(a)(16)	Working pressure	Section 16
173-420(3)(b)(i)	33 CFR 154.310(a)(4)	Size and type of vessels	Section 4
173-420(3)(b)(ii) and (iii)		Vessel equipment and procedures, and verification	Section 17.1

Ecology Regulation	U.S. Coast Guard Regulation	Description	Location Where Addressed in Manual
173-420(3)(b)(iv)	33 CFR 154.310(a)(6)	Transfer staff and duties	Section 6
173-420(3)(b)(v)	33 CFR 154.310(a)(11)	Drip and discharge collection	Section 11
173-420(3)(b)(vi)	33 CFR 154.310(a)(20)	Shielding portable lighting	Section 20
173-420(3)(b)(vii)		Actions taken regarding unexpected weather	Appendix L
173-420(3)[c]		Safe and effective threshold	Appendix K
173-420(3)(d)(i) and (ii)	33 CFR 154.310(a)(7), (17)(iv), and (18)	Reporting spills, contacts, and initial actions	Sections 7 and 18
173-420(3)d(iii)	33 CFR 154.310(a)(12),	Emergency response and shutdown systems	Section 12, Appendix A
173-420(3)(d)(iv)	33 CFR 154.310(a)(14)	Oil containment equipment and access	Section 14, Appendix E
173-420(3)(d)(v)	33 CFR 154.310(a)(15)	Fire extinguishers	Section 15, Appendix A
	33 CFR 154.310 (a)(8)	Duties of watchman	Section 8
WAC 173-180-510	33 CFR 154.310(a)(21)	Training and qualifications	Section 21
	33 CFR 154.310(a)(22)	Hose marking	Section 22
	33 CFR 154.310(a)(23)	Tank cleaning	Section 23
WAC 173-180-040		Recordkeeping	Section 25, Appendices F, G, and J
WAC 173-180-055		Work hours	Section 26
WAC 173-180-430		Manual review and approval	Section 27

Appendix D.4

Operations Facility Oil Spill Contingency Plan

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Vancouver Energy
Operations Facility Oil Spill Contingency Plan

Plan No. OP.04 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 26 June 2015

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Vancouver Energy
Operations Facility Oil Spill Contingency Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
26 June 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

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Vancouver Energy
Operations Facility Oil Spill Contingency Plan

Table of Contents

Section

BINDING AGREEMENT V

RECORD OF CHANGES VI

DISTRIBUTION LIST VII

1. INTRODUCTION 1-1
- 1.1 Purpose/Scope of Plan 1-1
- 1.2 Regulatory Mandate 1-2
- 1.3 Plan Updating Procedures 1-2
  - 1.3.1 Periodic Reviews and Evaluations 1-3
  - 1.3.2 Interface with Other Plans 1-3
- 1.4 Description of Geographic Area 1-6
- 1.5 Trajectory Analysis 1-6

2. INITIAL RESPONSE ACTIONS 2-1
- 2.1 Field Document 2-1
- 2.2 Safety Information and Facility Evacuation 2-1
- 2.3 Source Control and Mitigation 2-1
- 2.4 Spill Surveillance 2-1
  - 2.4.1 Aerial Surveillance 2-2
  - 2.4.2 On-Water Surveillance 2-2
  - 2.4.3 Documentation of Surveillance 2-2
- 2.5 Spill Volume Estimating 2-2
- 2.6 Monitoring and Predicting Spill Movement (Trajectories) 2-4
- 2.7 Initial Containment Actions 2-5
  - 2.7.1 Safety Considerations 2-5
  - 2.7.2 Response Guidelines for Crude 2-6

3. NOTIFICATION PROCEDURES 3-1
- 3.1 Emergency Reporting and Notification Procedures 3-1
- 3.2 Oil Spill Prioritized Notifications 3-1
- 3.3 Oil Spill Information Requirements and Procedures 3-2

4. RESPONSE TEAM ORGANIZATION 4-1
- 4.1 Description 4-1
  - 4.1.1 Facility Initial Response Team 4-1
  - 4.1.2 West Coast Regional Response Team 4-1
  - 4.1.3 Contractor Equipment, Personnel, and Services 4-2
  - 4.1.4 Volunteers 4-2
- 4.2 Activation Procedures 4-2
- 4.3 Team Member Response Times 4-2
- 4.4 Command Post 4-3

4.4.1 Location 4-3
4.4.2 Staging Areas 4-4
4.5 Unified Command System 4-4
4.6 Qualified Individual 4-4
4.7 Response Team Training Program 4-13

5. INCIDENT PLANNING/DOCUMENTATION 5-1
5.1 Documentation Procedures 5-1
5.1.1 Origin of Spill 5-1
5.1.2 Spill Characteristics 5-1
5.1.3 Photographic Surveys 5-1
5.1.4 Climatological Reports 5-2
5.1.5 Cost Information 5-2
5.1.6 Equipment Utilization and Evaluation 5-2
5.1.7 Logs 5-2
5.1.8 Record of Contacts with and Permits Obtained from Regulatory Agencies 5-2
5.1.9 Copies of Plans Prepared for the Incident 5-2
5.2 Claims Process 5-10
5.3 Dispersant Plan 5-11
5.4 Bioremediation 5-11
5.5 In-Situ Burning 5-11
5.6 Decanting 5-11
5.7 Disposal Plan 5-14
5.8 Recovered Oil and Water Management Plan 5-18
5.9 Recovered Oil Quantification Plan 5-23

6. FACILITY SENSITIVE AREAS/RESPONSE TACTICS 6-1
6.1 Introduction 6-1
6.2 Types of Sensitive Resources 6-1
6.2.1 Key Sensitive Resources 6-1
6.2.2 General Sensitive Resources 6-3
6.3 Area Description 6-3
6.3.1 Tide and Current Considerations 6-4
6.3.2 Climate 6-4
6.3.3 Birds 6-5
6.3.4 Marine Mammals 6-5
6.3.5 Priority Habitats and Species 6-5
6.3.6 Inlets, Intakes, Harbors, and Marinas 6-6
6.3.7 Sole Source Aquifers 6-6
6.4 Vulnerability Analysis 6-9
6.4.1 Water Intakes 6-9
6.4.2 Schools, Medical Facilities, Residential, and Business Areas 6-9
6.4.3 Sensitive Environments and Wetlands 6-9
6.4.4 Economically Important Resources 6-10
6.4.5 Endangered Flora and Fauna 6-10
6.4.6 Utilities 6-11
6.4.7 Transportation Routes 6-11
6.5 Sensitive Area Protection 6-11
6.6 Oiled Wildlife Care 6-14
6.6.1 Notifications 6-14
6.6.2 Permits 6-15
6.6.3 Wildlife Branch 6-16
6.6.4 Oiled Wildlife Care Procedures 6-16

6.6.5 Oiled Wildlife Facilities, Equipment, and Personnel 6-16
6.7 Protection/Response Strategies 6-21
6.8 Spills to Ground 6-21
6.8.1 Reportable Spills to Ground 6-21
6.8.2 Spills to Ground of Unknown Volume 6-22
6.8.3 Procedure for Reporting Spills to Ground 6-22
6.8.4 Impacted Groundwater Mitigation Protocol 6-23

7. VANCOUVER SUSTAINED RESPONSE ACTIONS 7-1
7.1 Response Resources 7-1
7.1.1 Firefighting Equipment 7-1
7.1.2 Facility Response Equipment 7-2
7.1.3 Contractor Equipment and Manpower 7-3
7.1.4 Marine Spill Response Corporation 7-4
7.1.5 Clean Rivers Cooperative 7-5
7.1.6 NRC Environmental Services 7-5
7.1.7 Other Resources 7-5
7.1.8 Oil Spill Response Equipment 7-6
7.1.9 Non-Dedicated Workboats and Operators 7-8
7.1.10 Communications Equipment 7-8
7.2 Site Security Measures 7-8
7.3 Alternative Response Strategies 7-10
7.3.1 Dispersants 7-10
7.3.2 In-situ Burning 7-10
7.3.3 Storage 7-10
7.3.4 Group 5 Oils 7-10
7.3.5 Bioremediation 7-10
7.4 Decontamination 7-12
7.5 Oil Handling, Storage, and Disposal 7-12
7.5.1 Model Disposal Plan 7-13
7.5.2 Recovered Oil and Water Storage 7-13
7.5.3 Contaminated Solids Storage Area 7-14
7.5.4 Temporary Storage and Ultimate Disposal of Contaminated Debris 7-14
7.5.5 Decanting 7-14
7.6 Public Affairs 7-15
7.7 Drill and Equipment Verification Program 7-15
7.8 Shoreline Cleanup 7-16
7.9 Groundwater Spills 7-16
7.10 Compliance with Planning Standards 7-16

8. DEMOBILIZATION/POST-INCIDENT REVIEW 8-1
8.1 Equipment Demobilization 8-1
8.2 Post Incident Debriefing and Critique 8-1
8.3 Post Spill Critique Outline 8-2
8.4 Final Spill Cleanup Report 8-12

List of Figures

Figure 1.1. Interface with Other Contingency Plans 1-4
Figure 1.2. Planning Standards Compliance Schedule 1-5
Figure 1.3. Products Handled 1-6
Figure 1.4. Facility Information Summary 1-7
Figure 1.5. Facility Location Area Map 1-8

Figure 1.6. Facility Diagram 1-9
Figure 1.7. Facility Drainage Plan 1-11
Figure 2.1. Emergency Evacuation 2-6
Figure 2.2. Facility Evacuation Plan 2-9
Figure 2.3. Spill Mitigation Procedures* 2-17
Figure 2.4. Oil Spill Surveillance Form 2-18
Figure 2.5. Glossary of Standard Oil Spill Observation Terms 2-21
Figure 2.6. Spill Estimation Factors 2-22
Figure 2.7. Visual Slick Size in Fraction of a Square Mile Chart 2-23
Figure 2.8. Estimations of Spilled Oil Volumes from Slick Appearances (Large Volumes) 2-24
Figure 2.9. Oil Spill Trajectory Information Form 2-25
Figure 2.10. Examples of Oil Movement on Water Surfaces 2-26
Figure 3.1. Notification Flow Chart 3-3
Figure 3.2. Notification Information Reporting Form 3-4
Figure 3.3. Notification Summary and Documentation Form 3-5
Figure 3.4. Agency Notifications Requirements 3-11
Figure 4.1. Facility/Company Incident Management Team 4-6
Figure 4.2. Company West Coast Regional Response Team 4-7
Figure 4.3. Spill Management Team Activation Procedure 4-9
Figure 4.4. Incident Command Team Duties and Responsibilities 4-10
Figure 5.1. Incident Briefing Form (ICS 201 Equivalent) 5-3
Figure 5.2. Bioremediation Checklist 5-12
Figure 5.3. Sample Incident Disposal Plan 5-14
Figure 6.1. Sensitive Area Protection Implementation Sequence 6-2
Figure 6.2. ESI Shoreline Types and Rankings 6-3
Figure 6.3. Troutdale Sole Source Aquifer Boundary 6-8
Figure 6.4. Environmental Response Map Index 6-12
Figure 6.5. MRU Operational Requirements 6-18
Figure 6.6. Data Sheet for Collection of Live Contaminated Wildlife 6-19
Figure 6.7. Data Sheet for Collection of Dead Contaminated Wildlife 6-20
Figure 6.8. Decision Process for Spills to Ground Notification 6-22
Figure 6.9. Proposed Booming Strategy Maps 6-24
Figure 6.10. Proposed Booming and Collection Strategies – Lower Columbia River 6-28
Figure 6.11. Clean Rivers Co-op Boom Site List 6-34
Figure 6.12. Climatic Information Lower Columbia River Region 6-36
Figure 7.1. On-Site Oil Spill Response Equipment 7-3
Figure 7.2. Equipment Availability Summary 7-7
Figure 7.3. Decision Guide for the Federal Bioremediation Approval Process 7-11
Figure 7.4. DRAFT Ecology Planning Standard Calculations 7-17
Figure 8.1. Demobilization Plan 8-1
Figure 8.2. Post Incident Critique (PIC) Form 8-5

List of Appendices

Appendix A. Training and Exercises
Appendix B. Vancouver Energy Contractor Response Equipment
Appendix C. Vancouver Energy Facility Operations
Appendix D. Hazard Evaluation/Risk Analysis
Appendix E. Cross Reference/OPA 90 Requirements
Appendix F. Response Techniques and Guidelines
Appendix G. Inspection/Prevention and Maintenance
Appendix H. Trajectory Analysis
Appendix I. Acronyms and Definitions

Binding Agreement

Washington State Department of Ecology
Spill Prevention, Preparedness and Response Program
P.O. Box 47600, Olympia, WA 98504-7600
For information, please contact SPPR Program at 360-407-7455.

WAC 173-182-220. Binding Agreement
Each plan shall contain a written statement binding the plan holder to its use. The binding agreement shall be signed by the owner or operator, or a designee with authority to bind the owners and operators of the facility or vessel covered by the plan. The agreement is submitted with the plan.

Submitting Party Information

Company Name:	
Contact Name:	
Address:	
Phone Number:	**Fax Number:**
Email:	**Website:**

Binding Agreement

I certify that I reviewed and am familiar with the information submitted in this Plan. I verify acceptance of the plan and commit to (a) a safe and immediate response to spills and to substantial threats of spills that occur in, or could impact Washington waters or Washington's natural, cultural and economic resources; (b) having an incident commander in the state within six hours after notification of a spill; (c) the implementation and use of the plan during a spill and substantial threat of a spill, and to the training of personnel to implement the plan; (d) the authority and capability to make the necessary and appropriate expenditures in order to implement plan provisions; (e) working in unified command within the incident command system to ensure that all personnel and equipment resources necessary to the response will be called out to clean up the spill safely and to the maximum extent practicable.

_____ _____
Authorized Signature Date

_____
Print Name

_____
Title

Record of Changes

Changes to this plan will be documented in the Record of Changes form shown below. Plan review and modifications will be initiated and coordinated by the Supervisor of Contingency Planning. All plan holders on the Distribution List (see next page) will be notified in writing of any changes to this plan.

Change No.	Date of Change	Description of Change	Name and Signature
1	26 June 2015	Response to EFSEC Review	

Distribution List

Plan No.	Name	Address
1, 2	Vancouver Energy Manager c/o Jared Larabee Field Document	Tesoro Savage Vancouver Energy Distribution Terminal 5501 Northwest Old Lower River Road Vancouver, WA 98660
3	Kelly Flint Tesoro Savage Petroleum LLC	Savage Industries Inc. 901 West Legacy Center Way Midvale, UT 84047
4	Director, Contingency Planning and Emergency Response Eric Haugstad	Tesoro Corporation 19100 Ridgewood Parkway San Antonio, TX 78259
5	Marc Bayer, Tesoro Senior Director Shipping Operations	Tesoro Corporation 19100 Ridgewood Parkway San Antonio, TX 78259
6e	Director, Environmental Marketing and Logistics Rob Donovan	3450 South 344th Way, Suite 201 Auburn, WA 98001
7	Manager, West Coast Terminals John Walker	3003 Navy Drive Stockton, CA 95206
8	Senior Environmental Specialist Peter Hendricks	Tesoro Logistics GP, LLC 803 North 300 West, Suite S-100 Salt Lake City, Utah 84103
9	Lead Contingency Planning Coordinator Craig Hyder	Tesoro Refining & Marketing Company LLC P.O. Box 700 Anacortes, WA 98221
10e, 11e, 12e	U.S. Environmental Protection Agency Region 10	1200 Sixth Avenue, Suite 900 Seattle, WA 98101
13, 14, 15e, 19e	Washington Department of Ecology	300 Desmond Drive Lacey, WA 98503 (P.O. Box 47775, Olympia, WA 98504-7775)
16	Oregon Department of Environmental Quality	Land Quality Division, 7th floor 811 SW Sixth Avenue Portland, OR 97204-1390
17, 18e	Commanding Officer U.S. Coast Guard Sector Puget Sound	Facility & Container Branch 1519 Alaskan Way South, Bldg. 4, 4th Floor Seattle, WA 98134

11=Hard Copies; 7=Electronic Copies

Note: This Preliminary Plan is intended for permitting purposes only. The distribution list is for indicative purposes only, and copies of the plan have not been submitted to the agencies noted above.

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1. Introduction

1.1 Purpose/Scope of Plan

This preliminary oil spill contingency plan (OSCP) has been prepared for the Tesoro Savage Petroleum Terminal LLC's (Company) Vancouver Energy (Facility) to satisfy Washington State statutes and the federal oil spill planning requirements of the U.S. Coast Guard (USCG) and Environmental Protection Agency (EPA) as set forth by the Oil Pollution Act of 1990. A summary of Facility information is provided in **Figure 1.4**.

This OSCP is a PRELIMINARY version of the plan that will be prepared, implemented, and submitted as necessary to applicable state and federal agencies in accordance with applicable laws and regulations prior to the beginning of operations of the Facility. This OSCP has been developed based on Facility design completed at the time of writing. The Company will update this OSCP based on additional consultation conducted during the permitting effort for the Facility and the final design of the Facility. This preliminary OSCP is intended to be indicative of the planning and response strategies to be implemented by the Company at the Facility.

The purpose of this operations facility OSCP is to provide guidelines for responding to, and documenting, a spill originating from the Facility. A field document is contained in **Section 2** of this OSCP, and copies are also available at the following locations within the Facility for use by field staff. The field document is used to document initial response actions for a spill event.

The Facility has a possible worst-case discharge volume of 380,000 barrels of crude oil from Tank 0300-TK-001. This tank is located approximately 4,000 feet northeast of the Columbia River within Area 300 – Storage Area. The location of the first block valve inside containment for Tank 0300-TK-001 is indicated on **Figure 1.7B**.

The Facility transfers crude oil to vessels over the dock located at berths 13 and 14 inside the Port of Vancouver USA (Port) facility on the Columbia River. Vessels will only be loaded, and only one vessel will be serviced at any given time.

Facility vessel specifications are as follows.

Maximum vessel size: Oil Tanker
899-foot length overall
158-foot beam
43-foot draft
171,732 deadweight tonnage

The information contained in this OSCP is intended to be used as a guideline for the spill responder. Actual circumstances for each event will vary and will dictate the procedures to be followed, some of which may not be included in this OSCP. This OSCP contains information designed to improve the responder's ability to select appropriate resources, cleanup methods, and to manage an effective response team.

1.2 Regulatory Mandate

This OSCP is designed to satisfy the requirements of the Oil Pollution Act of 1990 (OPA 90) and the State of Washington under WAC 173-182, and has been prepared in accordance and used in conjunction with

- National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300)
- Oil and Hazardous Pollution Contingency Plan for Environmental Protection Agency (EPA) Region 10
- Northwest Area Contingency Plan
- Lower Columbia River, Washington Geographic Response Plan (GRP)

A Compliance Schedule that describes how the Company intends to meet the planning standards in WAC 173-182-310 through 173-182-450 is included in **Figure 1.2**.

1.3 Plan Updating Procedures

The Manager of Contingency Planning is responsible for reviewing, updating, and distributing this OSCP. Plan review and updating will be done on an annual basis or more frequently if significant changes occur at the facility that may affect the facility's spill response capability. Key items that influence response capability and that should be reviewed and updated as necessary include

- Inventories of Company spill response equipment.
- Names and/or telephone numbers of the Oil Spill Response Organizations listed in **Section 3**.
- Names and/or telephone numbers of the Company's Oil Response Team personnel, including Qualified Individuals. (OSCP holders with new or incorrect phone numbers should notify the Supervisor of Manager of Contingency Planning immediately of changes).
- Oil storage, transfer, or handling procedures at the Facility.
- Response procedures as necessitated by potential deficiencies identified during training or exercises.
- Revised spill response procedures.
- Pertinent regulations.
- Any change to information relating to circumstances likely to affect full implementation for the OSCP.

OSCP revisions or amendments will be numbered sequentially and entered on the Record of Changes Form (on **page vi**). The changed numbers, date, and description of change (including plan section[s] affected by the review or amendment) and the name and signature of the person completing the review and amendment will also be entered on the form. These amendments will be implemented as soon as possible, but no later than the duration listed in **Section 1.3.1**. These changes are then to be distributed to all plan holders on Distribution List (on **page vii**). When review is completed without changes, the Washington State Department of Ecology (Ecology) will be notified of completion of review.

The Lead Contingency Planning Coordinator will notify Ecology in the event of any significant changes in availability of oil spill response equipment within 24 hours. **Additionally, Ecology will be notified in writing within 30 days of changes that will have significant impact to response capability.**

The OSCP will be centrally located in the Lead Contingency Planning Coordinator office and at the terminal office and will be accessible at any time for agency review.

1.3.1 Periodic Reviews and Evaluations

A review and evaluation will be annually performed to comply with regulatory requirements. As a result of the periodic review and evaluation, the OSCP will be amended, if necessary, to include more current and effective response measures. The time frame for revisions to reflect significant facility changes as described above are as follows.

- Annual review, within one month of the anniversary date of Captain of the Port approval, to incorporate any changes in the listings of economically important or environmentally sensitive areas identified in the Northwest Area Contingency Plan (ACP) in effect six months prior to the OSCP review.
- Five-year review for the portions of the OSCP addressing Ecology, USCG marine transportation-related facility requirements, or after significant change.
- Post-discharge review to evaluate OSCP effectiveness.

Amendments to the OSCP will be submitted to the appropriate agencies for information and approval.

1.3.2 Interface with Other Plans

This OSCP interfaces with other federal, state, and local contingency plans as outlined in **Figure 1.1**.

Figure 1.1. Interface with Other Contingency Plans

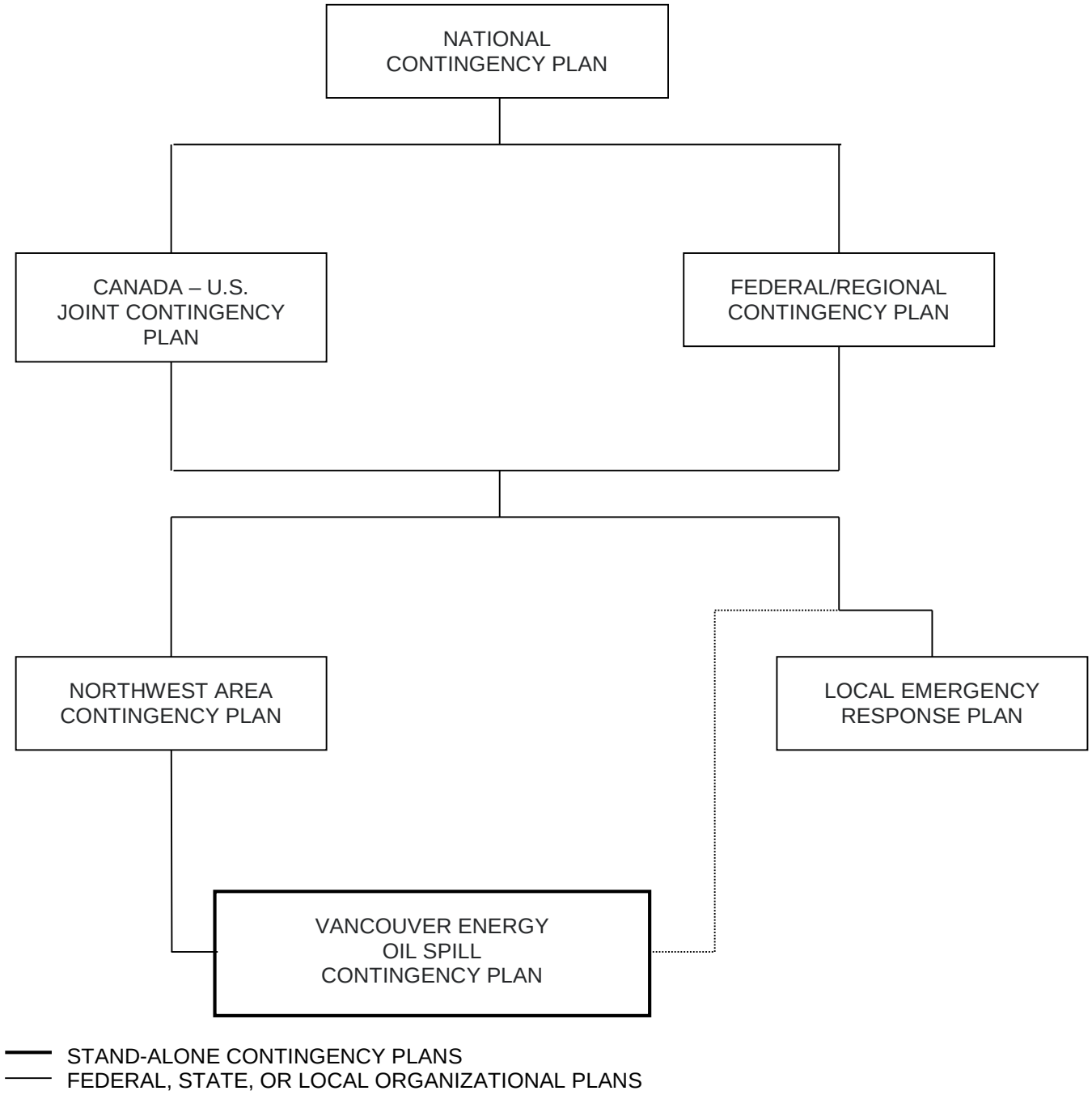

Figure 1.2. Planning Standards Compliance Schedule

WAC 173-182-310	Planning Standards	Compliance Status	
WAC 173-182-315	Planning Standards for non-dedicated work boats and operators	Pending future plan approval (see Note 1)	Appendix B
WAC 173-182-317	Covered vessel planning standards for vessels of opportunity	Pending future plan approval	
WAC 173-182-320	Planning Standards for aerial surveillance	Pending future plan approval	Section 2
WAC 173-182-321	Covered vessel planning standards for aerial surveillance	Pending future plan approval	
WAC 173-182-324	Planning Standards for Group 5 oils	Pending future plan approval	
WAC 173-182-325	Planning Standards for dispersants	Pending future plan approval	Section 7
WAC 173-182-330	Planning Standards for in situ burning	Pending future plan approval	Section 7
WAC 173-182-335	Planning Standards for storage	Pending future plan approval	Section 7 and Appendix B
WAC 173-182-345	Determining effectiveness of recovery systems	Pending future plan approval	
WAC 173-182-348	Determining effective daily recovery capacity	Pending future plan approval	
WAC 173-182-349	Covered vessel plan holders technical manuals	Pending future plan approval	
WAC 173-182-350	Documenting compliance with the planning standards	Pending future plan approval	Appendix B
WAC 173-182-355	Transfer sites for covered vessels at locations where transfers occur, and for facilities with a vessel terminal	Pending future plan approval	Section 7 and Appendix B
WAC 173-182-365	Transmission pipelines and pipeline tank farms	N/A	
WAC 173-182-370	San Juan County planning standard	N/A	
WAC 173-182-375	Padilla Bay planning standard	N/A	
WAC 173-182-380	Commencement Bay-Quartermaster Harbor planning standard	N/A	
WAC 173-182-385	Nisqually planning standard	N/A	
WAC 173-182-390	Dungeness planning standard	N/A	
WAC 173-182-395	Neah Bay staging area	N/A	
WAC 173-182-400	Copalis, Flattery Rocks and Quillayute Needles planning standard	N/A	
WAC 173-182-405	Grays Harbor planning standard	N/A	
WAC 173-182-410	Willapa planning standard	N/A	
WAC 173-182-415	Cathlamet staging area	N/A	
WAC 173-182-420	Vancouver planning standard	Pending future plan approval	Section 7 and Appendix D
WAC 173-182-430	Tri-Cities planning standard	N/A	
WAC 173-182-450	Planning standards for the Washington Coast	N/A	

Note 1: Compliance with the noted standards will be verified upon review of the final contingency plan submitted to the appropriate regulatory agencies, post Site Certification Approval by EFSEC.

1.4 Description of Geographic Area

The Facility is located within the Port and is leased from the Port (see **Figures 1.5, 1.6, and 1.7**). The Port area is zoned “heavy industrial.” The dock facility is located at Columbia River Mile 103.5 (RM 103.5). A detailed description of the terminal and dock and surrounding geographic area is presented in **Section 6** and **Appendix C**.

This OSCP provides for the response to oil spills for which the Company assumes responsibility that may occur within the geographic location boundaries. For planning purposes, the geographic area at risk from a worst-case discharge (unabated release over 72 hours during maximum current speeds) extends from approximately 5 miles upriver from the facility (RM 109) to the mouth of the Columbia River and approximately 100 miles in either direction (north or south) along the Washington and Oregon coastlines (see **Figure 1.5**). The probable route of discharge off the facility property would follow natural drainage patterns from the bulk storage area to the south, past existing rail infrastructure, through the Terminal 4 stormwater pond located on Port property and into the Columbia River (see **Figure 1.6**).

1.5 Trajectory Analysis

A trajectory analysis has been completed for the site by NJResources. The trajectory analysis was completed based on a 48-hour worst-case spill condition. The trajectory analysis report is provided in Appendix H. The results of the analysis indicate that the geographic area of potential impact from an incident originating in Vancouver, Washington, within 48 hours of release is the Lower Columbia River from RM 105 (45°38'4.19"N, 122°42'10.55"W) to RM 47 (46° 8'40.52"N, 123°17'46.39"W).

Figure 1.3 summarizes the types of oil products that will be handled at the facility.

Figure 1.3. Products Handled

Product Name	Density (kg/m^3)	Specific Gravity	API	Oil Group No.	Sulfur Content
Bakken (ND and MT)*	813	0.815	42.1	Group 2	0.18%
WTI (Midland, TX & Cushing, OK)**	823	0.825	40.0	Group 2	0.37%
Syncrude (Canda)	858	0.860	33.0	Group 3	0.16%
Uinta Black Wax (Utah)***	877	0.879	29.5	Group 3	0.13%
WCS (Canada)	932	0.934	20.1	Group 3	3.64%

* There is natural variability in all produced crude oil, and so the typical pipeline average specs are representative of blended crude oils from multiple wells in the area.

**A majority of the crude oil produced in the Niobrara area (CO/WY) has an API Gravity ranging between 35 and 50 degrees, and so on average is generally in the range of WTI and Bakken crude oils.

***Since Uinta Black Wax and Yellow Wax crude oils are typically not pipelined and there are no published market specs, the listed information for Uinta Black Wax is from an example well assay.

Figure 1.4. Facility Information Summary

Owner/Operator	Tesoro Savage Petroleum Terminal LLC 901 West Legacy Center Way Midvale, UT 84047 801-944-6600	
Facility Name/SIC Code	Vancouver Energy / 5171	
Name and Address of person to whom correspondence should be sent	Terminal Manager 5501 NW Old Lower River Rd Vancouver, WA 98660	
County	Clark	
Description of Facility	Includes a diked tank storage area with six welded steel vertical storage tanks with an aggregate storage capacity of 2,220,000 barrels; a covered rail unloading area for delivery of tank cars containing crude oil; three 24-inch transfer pipelines between the unloading area and the storage area; a 36-inch aboveground and buried pipeline between the storage area and dock; a marine vapor control unit; and an office/administrative area.	
Description of Operations	Crude oil is received via rail. Crude oil is temporarily stored at the terminal and distributed via vessel.	
Description of Tanks	Refer to Figure C.2	
Hours of Operating/Manning	Normal hours of operation are 24 hours a day, seven days a week. The Facility is continuously staffed.	
Facility Throughput	Varies according to season and market. Daily average is 360,000 barrels per day.	
Products Handled	Crude oil (see Figure 1.4)	
Physical Address	Tesoro Savage Vancouver Energy Distribution Terminal 5501 NW Old Lower River Road Vancouver, WA 98660	
Mailing Address	Tesoro Savage Vancouver Energy Distribution Terminal 901 West Legacy Center Way Midvale, UT 84047	
Location	Latitude: 45° 39’ 6” N, / Longitude: 122° 43’ 52”W	
Telephone/FAX	TBD	
Primary Qualified Individual*	TBD	TBD
Alternate Qualified Individual*	TBD	
Date of Storage Startup	2015 (anticipated)	
Wellhead Protection Area	No	
Basis for Significant and Substantial Harm	The Facility is located in the Port directly adjacent to other industrial facilities and within 1-1/2 miles of residential neighborhoods. There are approximately 2,300 employees at the Port; approximately 400 people may be working at their job sites at any given time. The Port is zoned heavy industrial and is not considered an environmentally sensitive area.	
EPA Worst-Case Discharge (gallons)	15,960,000	
Dates(s) and Type(s) of Substantial Expansion:	2015 – terminal constructed	
Date Prepared	June 2015	

*For further information on Qualified Individual’s training and qualifications, refer to **Section 4.6** and **Appendix A.2** in this OSCP.

Figure 1.5. Facility Location Area Map

Figure 1.6. Facility Diagram

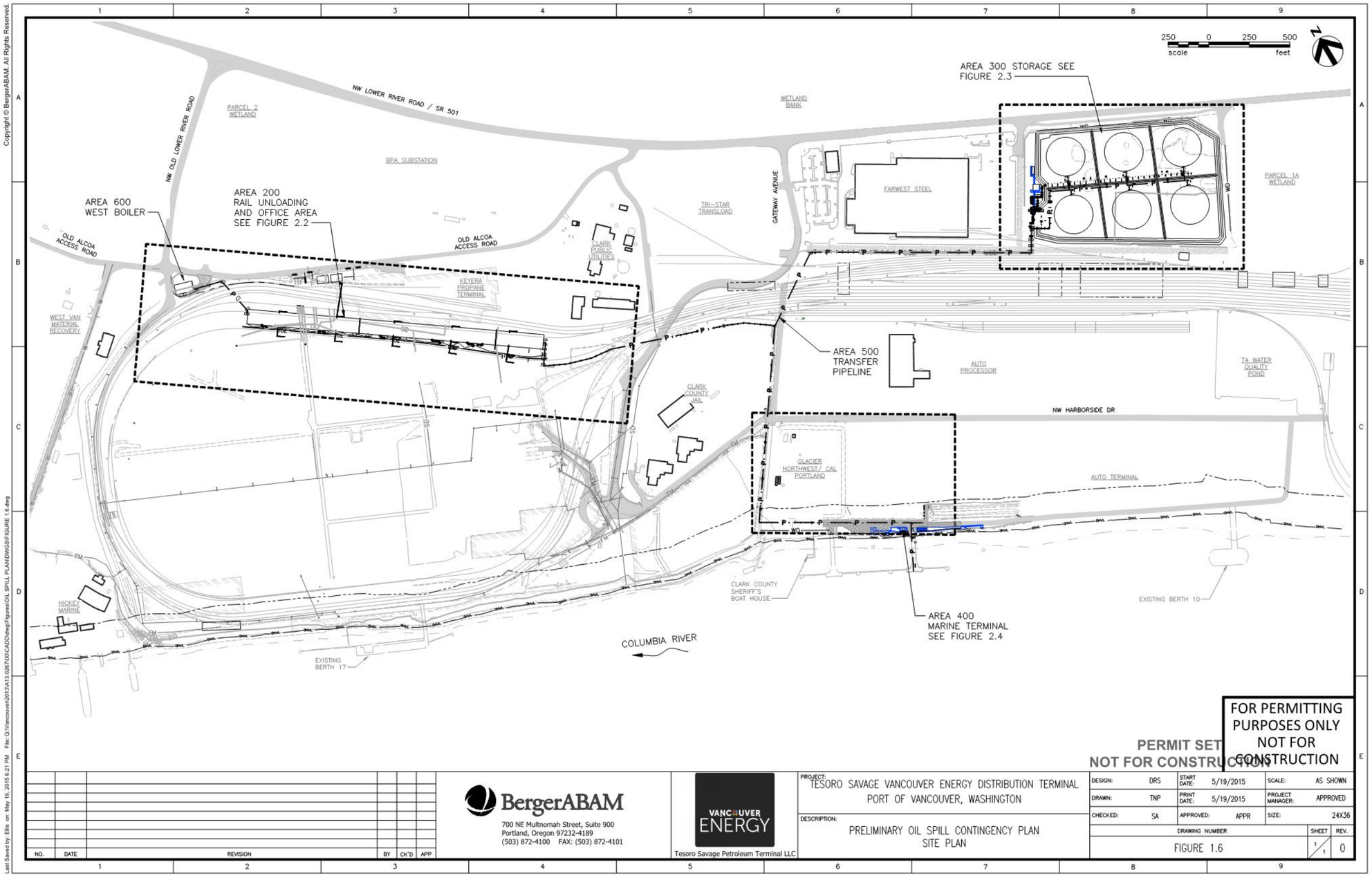

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Figure 1.7. Facility Drainage Plan

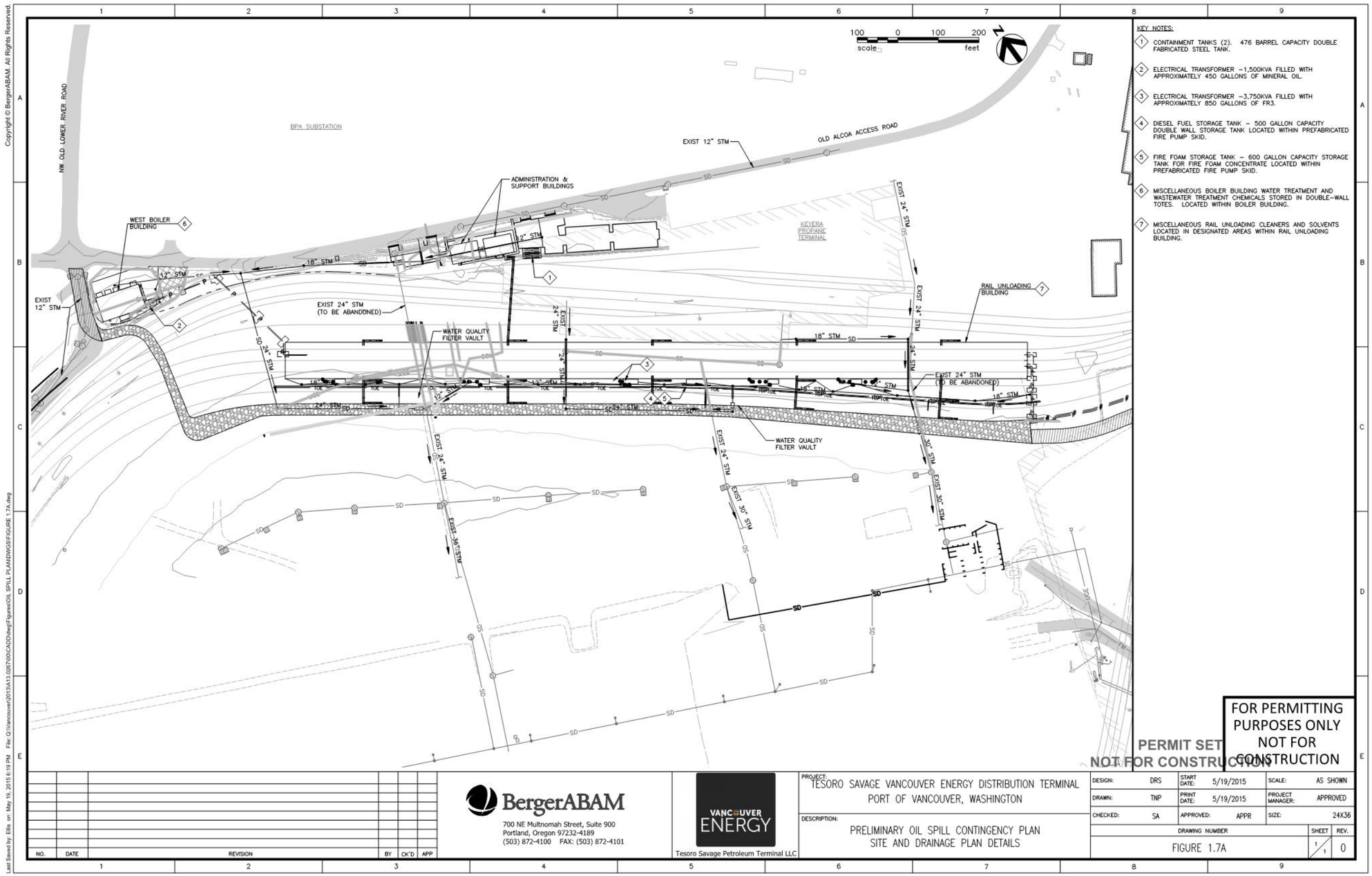

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Figure 1.7B. Facility Drainage Plan (continued)

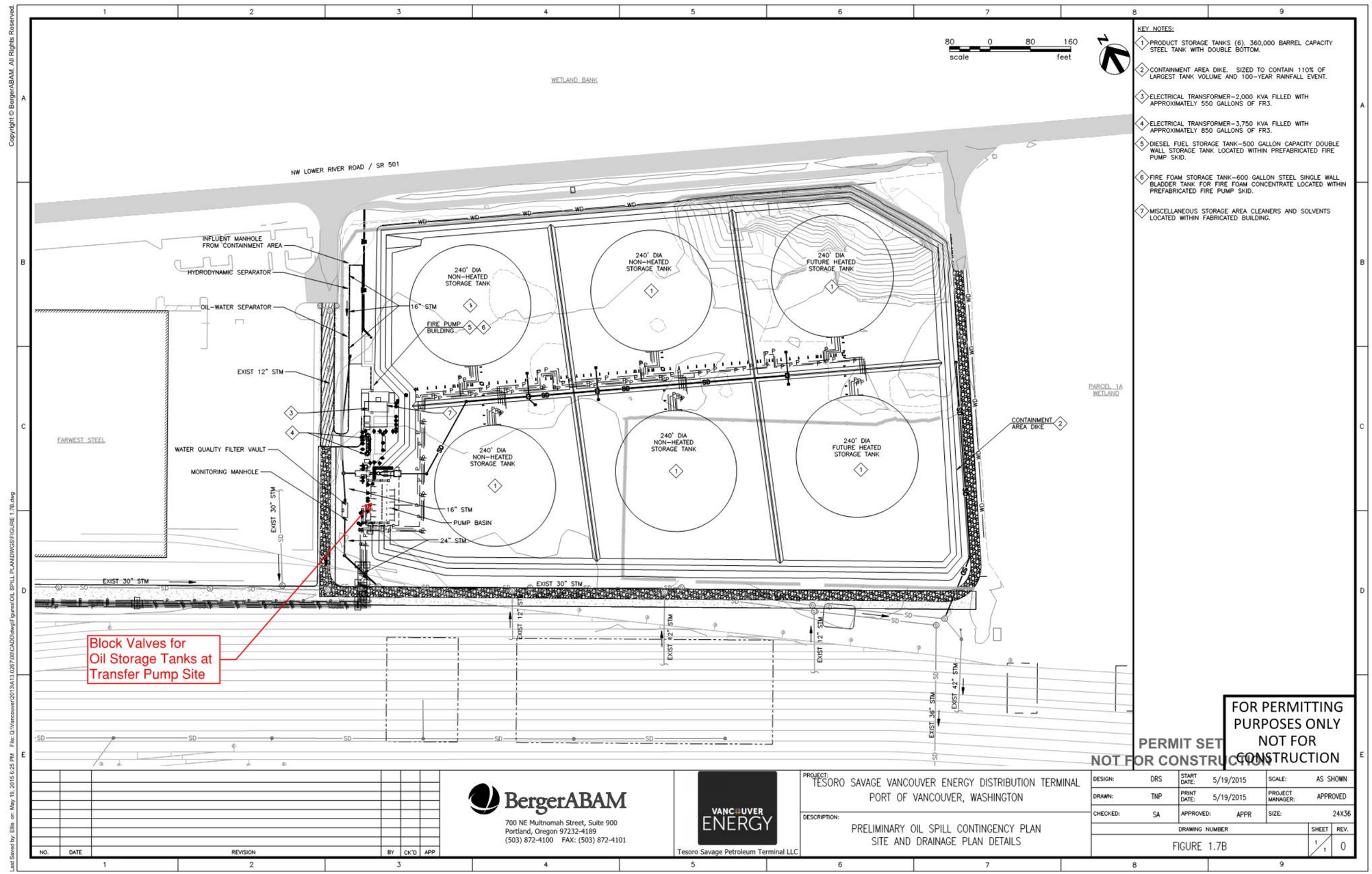

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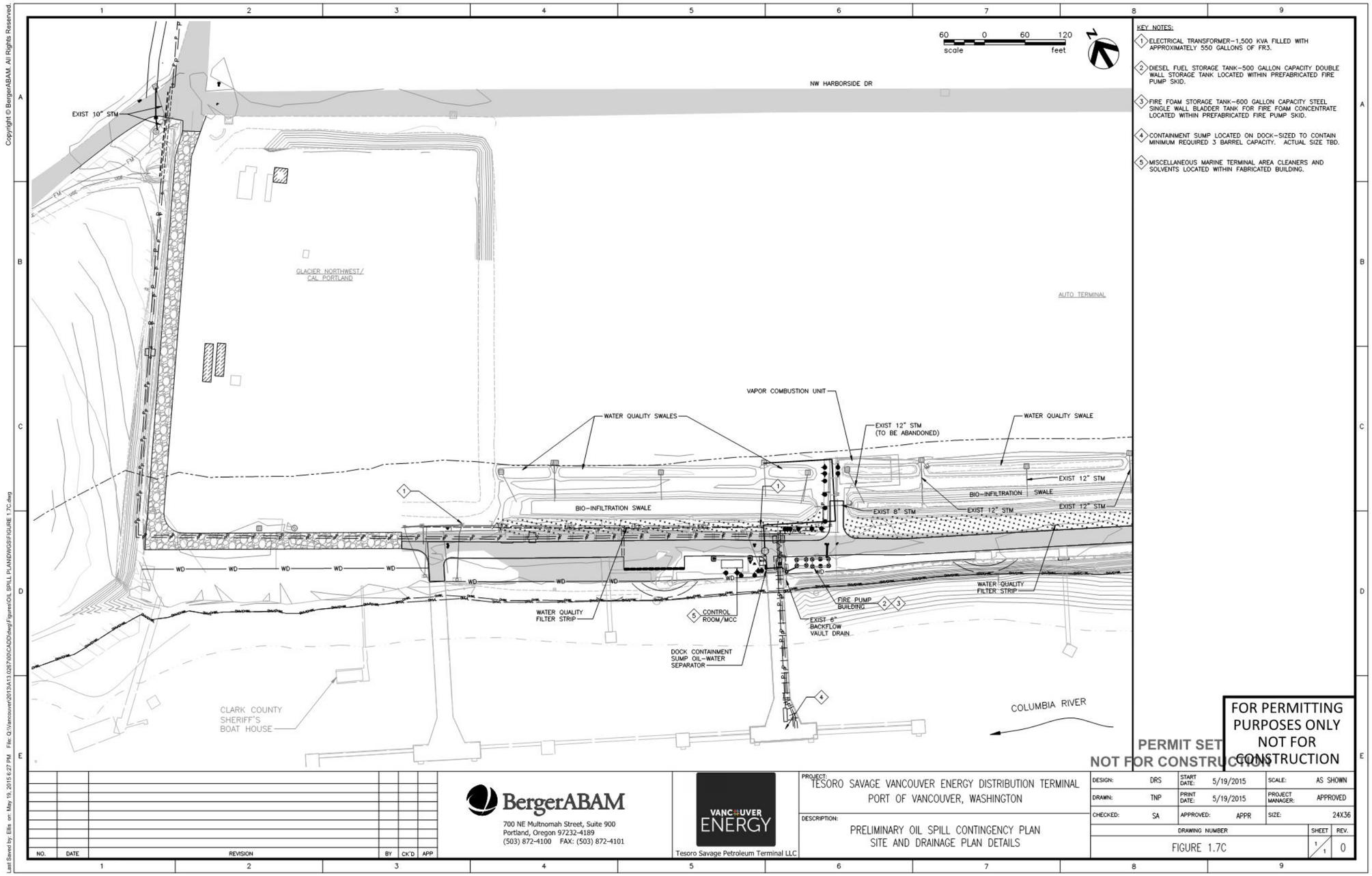
Figure 1.7C. Facility Drainage Plan (continued)



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2. Initial Response Actions

This section includes guidance documents that address the initial response actions to be followed in the event of a discharge at the Facility, including the following.

- Actions taken in the initial emergency phase of a spill
- Source control and mitigation actions
- Spill surveillance actions
- Initial containment actions

2.1 Field Document

Information about the time-critical information for the initial emergency phase of a spill is documented in a Field Document, which is available to all personnel at the Facility that participate in all oil handling operations. The Field Document includes the following guidance and procedures.

- Emergency Initial Procedures
- Identification of Reportable Spills to Ground
- Spill Procedures Checklists
- Notification Procedures and Numbers
- Procedures to Detect, Assess, and Document the Spill Size

A copy of the Facility Field Document is included with this OSCP at the end of this section. Other copies are available at the Facility in all control rooms.

2.2 Safety Information and Facility Evacuation

Information about the Facility relative to evacuation safety is listed in **Figure 2.1**. Evacuation plans for the Facility are provided as **Figure 2.2**.

2.3 Source Control and Mitigation

This section provides general guidance for spill mitigation. Each situation is unique and must be treated according to the circumstance present. In every situation, however, personnel safety must be assessed as the first priority. The potential for ignition and/or toxic exposure must be promptly evaluated. **Figure 2.3** describes mitigation procedures for the types of discharges that could occur at the Facility.

2.4 Spill Surveillance

Surveillance of an oil spill should begin as soon as possible following discovery to enable the Incident Commander and other response personnel the ability to assess spill size, movement, and potential impact locations(s). Immediately following discovery of a spill, one or more tracking buoys will be launched in order to effectively track the leading edge of the spill. Tracking buoys are stored at the dock office.

Surveillance is also required during spill response operations in order to gauge effectiveness of response operations, to assist in locating skimmers, and to continually assess size, movement, and impact of spill.

Clouds shadows, sediment, floating organic matter, submerged sand banks, or wind-induced patterns on the water may resemble an oil slick if viewed from a distance.

2.4.1 Aerial Surveillance

Spill surveillance is best accomplished through the use of helicopters or small planes because it is difficult to adequately observe oil on the water surface from a boat, dock, or shoreline. Helicopters are preferred due to their superior visibility and maneuverability. If fixed-wing planes are to be used, high-wing types provide better visibility than low-wing types. Certain helicopters contracted through Marine Spill Response Corporation (MSRC) use infrared sensors for nighttime spill surveillance

It is expected that MSRC will give the Company permission to list them in this OSCP as having the capability to be on-scene within 6 hours of spill awareness and to provide aerial oil spill removal operations for three, 10-hour periods during the initial 72 hours of discharge. They have fixed-wing aircraft available for surveillance and have access to helicopters from Hillsboro Helicopters through contract. Contact information for helicopter and aircraft companies can be found in **Figure 3.3(J)**.

2.4.2 On-Water Surveillance

Surface vessels are used to confirm the presence of any suspected oil slicks, IF SAFE TO DO SO. If possible, direct the vessels from the aircraft and photograph the vessels from the air to show their position and size relative to the slick.

In the event of reduced visibility, such as dense fog or cloud cover, boats may have to be used to patrol the area and document the location and movements of the spill. However, this method may not be safe if the spill involves a highly flammable product.

Tracking buoys are used to track the leading edge of an oil spill during nighttime or adverse weather conditions. Two tracking buoys are stored on the dock. Each tracking buoy is equipped with a strobe light, and fresh batteries are located in the storage area. The buoys are marked as Tesoro oil spill response equipment and are not to be removed from the water by unauthorized persons. Within 30 minutes of discovery of an oil spill, at least one tracking buoy must be checked, energized, and placed at the leading edge of the spill. Time of deployment should be logged and visual observation of the buoy should be maintained until such time that aerial or other means of surveillance are established.

2.4.3 Documentation of Surveillance

All observations should be documented in writing and with photographs and/or videotapes.

Describe the approximate dimensions of the oil slick based on available reference points (i.e., vessel, shoreline features, and facilities). Use the aircraft or vessel to traverse the length and width of the slick while timing each pass. Calculate the approximate size and area of the slick by multiplying speed and time.

Aerial observations should be recorded on detailed maps, such as topographic maps.

An Oil Spill Surveillance Form is included in **Figure 2.4**. A Glossary of Standard Oil Spill Surveillance Forms is included in **Figure 2.5**.

2.5 Spill Volume Estimating

Early in a spill response, estimation of spill volume is required in order to

- Report to agencies;
- Determine liquid recovery requirements;
- Determine manpower and equipment requirements; and
- Determine disposal and interim storage requirements.

Actual spill volumes are often unavailable or inaccurate so that field estimates are usually required. Some rapid methods to estimate spill size are as follows.

Catastrophic Failure

If a spill occurs during transfer operations, the total spill volume can be estimated by multiplying the pumping rate by the elapsed time that the leak was in progress, plus the drainage volume of the line between the two closest valves or isolation points. Volume loss = Pump Rate (bbl/min) x Elapsed Time (min) + Line Contents (bbl).

Rule of Thumb on Line Volumes

Line size $(\text{inches})^2$ = bbl/1,000 feet

Inside diameter (I.D.)

Outside diameter (O.D.)

Note: 12-inch pipe and smaller is I.D. dimension, 14-inch pipe and larger is O.D. dimension.

For example:

6 inches I.D. = 36 bbl/1,000 feet of line

16 inches O.D. (15-inch I.D.) = 256 bbl/1,000 feet

A high percentage of spills are caused by internal or external corrosion or hole in hose. Spills resulting from a flange or hose leak will likely occur at a significantly lower rate.

For this purpose, the following calculations and techniques may be used.

$$\text{Vol (gal)} \sim 1800 \times A\ (\text{in}^2) \times T\ (\text{hrs}) \times (P)^{½}\ (\text{psig})$$

The approximate volume in gallons equals approximately 1,800 times the area of the hole (square inches) times the time of leakage (hours) times the square root of the pipeline operating pressure (psig).

This approximation is reasonable when the diameter of the hole is less than 1/4 of the pipes inside diameter, when the liquid is packed over the hole, and when frictional losses are considered negligible.

Another field technique is

- Divide the number 10,286 by the number of seconds it takes to fill a 5-gallon pail.
- A simpler rule of thumb would be to divide 10,000 by the number of seconds to collect 5 gallons for the approximate flow in bbl per day.

Estimated Drip Rates

One drop/second	=	1 gallon per day
Thin stream breaking into drops	=	24 gallons per day
Small stream (about 1/8 inch)	=	84 gallons per day
Large stream (about 1/4 inch)	=	336 gallons per day

For tank overfills, the total volume would be limited to the elapsed time multiplied by the pumping rate.

In the event that a more accurate method is not available, an estimate of spill size can be made by visual assessment of the surface area and thickness. Refer to the following procedures.

- Estimate the coverage dimensions of each part of the spill in feet or miles using whichever of the six appearances (**Figure 2.6**) that may be observed in the spill. Multiply the dimensions in feet or in miles by the appropriate factor from the figure. Add the individual parts of the spill areas together.

The combined result is the estimated volume of the spill in gallons or in barrels of oil.

Volumes that are calculated less than one barrel should be reported in gallons. Spills that are calculated less than a gallon should be reported as “less than one gallon” rather than a decimal amount.

In the event of a large spill that encompasses several miles, use the chart in **Figure 2.8** to estimate the spill volume.

Example

A spill has created a “silvery” slick 0.25 mile wide by 2 miles long. From **Figure 2.6**, the amount of oil would be 50 gallons/square mile; and from **Figure 2.7**, the area would be 0.500 square mile. Therefore, 50 gallons/square mile X 0.500 square mile equals 25 gallons of oil spilled. If the quantity cannot be accurately determined, then the best initial estimate discharged should be reported to the Federal and State On-Scene Coordinators. As more accurate estimates are confirmed, they should also be reported.

2.6 Monitoring and Predicting Spill Movement (Trajectories)

Factors Affecting Oil Movement

- Depends primarily on wind and surface currents near the spill.
- Surface currents will dominate oil movement unless the winds are strong.
- When winds are strong, the oil will move at approximately 3.4 percent of the wind speed in the same general direction.
- When currents and strong winds are absent, oil spreading will dictate oil movement.
- If only weak winds or surface currents are present, they will dominate oil movement.
- Examples of oil movement on water surfaces are shown in **Figure 2.10**.
  - Current speeds and directions may be estimated by pacing off a 100-foot section of shoreline, throwing a stick or orange into the water up-current of the section and timing how long it takes the stick/orange to traverse the 100-foot area. The direction of stick/orange movement will also approximate the surface current direction combined with the effects from local winds, if present.

The time required (in seconds) for the stick/orange to move 100 feet is divided into 100 to estimate current speed in feet per second (fps). The resulting fps is then multiplied by 0.5924 to convert the speed into knots. Selected conversions are provided below.

0.25 kt = 100 feet/240 seconds (0.42 fps)
0.5 kt = 100 feet/120 seconds (0.83 fps)
1.0 kt = 100 feet/60 seconds (1.67 fps)
1.5 kt = 100 feet/40 seconds (2.5 fps)

Methods Available for Predicting Slick Movements

To determine the potential impacts of an oil spill and to aid in response operations, it is essential to predict the direction of oil movements.

The initial direction of the oil’s movement should be determined visually.

Once the direction and speed of wind and current are known, a short-term projection can be made by performing a simple vector addition analysis.

- For a large spill, more sophisticated predictions would be generated by the Scientific Support Coordinator using the National Oceanic and Atmospheric Administration (NOAA) Oil Spill Simulation Model (OSSM), or the Company will use the SpillNet Model.

NOAA Oil Spill Simulation Model

- The Federal On-Scene Coordinator (FOSC) would access trajectory information generated by the NOAA OSSM.
- This information, supplemented by on-scene observations, would be analyzed and the approximate location of the oil during various time intervals would be projected onto a digitized map of the region.
- Different simulations are possible as conditions at the spill site change.
- These trajectory maps can then be telefaxed to the FOSC at the scene or be directly accessed through a computer terminal (with printer), which would be linked to the NOAA trajectory computer.
- Refer to **Figure 2.9** for a form to provide trajectory coordinator with information to calculate trajectory models.

2.7 Initial Containment Actions

Initial containment actions will rely on the use of pre-booming of all crude oil transfers and focus on using remaining on-site containment boom in the most effective manner to

- Control the source and limit the spread of oil, thereby reducing the surface area and shoreline to be cleaned;
- Concentrate the oil, when safe to do so, making physical recovery more efficient.
- Limit the environmental impact to the immediate spill area by immediate identification and initiation of local GRPs.

Selection of the appropriate location and method will depend upon

- Whether the spill occurs during an ebb or flood tide;
- Length of time spill occurs before being noticed;
- Amount of spill;
- Area of coverage;
- Environmental factors, such as wind speed and direction; and
- Immediate notification of the Primary Response Contractor will provide early GRP protection and facilitate on-water recovery within the first hour of occurrence.

2.7.1 Safety Considerations

A Site Safety Plan form is located in **Section 5** (Section J of Figure 5.1, Incident Briefing Form). The designated on-scene Safety Officer should use this form as a checklist while performing initial site safety assessment. Communication for monitoring and relaying safety information will be via radio, as described in **Section 7.1.10**. Communication equipment and numbers are summarized in **Section 7.1.10**.

- Air monitoring must be conducted in all spills to water or land in order to determine airborne concentrations of hazardous vapors, potential oxygen deficient and explosive atmospheres, so that safety precautions can be taken. Facility air monitoring equipment used to test breathing air in the vicinity of a spill includes a hand-held multi-gas monitor. These monitoring devices are located in the Terminal Office. Equipment testing and calibration are done daily and monthly.
- Careful consideration should be given to containment actions conducted during inclement weather or adverse conditions, such as high winds or rapid currents.
- Eliminate all ignition sources and keep boats as far as possible from the spill area.
- Be aware of hazards, such as fires, explosions, and exposure to toxic chemicals at lethal or sub lethal levels.
- Avoid contact with the spilled product and ensure that the area remains secure to boat and air traffic.
- Be aware of potential changes to position and movement of slick due to tidal action.
- The Terminal Manager, as the initial Incident Commander, will initially assume the role of Safety Officer and should enlist the help of the Facility Manager of Safety.
- The Terminal Manager will be initially responsible to assure the safety of all people who may be impacted by the spill.
- The Facility Safety Officer will be responsible for the preparation of the Safety and Security Plan, and will establish safety zones, as appropriate.
- All response contractor Safety Officers will be advisors to the Facility Safety Officer on health and safety issues.

- The Facility Safety Officer will direct teams of trained operators equipped with self-contained emergency air packs, organic vapor respirators, and explosion meters to determine and mark the area of any explosive cloud coming from the spill so that safe limits for response activities can be determined. This equipment is available from Facility.
- The Facility Safety Officer will develop a site safety plan and establish safety zones, as appropriate.

2.7.2 Response Guidelines for Crude

The preferred response is to contain and recover product because crude oil exhibits low volatility characteristics.

- Ensure primary boom is deployed before any material transfer operation begins.
- Identify source and stop discharge, if possible.
- Deploy secondary facility containment boom, and skimmers if available, to attempt to isolate the slick and reduce the spread and potential impact area. Monitor the boom for effectiveness.
- If shorelines may be impacted, consider deploying exclusion boom to reduce the impact to shoreline.
- If there is still boom remaining, attempt to isolate pockets of oil where possible to facilitate more efficient recovery.
- If crude oil escapes, deploy sorbents along the shoreline to capture product during tidal cycles. Monitor the sorbents periodically for effectiveness and replace as needed.
- Callout response contractors to assist in containment efforts and begin recovery operations.
- Advise neighboring operators of any threat to their property or personnel. List of neighboring facilities is provided in **Figure 3.3**.
- Determine the direction and expected duration of spill movement. Tide and current tables are contained in the front pocket of this plan.
- Request USCG to establish Vessel Traffic Control in the area.
- Review the location of environmentally and economically sensitive areas in **Section 6**. Use the trajectory analysis in **Appendix H** to assist in prediction of potentially impacted areas. Determine which of these areas may be threatened by the spill and direct contractors to proceed with boom and skimmers to these specified locations.

Figure 2.1. Emergency Evacuation

Factor	Description
Stored Material Location	Location in oil storage area. Identified in Facility Diagram (Figure 1.7).
Spilled Material Hazards	Primary hazard is fire/explosion.
Spill Flow Direction	Adjacent, terrain is flat with defined drainage patterns to the north and south. Spilled product will accumulate in low lying areas directly adjacent to terminal.
Prevailing Wind Direction and Speed	Prevailing winds are normally from the west. Because wind direction varies with weather conditions, consideration for evacuation routing will depend in part on wind direction.
Water Currents, Tides, or Wave Conditions	Area currents range between 0.25 and 0.5 knot. Tidal currents may alter, depending on distance off shore and tidal cycle stage and run north and south along the shoreline.
Emergency Personnel Arrival Route	Emergency personnel and equipment would be dispatched by land or boat. By land, facility is accessible via NW Gateway Avenue/NW Harborside Avenue and NW Lower River Road. By water, the facility is accessible via the Columbia River/Port of Vancouver.
Evacuation Routes	Exit terminal from front gate or dock. Assemble up wind from Terminal at the east or west end of the terminal. Criteria for determining safest evacuation routes from Facility may include wind direction, potential exposure to toxics and carcinogens, intense heat, potential for explosion or fire, and blockage of planned route by fire, debris, or released liquid.
Alternative Evacuation Routes	Alternative evacuation route for employees on the dock may be required to evacuate through Berth 10 to the east (Subaru Dock), or the Clark County Sherriff's Boat House, to the west, if fallen power lines are observed at the base of the dock. Employees can also evacuate through the Cal Portland Facility.
Injured Personnel Transportation	Emergency vehicles can be mobilized to the Facility (dial 911).
Alarm/Notification System Location	Terminal uses internationally recognized signs for emergencies.

Factor	Description
Centralized Check-In Area	Evacuate to identified regroup areas, including, but not limited to, the northwest corner of the intersection of NW Old Lower River Road and Old Alcoa Access Road, the inside of the Terminal 5 rail loop, or the northwest corner of the intersection of Harborside Drive and Gateway Avenue. Terminal Manager is responsible for headcount.
Mitigation Command Center Location	Initial Command Center is located at the Facility. Mobile command posts may be established.
Facility Shelter Location	The office is the only area that could provide adequate heated shelter within the facility.
Community Evacuation Plans	NW Lower River Road (Highway 501) is a community evacuation route. Contact City of Vancouver police and fire departments for assistance with determining evacuation limits and making necessary public and private notifications.

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Figure 2.2. Facility Evacuation Plan

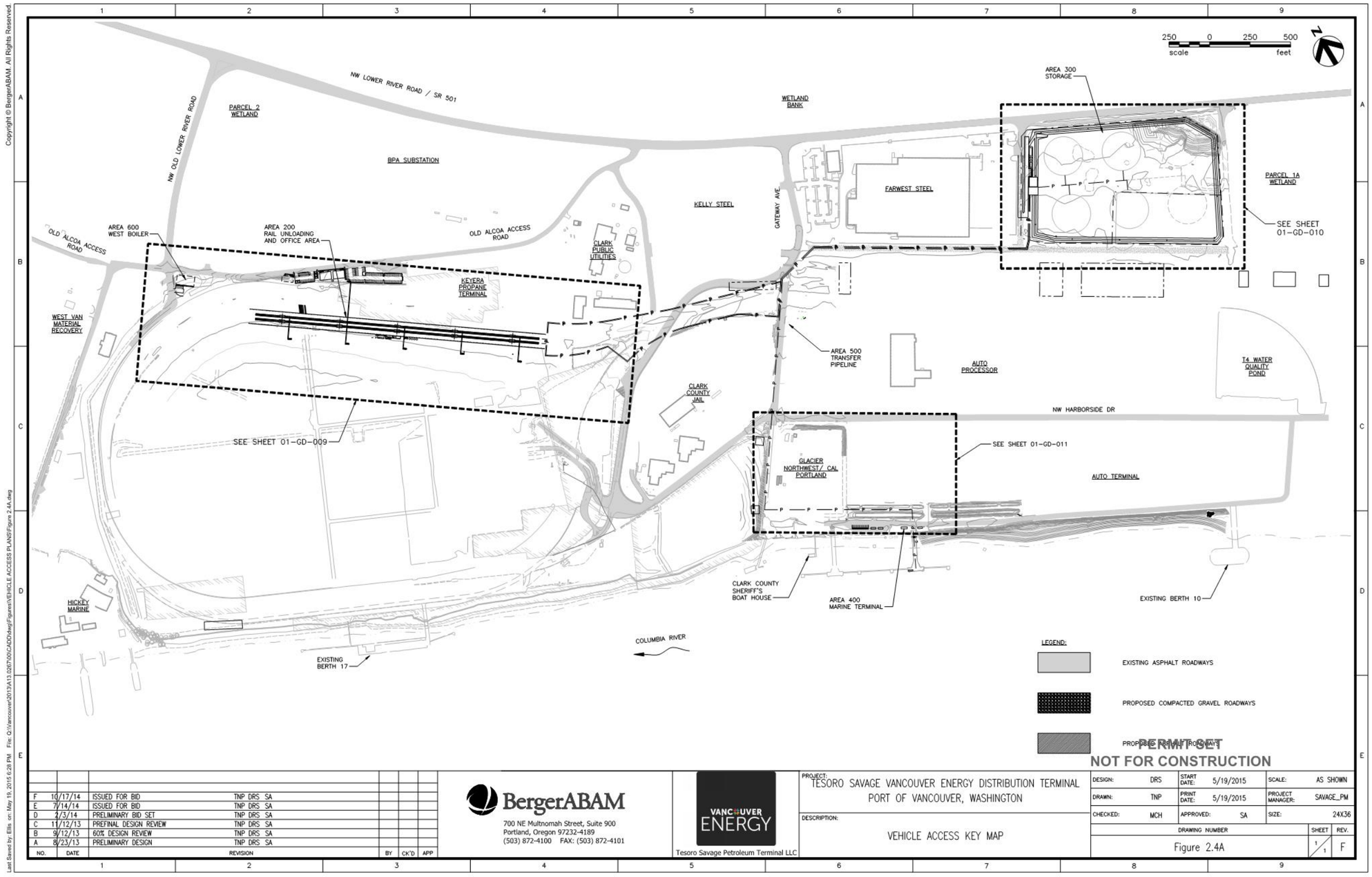

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Figure 2.2 – Facility Evacuation Plan (continued)

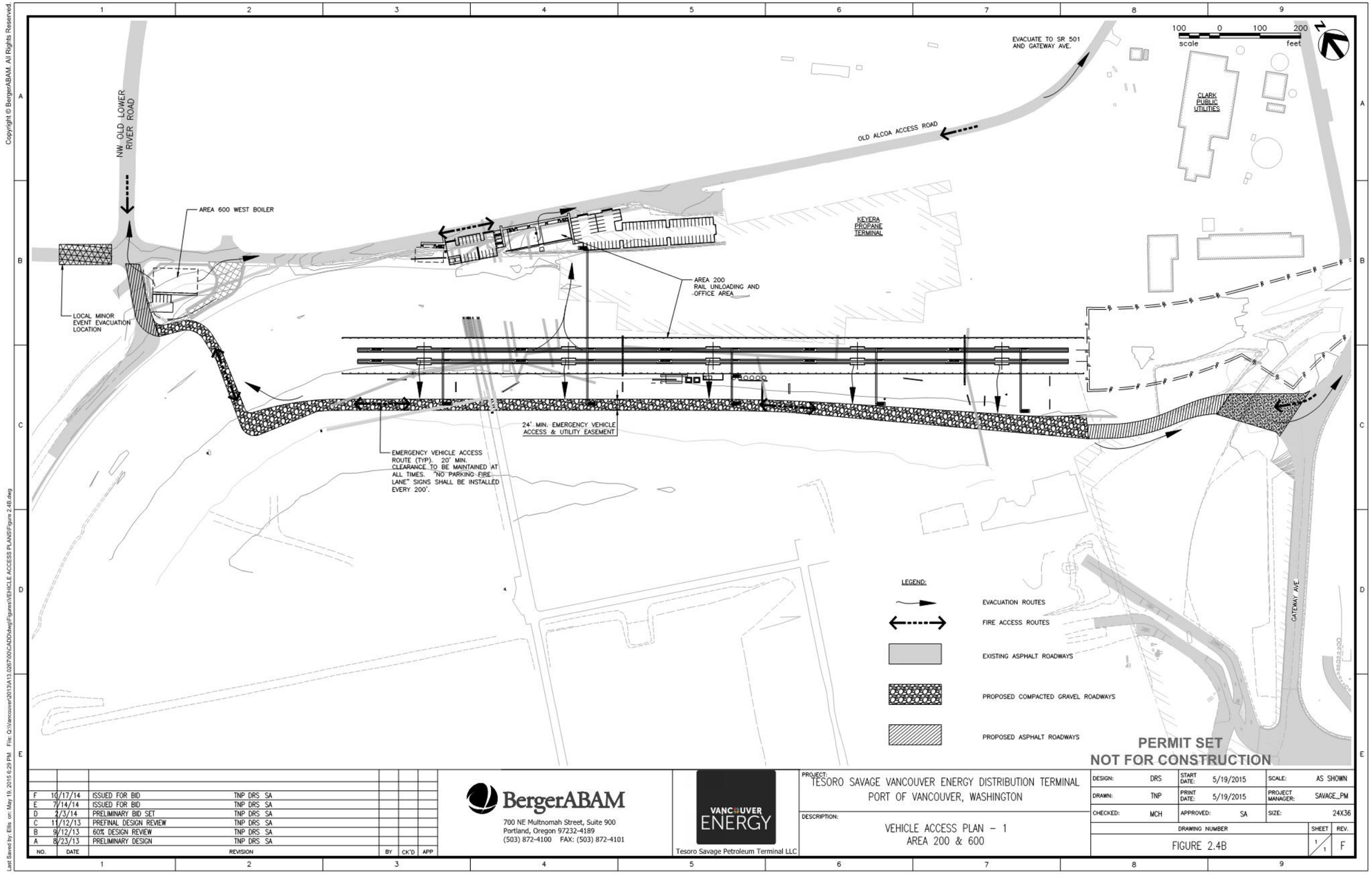

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Figure 2.2 – Facility Evacuation Plan (continued)

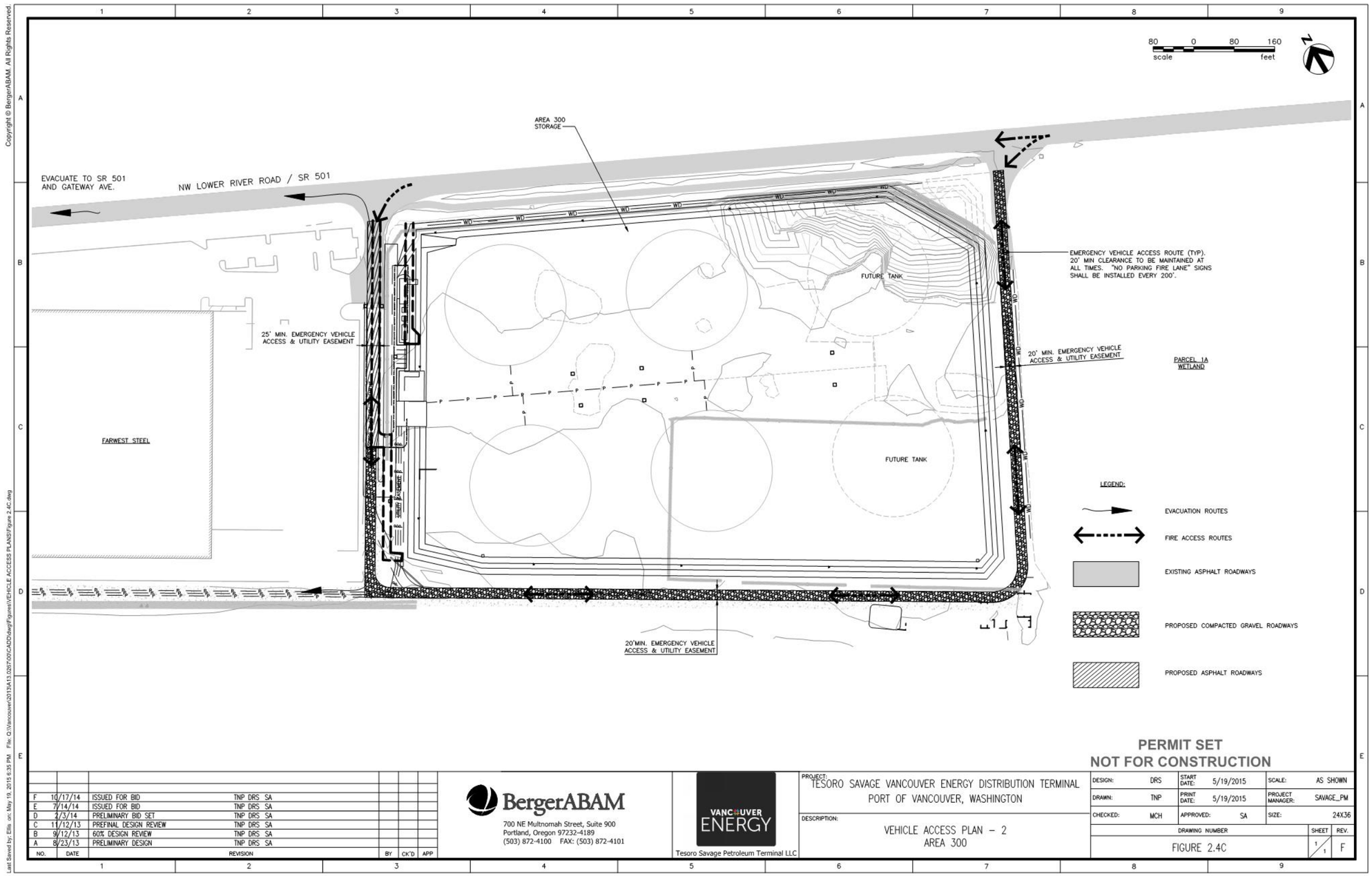

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Figure 2.2 – Facility Evacuation Plan (continued)

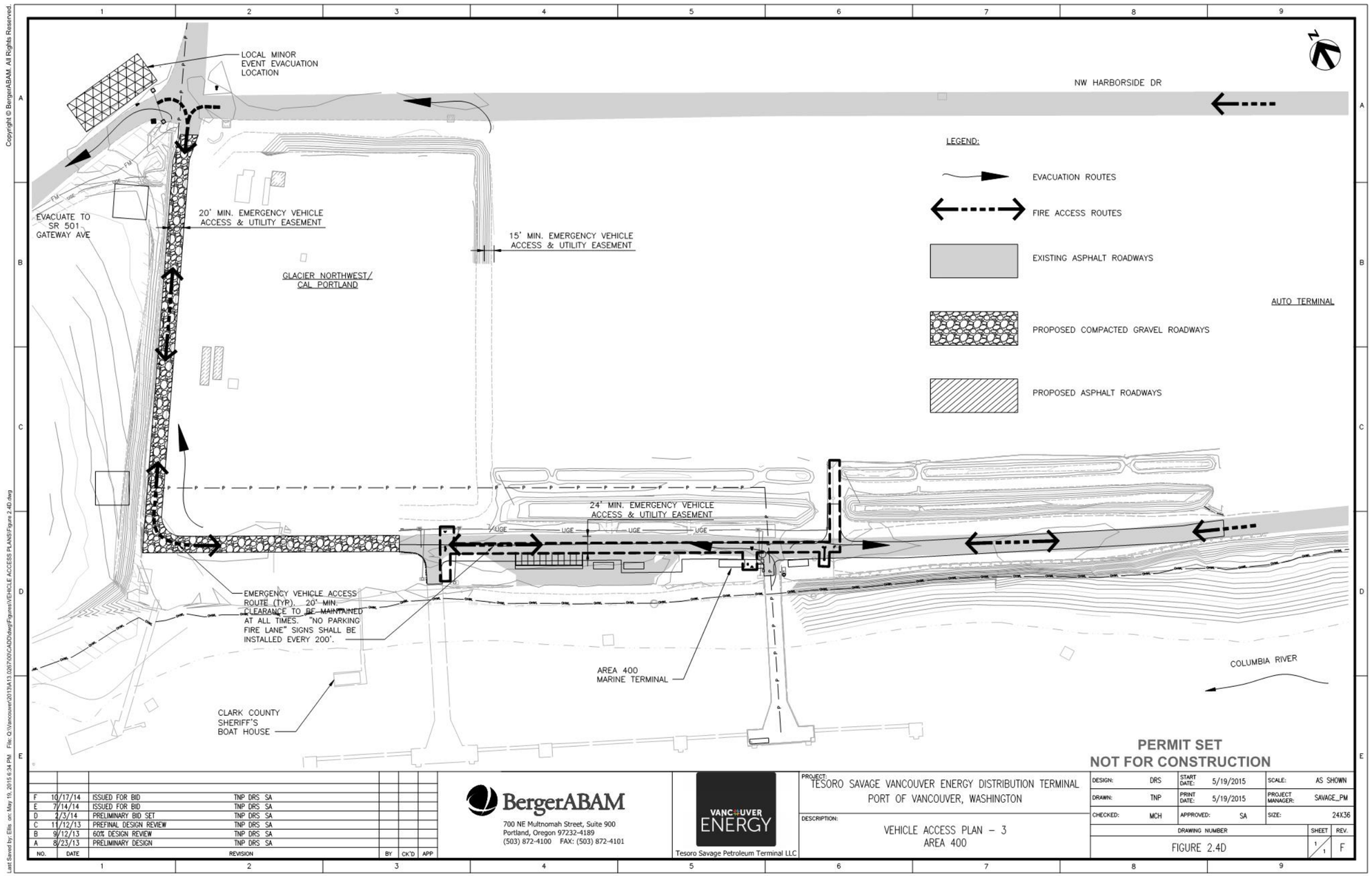

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Figure 2.3. Spill Mitigation Procedures*

Type	Mitigation Procedure
Any identified failure	Activate emergency shutdown system (ESO) to close all landside valves and stop transfer pumps.
Failure of Manifold, Mechanical Loading Arm, Transfer Equipment, or Hoses at Dock	Notify vessel and terminal to stop all product transfers. Advise vessel and terminal to close all line and ship manifold discharge valves. Shut down all transfer pumps and close all dockside valves. Eliminate sources of ignition. If hose ruptured, drain hose in a manner that minimizes spillage into water. If other than hose ruptured, determine source of leak and control the source. Initiate spill response.
Tank Overfill/Failure	Stop transfer of product into tank. Eliminate sources of ignition. Consider transferring the product from the overflowing tank into an adjacent tank to stop overflow. Isolate tank by closing all valves. Secure area to protect pedestrian and vehicle traffic and prevent the spreading of spilled oil. Consider facility evacuation for gasoline and ethanol spills. Initiate spill response
Piping Rupture/Leak	Shut down pumps and close pipeline block valves on both sides of the spill. Determine if options are available to minimize line drainage. Secure area to protect pedestrian and vehicle traffic and to prevent spreading of spilled oil. Initiate spill response. Contact pipeline repair specialist. See Figure 3.3.
Explosion/Fire	Alert terminal employees. Request emergency assistance by dialing “911.” Secure area to protect pedestrian and vehicle traffic from danger. Evacuate terminal as directed in the evacuation plan. Notify adjacent facilities. See Figure 3.3. Begin firefighting procedures.
Equipment Failure, such as Pumping or Relief Valve	Shut down and close adjacent valves. Eliminate sources of ignition. Secure area to protect pedestrian and vehicle traffic and to prevent spreading of oil. Initiate spill response.

*Worse-Case Discharge volume calculations are provided in Appendix D.

Figure 2.4. Oil Spill Surveillance Form

Record your observations of spilled oil either in a notebook or directly on a chart, of the area under observation. This checklist is an aid for organizing your observations.

General Information

Date _____ Time _____ Case name _____

Observer's name _____ Observer's affiliations _____

Current stage of tide (flood, ebb, slack) _____

On-scene weather (wind, sea state, visibility)

TIDES: HIGH(s) _____ _____ MAX CURRENT: _____ _____
LOW(s) _____ _____ (W/VELOCITY FLOOD) _____ _____

DAYLIGHT: SUNRISE _____ SLACK _____ _____
SUNSET _____ WATER _____ _____

WIND: SPEED _____ DIRECTION _____

CURRENT CONDITIONS:

_____

_____

FORECAST (NEXT OPERATIONAL PERIOD):

_____

_____

Platform (helicopter, fixed-wing aircraft, boat)_____
Flight path/trackline _____
Altitude where observation taken (feet) _____
Location of oil's source (if known) _____
Areas not observed (e.g., foggy locations, restricted air spaces, shallow water areas)

_____

_____

Figure 2.4 – Oil Spill Surveillance Form (continued)

Oil Observations

Slick location(s) _____

Latitude _____ Longitude _____ (central point)

Slick dimension(s) _____

Orientation of slick(s) _____

Description of oil distribution (e.g., as windrows, streamers, pancakes, or patches)

_____

_____

Color and appearance (e.g., rainbow, dull or silver sheen, black, or brown in color, or mousse)

_____

Percent coverage _____

Is oil recoverable (Y/N)? _____

(examples or recoverable oil types include black oil, mousse, and heavy dull– or dark – colored sheens)

Considerations

1. During surveillance flights, travel beyond known impacted areas to check for oil beyond these areas.
2. Include the name and phone number of the person making the observations.
3. Clearly describe the locations where oil is observed, as well as the areas where no oil has been seen.

Other Observations

Response Operations

Skimmer deployment (general locations where skimmers are working).

Are they working in the heaviest concentration of oil? Describe.

_____

_____

_____

_____

_____

Figure 2.4 – Oil Spill Surveillance Form (continued)

Boom deployment

Describe general locations of boom(s). _____

Does the boom contain oil? _____ Is oil entraining under the boom? _____

Environmental Observations

Locations of any convergence line, rip tides, and sediment plumes

_____

Locations of kelp beds, seagrass beds, and other features that could be mistaken for oil

_____

General description of wildlife present in area (locations and approximate numbers of birds and marine mammals)

BIRDS _____

_____

MARINE MAMMALS _____

_____

General Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Figure 2.5. Glossary of Standard Oil Spill Observation Terms

Black oil
A black or very dark brown layer of oil. Depending on the quantity spilled, oil tends to quickly spread out over the water surface to a thickness of about 1 millimeter (0.04 inch). However, from the air, it is impossible to tell how thick a black oil layer is.

Convergence line
A line on the water surface where floating objects and oil collect. A convergence can be in the interface between two different types of bodies of water, or it can be caused by a significant depth change, tidal changes, or other common phenomena. Convergences are common in the marine environment.

Dispersion
The breaking up of an oil slick into small droplets that are mixed into the water column by breaking waves and other sea surface turbulence.

Emulsification
The formation of a water-in-oil mixture. Different oils exhibit different tendencies to emulsify, and emulsification is more likely to occur under high energy conditions (strong winds and waves). An emulsified mixture of water in oil is commonly called “mousse,” its presence indicates a spill that has been on the water for some time. See also **mousse**.

Entrainment
The loss of oil from containment when it is pulled under a boom by a strong current. Entrainment typically occurs from booms deployed perpendicular to currents greater than 1 knot (0.5 meter per second).

Mousse
An emulsified mixture of water in oil. Mousse can range in color from dark brown to nearly red or tan, and typically has a thickened or pudding-like consistency compared with fresh oil. Incorporation of up to 75 percent water into the oil will cause the apparent volume of a given quantity of oil to increase by up to four times. See also **emulsification**.

Pancakes
Isolated, roughly circular patches of oil ranging in size from a few feet across to hundreds of yards (or meters) in diameter. Sheen may or may not be present.

Recoverable oil
Oil in a thick enough layer on the water to be recovered by conventional techniques and equipment. Only black or dark brown oil, mousse, and heavy sheens (which are dull brown in color) are generally considered to be thick enough to be effectively recovered by skimmers.

Sheen
A very thin layer of oil (less than 0.0001 inch or 0.003 millimeter in thickness) floating on the water surface. Sheen is the most commonly observed form of oil during the later stages of a spill. Depending on thickness, sheens range in color from dull brown for the thickest sheens to rainbows, grays, silvers, and near-transparency in the case of the thinnest sheens.

Slick
Oil spilled on the water, which absorbs energy and dampens out surface waves, making the oil appear smoother or slicker than the surrounding water.

Figure 2.5 - Glossary of Standard Oil Spill Observation Terms (continued)

Streamers
A narrow line of oil, mousse, or sheen on the water surface, surrounded on both sides by clean water. Streamers result from the combined effects of wind, currents, and/or natural convergence zones. Often, heavier concentrations of mousse or sheen will be present in the center of a streamer, with progressively lighter sheen along the edges. Streamers are also called “fingers” or “ribbons.”

Tarballs
Weathered oil that has formed pliable balls or patches that float on the water. Tarballs can range in diameter from a few millimeters (much less than an inch) to a foot (0.3 meter). Depending on how weathered, or hardened, the outer layer of the tarball is, sheen may or may not be present.

Weathering
A combination of physical and environmental processes, such as evaporation, dissolution, dispersion, and emulsification, which act on spilled oil to change its physical properties and composition.

Windrows
Streaks of oil that line up in the direction of the wind. Windrows typically form early during a spill when the wind speed is at least 10 knots (5.1 meters per second). Sheen is the form of spilled oil that most frequently windrows.

Figure 2.6. Spill Estimation Factors

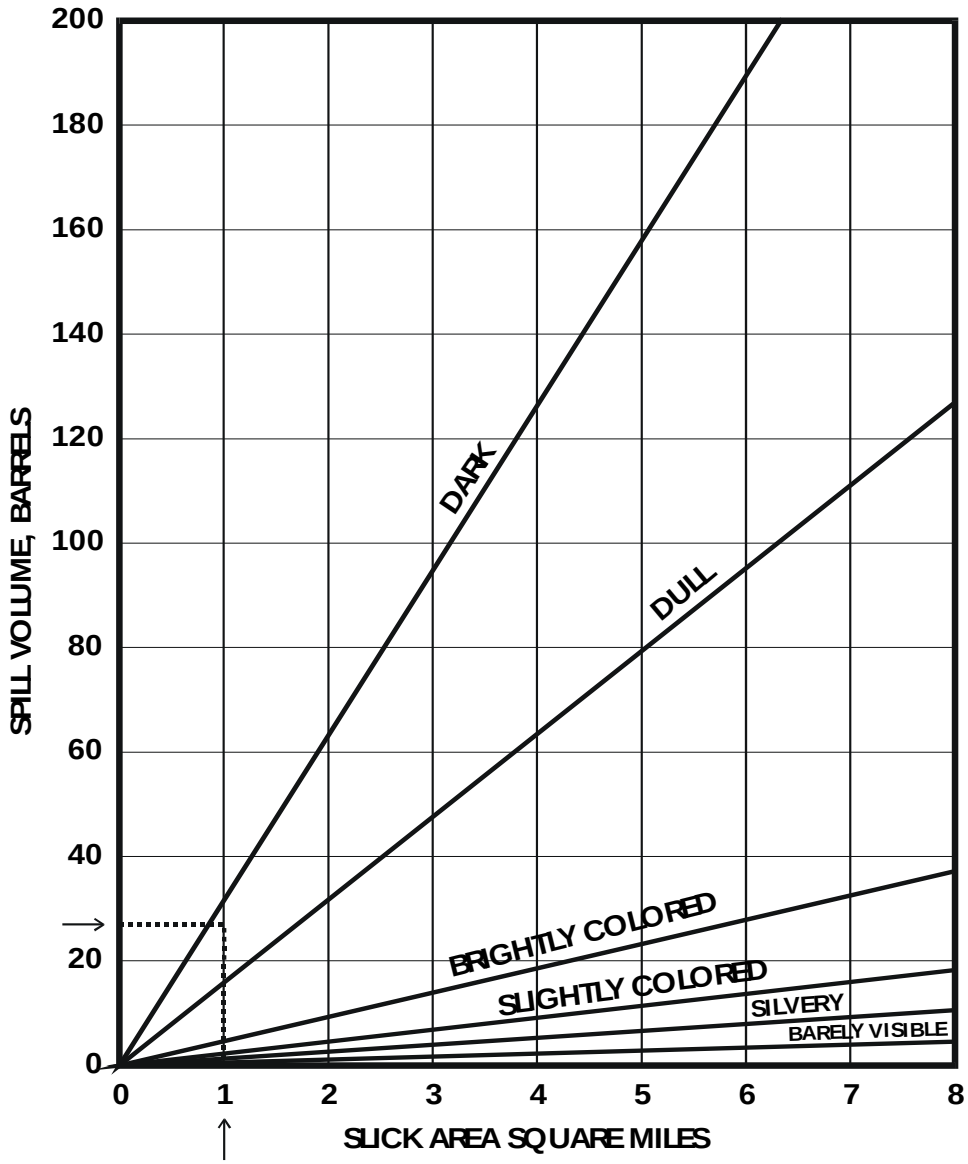
Definitions	Gallons of Oil per Square Mile
barely visible	25
silvery	50
slightly colored	100
brightly colored	200
dull	666
dark	1,332

Figure 2.7. Visual Slick Size in Fraction of a Square Mile Chart

LENGTH																							
	(FEET)											(MILES)											
WIDTH	100	200	300	400	500	600	700	800	900	1000	1200	1/4	½	3/4	1	2	3	4	5	6	7	8	9
10																				0.011	0.013	0.015	0.017
20																	0.013	0.015	0.019	0.023	0.026	0.030	0.034
30																0.011	0.017	0.023	0.028	0.034	0.040	0.045	0.051
40																0.015	0.023	0.030	0.038	0.046	0.053	0.061	0.068
50															0.010	0.019	0.028	0.038	0.047	0.057	0.066	0.076	0.085
60					LESS THAN 0.010 SQUARE MILES										0.011	0.023	0.034	0.045	0.057	0.068	0.079	0.091	0.102
70														0.010	0.013	0.026	0.040	0.053	0.066	0.080	0.093	0.106	0.119
80														0.011	0.015	0.030	0.045	0.060	0.076	0.091	0.106	0.121	0.136
90														0.013	0.017	0.034	0.051	0.068	0.085	0.102	0.119	0.136	0.153
100													0.010	0.014	0.019	0.038	0.057	0.076	0.095	0.113	0.132	0.152	0.170
150													0.014	0.021	0.028	0.057	0.085	0.113	0.142	0.170	0.199	0.227	0.256
200												0.010	0.019	0.028	0.038	0.076	0.114	0.152	0.189	0.228	0.265	0.303	0.341
300									0.010	0.011	0.013	0.014	0.028	0.042	0.057	0.113	0.171	0.227	0.284	0.341	0.397	0.455	0.511
400							0.010	0.011	0.013	0.014	0.017	0.019	0.038	0.057	0.076	0.151	0.226	0.303	0.379	0.455	0.530	0.606	0.682
500					0.010	0.011	0.013	0.014	0.016	0.018	0.022	0.024	0.047	0.071	0.095	0.189	0.284	0.378	0.472	0.518	0.662	0.756	0.852
600				0.010	0.011	0.013	0.015	0.017	0.019	0.022	0.026	0.028	0.057	0.085	0.117	0.227	0.341	0.455	0.568	0.683	0.795	0.911	
1/4 MILE		0.010	0.014	0.019	0.024	0.028	0.033	0.038	0.043	0.047	0.056	0.066	0.125	0.187	0.250	0.500	0.750						
½ MILE	0.0100	0.019	0.028	0.038	0.047	0.057	0.066	0.076	0.085	0.095	0.114	0.125	0.250	0.375	0.500								
3/4 MILE	0.014	0.028	0.042	0.057	0.071	0.085	0.099	0.114	0.128	0.142	0.171	0.187	0.375	0.562	0.750		GREATER THAN ONE (1) SQUARE MILE						
1 MILE	0.019	0.038	0.057	0.076	0.095	0.117	0.133	0.152	0.171	0.189	0.227	0.250	0.500	0.750									
2 MILE	0.038	0.076	0.113	0.151	0.189	0.227	0.265	0.304	0.342	0.379	0.455	0.500											
3 MILE	0.057	0.114	0.171	0.228	0.284	0.341	0.398	0.455	0.512	0.568	0.673	0.750											
4 MILE	0.076	0.152	0.227	0.303	0.378	0.455	0.530	0.607	0.683	0.758	0.910												
5 MILE	0.095	0.189	0.284	0.379	0.472	0.568	0.662	0.759	0.854	0.948													

One square mile = 27.878×10^6 square feet

Figure 2.8. Estimations of Spilled Oil Volumes from Slick Appearances (Large Volumes)



Source: NOAA Spill Volume Estimating Guide

Figure 2.9. Oil Spill Trajectory Information Form

INCIDENT INFORMATION

Company:_____ Contact:_____ Phone:_____ Fax:_____

Date/Time of Spill:_____

Location of Source (*Latitude/Longitude):*_____

Last Known Location of Spill (*Latitude/Longitude*):_____

_____

Type of Oil (*API, if known):*_____ Estimated Volume of Initial Release:_____

If continuing release, how much?_____ For how long? _____

WEATHER CONDITIONS

Present Time:_____ Air Temperature:_____

Wind Direction:_____ Wind Speed:_____

Wave Height:_____ Water Temperature:_____

Current Direction:_____ Current Speed:_____

Weather Forecast: _____

_____

Additional Information:_____

_____

Submit Results To:

Company: _____

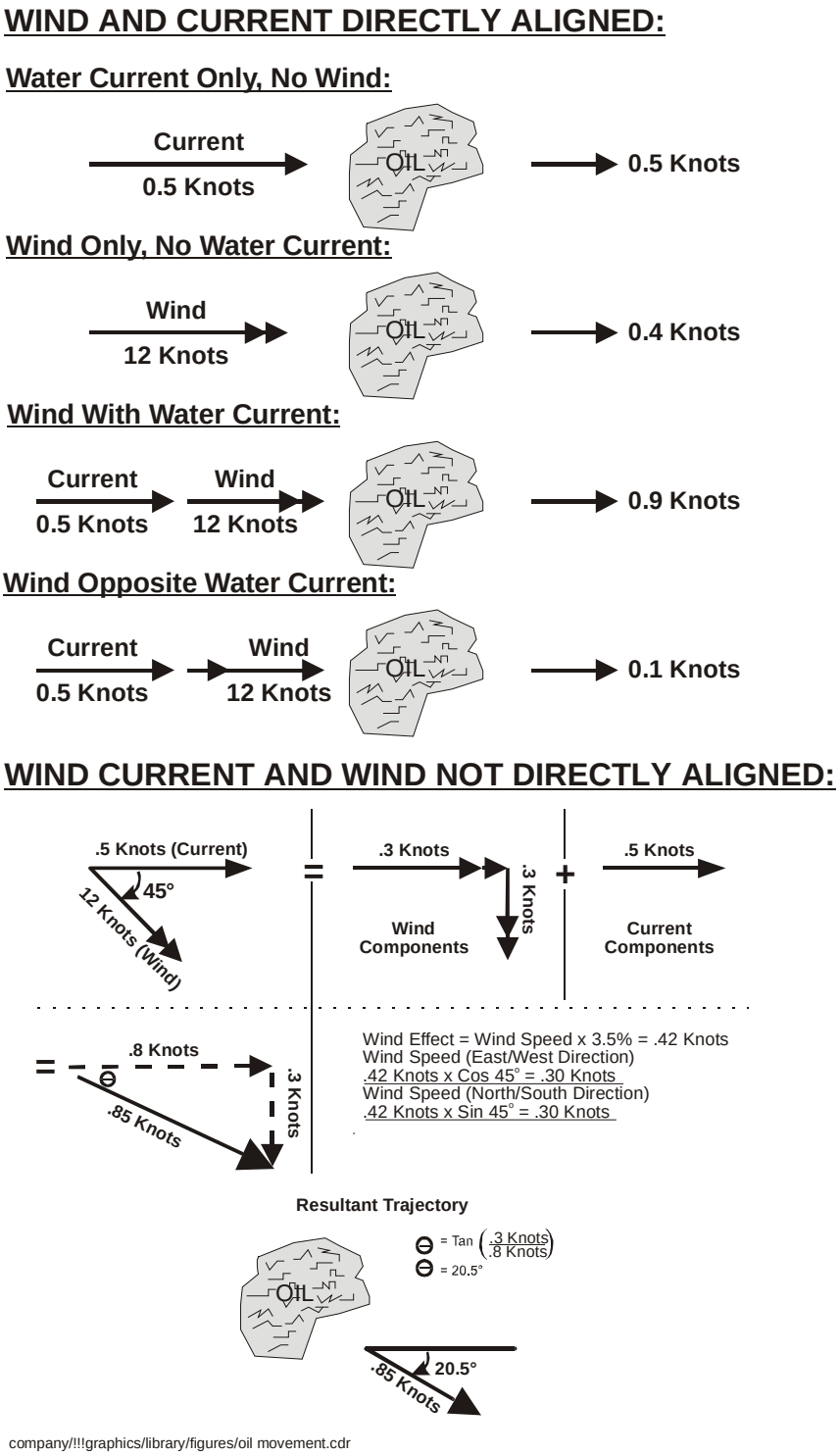
Name: _____

Fax Number: _____

Office Number: _____

Home Number: _____

Figure 2.10. Examples of Oil Movement on Water Surfaces



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OIL SPILL RESPONSE – EMERGENCY PROCEDURES

- **STOP THE PRODUCT FLOW:** Act quickly. Secure pumps. Close valves, etc.
- **WARN PERSONNEL:** Enforce safety and security measures.
- **SHUT OFF IGNITION SOURCES:** Motors, electrical circuits, open flames, etc.
- **CONTAIN / CONTROL THE SPILL:** Use berms, boom, absorbents, etc.

DO NOT use any cleaning or dispersing agents on the spilled oil (e.g. no liquid soaps, chemical dispersants, and bio-agents). The use of such products is strictly controlled by government laws and regulations and will result in fines/penalties.

IDENTIFICATION OF REPORTABLE SPILLS TO GROUND

All spills are considered reportable spills to ground, except as follows:

- Spills of known volume less than 42 gallons,
- CERCLA releases,
- Air releases to atmosphere only.
- Releases from underground storage tanks
- Spills contained within areas controlled by NPDES permitted systems that are not likely to threaten groundwater and do not exceed federal reportable quantities.

For spills of unknown volume, the spill should be considered reportable if the spill is ongoing, if the spill has a pathway to water of the state, if environmental conditions (rain or high groundwater) might lead to environmental exposure, if the volume is not known to be less than 42 gallons.

SPILL OBSERVER INITIAL PROCEDURES CHECKLIST

____ Make an immediate and rapid assessment to determine:

- If anyone has been injured
- If situation poses hazards to other personnel or the public (i.e., fire, explosion, fumes, etc.)
- Source of the spill
- Type of material spilled and approximate size

____ Take immediate steps to stop the flow.

____ Ensure the safety of personnel. If someone requires medical attention or there is an emergency, dial 911.

____ Notify the Terminal Manager and/or the Area Supervisor.

____ Evacuate personnel as necessary (refer to Figures 2.3 and 2.4 in the Spill Contingency Plan).

____ Shut down and control the source of the spill, if safe to do so. Assess the potential hazards for explosion and airborne toxins.

____ If safe to do so, shut down or direct appropriate personnel to shut down potential ignition sources.

____ Monitor the area for potential explosion and fire hazards. If fire is present, enable fire alarm and water system.

____ Ready the area for firefighting, if necessary.

Field Document Page 1

____ Use whatever resources are available to limit the spread of the spill (see **DO NOT** note above)

____ Establish a safety zone around the spill.

____ Complete the Initial Spill Documentation Forms (see below)

All Facility employees have the authority to activate the Facility Spill Response Team, activate spill response action contractions, and act as the Incident Commander if a designated Incident Commander, Deputy Commander, or a more Senior Facility Manager is not available.

INCIDENT COMMANDER PROCEDURES CHECKLIST

Terminal Manager receives initial report from Facility operator or Area Supervisor, and assumes role as initial Incident Commander.

____ Determine the degree of spill response that will be required. Assessment should include:

- Product and volume spilled
- Spill trajectory
- Response personnel and equipment needs

____ Make mandatory and internal Notifications (see **NOTIFICATIONS PROCEDURES** below).

____ Activate the following response teams, as appropriate:

- Facility Incident Response Team
- Primary Response Contractors (see Spill Contingency Plan)
- Tesoro West Coast Regional Response Team

____ A Spill Report Form is provided in **Figure 3.2**.

____ Establish a Command Post

- Primary Location: Vancouver Energy Terminal Office
- Alternate Location: Hilton Hotel Vancouver

____ Act as initial Site Safety Officer.

____ Notify down river water users as appropriate (see the Spill Contingency Plan

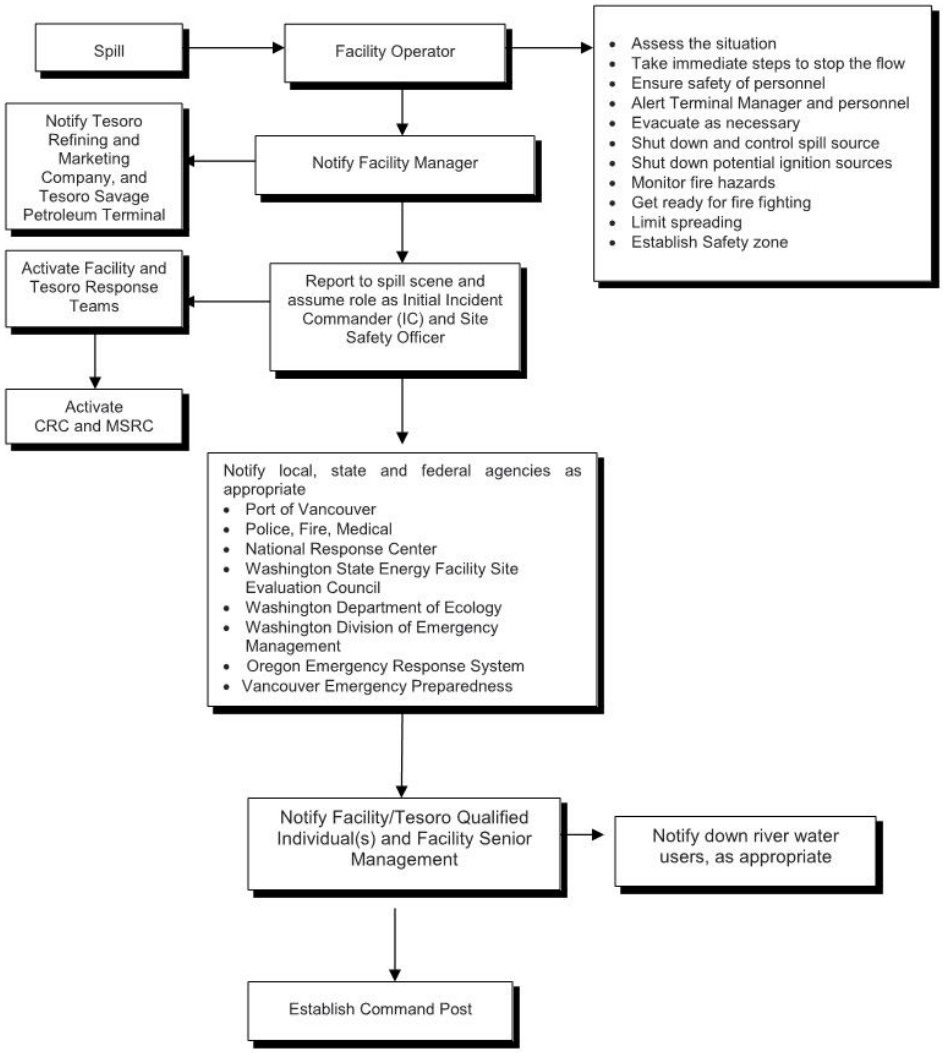
INITIAL SPILL DOCUMENTATION FORMS

Initial documentation of a spill shall be completed by the initial observer(s) of the spill. This documentation is to be provided to the Incident Commander and used to evaluate the need for and extent of additional response actions and notifications. The following form is included at the end of this Field Document.

- **Procedures to Detect, Assess, and Document the Spill Size**

Vancouver Energy
Field Document

NOTIFICATION PROCEDURES



Field Document Page 3

Vancouver Energy
Field Document

NOTIFICATION NUMBERS

Facility Manager

Work: TBD
Cellular: TBD
Home: TBD

Alternate Incident Commander

Work: TBD
Cellular: TBD
Home: TBD

Mandatory Calls

National Response Center
(800) 424-8802
For USCG and EPA

WEMD (800) 258-5990
(Washington Division of Emergency Management)

Port of Vancouver Security
(360) 992-1120

Secondary Calls

Clean Rivers Cooperative
(503) 220-2040

Marine Spill Response Corporation
(425) 252-1300
(800) 645-7745

Department of Ecology (SW Office)
(360) 407-6300

Oregon Emergency Response System
(800) 452-0311

Clark Regional Emergency Services
(360) 737-1911

USCG Marine Safety Unit – Portland
(503) 240-9301

Field Document Page 4

Vancouver Energy
Field Document

PROCEDURES TO DETECT, ASSESS, AND DOCUMENT THE SPILL SIZE

The Vancouver Energy Operations Facility Oil Spill Contingency Plan Section 2 contains guidelines for estimating the volume of a spill, and predicting spill movement, and should be referenced for completing this document.

This form shall be completed by the first spill observer(s), and shall be provided to the Incident Commander to be used to evaluate the need for and extent of additional response actions.

1. Location of the Spill:_____
2. Type of Oil Product Spilled:_____
3. Color of Oil Spill:

   ☐ Rainbow

   ☐ Silver

   ☐ Dark

4. Length of Oil Spill:_____feet/meters
5. Width of Oil Spill:_____feet/meters
6. Estimated Volume of the Spill:_____gallons
7. Is the Spill Contained?: Yes:_____No:_____
8. If no, what is the estimated rate of release?:_____
9. Is there a potential for impact to the waters of the state? Yes:_____No:_____

This form was completed by:_____
Print Name

Signature:_____

Date:_____

Field Document Page 5

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3. Notification Procedures

3.1 Emergency Reporting and Notification Procedures

This section describes required notifications and information summaries to be provided in the event of a spill. The priority of actions and response procedures will depend upon actual circumstances, and will be determined by the Incident Commander.

> Spillage of any petroleum hydrocarbon or other hazardous substance onto land or water must be immediately reported, without exception.

3.2 Oil Spill Prioritized Notifications

The priority of notifications is summarized below and illustrated on **Figure 3.1**. All notifications should be documented on **Figure 3.3. Figure 3.4** is a summary of agency notification requirements.

- The **Spill Observer** notifies the Area Supervisor, nearby vessel personnel, and Terminal Manager.
- Area Supervisor or **Terminal Manager** notifies the Incident Commander (or assumes that role).
- **Incident Commander** notifies the following in the order listed.

Mandatory Notifications
- National Response Center (NRC)
- Washington Emergency Management Division (EMD)
- Port Security

Secondary Notifications
- Clean Rivers Cooperative
- Marine Spill Response Corporation
- Ecology – Southwest Office
- Oregon Emergency Response System
- Clark Regional Emergency Services Agency
- USCG Marine Safety Unit – Portland Office

Company Internal Notifications
- Tesoro West Coast Regional Response Team
- Tesoro Refining and Marketing Company
- Tesoro Savage Petroleum Terminal LLC

3.3 Oil Spill Information Requirements and Procedures

The following information should be collected to the maximum extent possible and documented, where appropriate in the Notification Information Reporting Form (**Figure 3.2**).

- If a spill is detected the following information should be provided to the **Incident Commander**.
  - Was anyone hurt?
  - Location of spill
  - Time of spill
  - Product/volume spilled
  - Source of spill
  - Actions taken
  - Weather conditions
  - Projected spill movement
  - Equipment needed
  - Environmental concerns
- Never speculate when reporting a spill. Report only facts.
- Employees and contractors are not to give any information about a spill to anyone other than the designated on-scene representatives of Ecology, USCG, or the EPA.
- No statements should be made regarding the following subjects, except by persons designated by the Incident Commander.
  - Liability for spill.
  - Estimates of damage expressed in dollars.
  - Estimates of the duration of cleanup.
  - Commitments regarding effectiveness of cleanup.
  - Comments regarding appropriateness or effectiveness of public or private involvement.

All inquiries from newspapers, radio stations, and television stations will be referred to the Incident Commander.

Figure 3.1. Notification Flow Chart

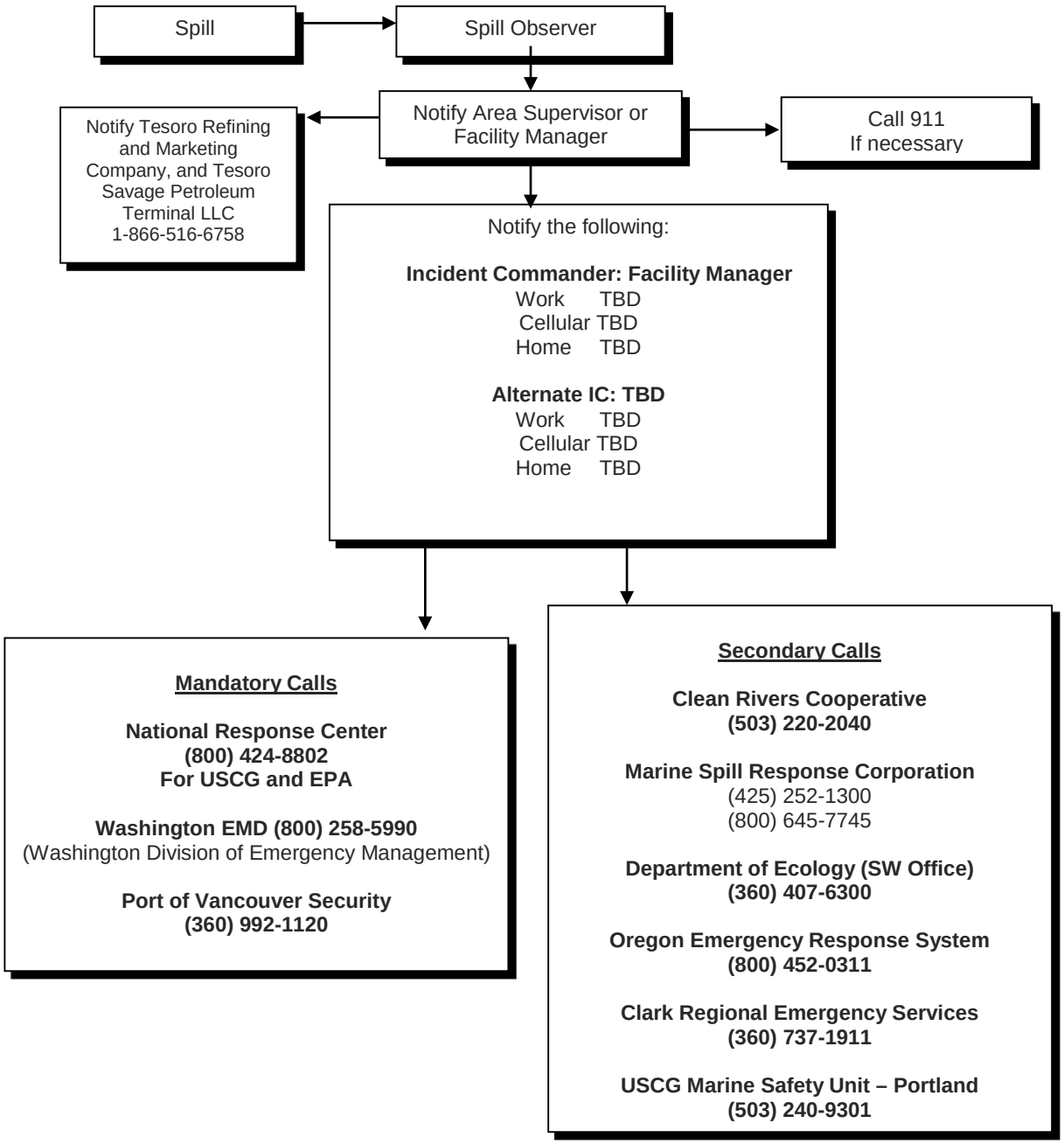

Figure 3.2. Notification Information Reporting Form

Required in a Report to the National Response Center (NRC): 24/7 TELEPHONE: (800) 424-8802
Note: it is not necessary to wait for all information before calling NRC. Notification Must Occur within the First Hour.

REPORTING PARTY INFORMATION

Name: _____ Position: _____ Company: _____
Day Telephone: TBD Evening Telephone: _____
Address: 5501 NW Old Lower River Rd
City: Vancouver State: WA Zip: 98660
Were Materials Discharged? **YES/NO** Confidential? **YES/NO**
Meeting Federal Obligations to Report? **YES/NO** Date Called: _____
Are you calling for the responsible party? **YES/NO** Time Called: _____

INCIDENT DESCRIPTION

Source and/or Cause of incident: _____
Date of Incident: _____ Time of Incident: _____
Incident Address/Location: _____
Nearest City: _____ State: _____ County _____ Zip _____
Distance From City: _____ Direction from City: _____
Section _____ Township _____ Range _____ Borough _____
Container Type _____ Tank Oil Storage Capacity _____
Facility Oil Storage Capacity: _____
Facility Latitude: Facility Longitude:

MATERIAL DISCHARGE

CHRIS CODE	Discharged Quantity	Unit of Measure	Material Discharged in Water	Quantity	Unit of Measure

RESPONSE ACTION

Actions Taken to Correct, Control, or Mitigate Incident?

IMPACT

Number of Injuries: _____ Number of Fatalities: _____
Were there Evacuations? YES//NO Number Evacuated: _____
Was there any Damage? YES/NO Damage in Dollars (approximate): _____
Medium Affected: _____
Description: _____
More Information about Medium:

ADDITIONAL INFORMATION

Any Information about the incident not recorded elsewhere in the report:

CALLER NOTIFICATIONS

EPA YES/NO | **USCG** YES/NO | **STATE** YES/NO | **OTHER** YES/NO **Describe:**

Figure 3.3. Notification Summary and Documentation Form

AFFILIATION	PHONE NUMBER	NAME OF PERSON CONTACTED	TIME CONTACTED
A. COMPANY PERSONNEL			
TBD	TBD		
B. MANDATORY NOTIFICATIONS			
National Response Center (NRC)	(800) 424-8802*		
Washington Emergency Management Division (EMD)	(800) 258-5990		
Port of Vancouver Security	360-992-1120		
C. SECONDARY NOTIFICATIONS			
Clean Rivers Cooperative	(503) 220-2040		
Marine Spill Response Corporation	(425) 252-1300 (800) 645-7745		
Department of Ecology – Southwest Office	(360) 407-6300		
Oregon Emergency Response System	(800) 452-0311		
Clark Regional Emergency Services Agency	(360) 737-1911		
USCG Marine Safety Unit – Portland	(503) 240-9301*		

*Represents after-hour telephone numbers

Figure 3.3. Notification Summary and Documentation Form (continued)

AFFILIATION	PHONE NUMBER	NAME OF PERSON CONTACTED	TIME CONTACTED
C. NOTIFICATIONS AS APPROPRIATE			
Federal Agencies			
EPA Region 10 – Seattle	(206) 553-1264*		
National Ocean and Atmospheric Association (NOAA) Seattle (Hazmat)	(206) 526-6317 (206) 526-4911		
National Weather Service Portland	(503) 326-2340 (503) 326-2720		
Federal Bureau of Investigation Portland	(503) 224-4181*		
U.S. Forest Service Mountlake Terrace, WA	(800) 627-0062		
U.S. Department of the Interior Portland, OR	(503) 326-2489		
Tribal Nations			
TBD	TBD		
Other State Agencies			
(EFSEC) State of Washington Energy Facility Site Evaluation Council	TBD		
Washington Highway Patrol (Emergency Only)	(360) 757-1175* (360) 753-6540		
Washington State Department of Fish and Wildlife	(800) 258-5990 (360) 534-8233 (pager) (360) 902-8124 (office)		
Washington State Department of Fish and Wildlife Oil Spill Response Team	(360) 534-8233 (pager) (360) 902-8124 (office)		
Washington State Department of Natural Resources (Regional)	(360) 856-3500		
Washington State Department of Parks and Recreation	(360) 755-9231		
Washington State Fire Marshall	(360) 596-3900		
Washington State Dept. of Transportation – Southwest Region	(360) 905-2000		
Oregon Department of Wildlife	(503) 872-5268		
Local Agencies			
Vancouver Public Works Operations Ctr	(360) 693-9302		
Clark Public Utilities	(360) 992-3000		
Clark County Public Works (waste water)	(360) 397-6118		
Vancouver-Clark Parks and Recreation	(360) 487-8311		
Clark County Public Health	(888) 727-6230		

*Represents after hours telephone numbers

Figure 3.3. Notification Summary and Documentation Form (continued)

AFFILIATION	PHONE NUMBER	NAME OF PERSON CONTACTED	TIME CONTACTED
D. EMERGENCY SERVICES			
Emergency Medical and Hospitals			
Legacy Salmon Creek Hospital	(360) 487-1000		
SW Washington Medical Center (Emergency Room)	(360) 514-2064		
Clark County/Vancouver Emergency Services	(360) 737-1911 or 911		
Clark County Public Health	(360) 397-8215		
Oregon Health & Science University (Portland)	(503) 494-7686		
Providence Portland Medical Center	(503) 215-1111		
Legacy Good Samaritan Hospital & Medical Center (Portland)	(503) 413-7711		
Fire Departments			
Vancouver Fire Department	911 or (360) 487-7211		
Clark County Fire Marshall	(360) 397-2375 x-2186		
Clark County Hazardous Materials	(360) 397-2375		
Police Departments			
Vancouver Police Administration	911 or (360) 487-7400		
Clark County Sheriff Administration	911 or (360) 397-2366		
E. MEDIA			
Radio			
AM 750 KXL, Portland	(503) 417-9595		
AM 1190 KEX, Portland	(503) 225-1190		
Television			
KING TV NBC, Channel 5 (Seattle)	(206) 448-5555		
KIRO TV CBS, Channel 7 (Seattle)	(206) 728-7777		
KOMO TV ABC, Channel 4 (Seattle)	(206) 404-4145		
KATU ABC, Channel 2 (Portland)	(503) 231-4222		
KOIN NBC, Channel 6 (Portland)	(503) 464-0600		
KGW NBC, Channel 8 (Portland)	(503) 226-5000		
Newspapers			
Seattle Times	(206) 464-2111 (206) 464-2261 (fax)		
Associated Press	(206) 682-1812		
The Columbian (Clark County)	(360) 699-6006		
The Oregonian (Portland)	(503) 221-8100		

Figure 3.3. Notification Summary and Documentation Form (continued)

AFFILIATION	PHONE NUMBER	NAME OF PERSON CONTACTED	TIME CONTACTED
F. RESPONSE CONTRACTORS			
Marine Spill Response Corporation	1-800-645-7745 (360) 417-9287 (Office) (206) 799-1621 (Cell)		
Clean Rivers Cooperative	(503) 220-2040*		
TBD Environmental Consultants	TBD		
Global Diving and Salvage Inc. (no contract in place)	(206) 623-0621* 1-800-441-3483		
NRC (no contract in place)	(800) 337-7455		
Harder Mechanical	(503) 281-1112		
G. MUTUAL AID			
Nustar	(360) 694-8591 (360) 772-5031 (Cell) (360) 567-8871 (Cell)		
H. MARINAS/PORTS			
Port of Vancouver	(360) 992-1120		
Port of Portland	(800) 547-8411		
Tomahawk Island Marina	(503) 289-5511		
Marineland at Pier 99	(503) 286-8221		
Ridgefield Marina	(360) 903-8517		
Kadow's Marina	(360) 693-0723		
I. LOCAL WATER SUPPLY			
City of Vancouver Municipal Water Treatment	(360) 696-8177		
Clark County Groundwater	(360) 397-6118		
Port of Vancouver Facilities	(360) 518-0501		
J. HELICOPTERS AND AIRCRAFT CHARTERS			
C&C Aviation (Portland)	(503) 760-6969		
Precision Helicopters	(503) 537-0108		
Hillsboro Helicopters (Contract with)	(503) 648-2831		

*Represents after hours telephone numbers

Figure 3.3. Notification Summary and Documentation Form (continued)

AFFILIATION	PHONE NUMBER	NAME OF PERSON CONTACTED	TIME CONTACTED
K. WILDLIFE REHABILITATION SPECIALISTS			
International Bird Rescue & Research Center (IBRRC)	(888) 447-1743*		
Focus Wildlife	(310) 386-5965 (800) 578-3048		
Oiled Wildlife Care Network	(530) 979-7561 (800) 645-1911 (oil spill) (877) 823-6926 (oiled animal)		
Progressive Animal Welfare Society (PAWS)	(425) 787-2500 (425) 412-4040		
Tri-State Bird Rescue	(302) 218-7371 (cell) (302) 737-7241		
L. LOCAL ACCOMMODATIONS			
Staybridge Suites	(360) 891-8282		
Homewood Suites	(360) 750-1100		
Red Lion at The Quay	(360) 694-8341		
Gateway Inn Express	(360) 576-1040		
La Quinta Inn	(360) 566-1100		
Hilton	(360) 993-4500		
M. NEIGHBORING FACILITIES			
Glacier/CalPortland	(360) 693-3611		
NGL Supply Terminal Company	(360) 892-5100 (360) 907-9607 (cell) (360) 694-9420 ext. 1 (Office)		
Clark Public Utilities	360-694-2844		
Clark County Jail Work Center	360-992-3000		
Tidewater Terminal Company	360-397-2138		
Farwest Steel	360-693-1491		
Subaru of America	360-735-8744		
Tri-Star Transload	360-737-7630		
West Vancouver Materials Recovery Center	503-807-2952 (24-hr)		
HME Construction	360-690-6842 (24-hr) or 360-904-0667		
BPA Substation	360-695-4553 or 888-699-1053		
Kelly Pipe	360-570-4338 (Office) 360-951-4464 (Cell)		

*Represents after hours telephone numbers

Figure 3.3. Notification Summary and Documentation Form (continued)

AFFILIATION	PHONE NUMBER	NAME OF PERSON CONTACTED	TIME CONTACTED
N. DOWNRIVER WATER USERS			
U.S. Fish & Wildlife Services Ridgefield Refuge (River Mile 94)	(360) 887-4106		
Bachelor Island Ranch (5 Intakes) (River Mile 90)	(360) 887-3883		
Boise Cascade Industrial Intake (River Mile 88)	(503) 397-2900		
Emerald Environmental (River Mile 75)	(360) 673-2550		
Trojan Nuclear Power Plant Intake (River Mile 73)	(503) 556-3713		
City of Rainier Drinking Water (River Mile 68)	(503) 556-7301 (City Hall) (503) 410-2173 (Cell)		
Longview Fiber (River Mile 68)	(360) 425-1550		
Weyerhaeuser Company (4 Intakes) (River Mile 64)	(360) 425-2150		
City of Longview (Discharge only) (River Mile 64)	(360) 442-5000		
Jammies Environmental (River Mile 58)	(360) 577-5691		
Portland General Electric (River Mile 53)	(503) 728-7470		

*Represents after hours telephone numbers

NOTE: For information about local food services and local transportation resources, consult the Vancouver-area yellow pages.

Figure 3.4. Agency Notifications Requirements

Agency	Spill Size	Verbal Report	Written Report
NRC (USCG, EPA, and DOT notified)	Immediately for all spills that impact or threaten navigable water or adjoining shoreline Any size on land if threatening surface waters Fire/explosion/injury from regulated pipeline	Call NRC Immediately (Within 1 hour): 800-424-8802	None
EPA Region 10	If spill is 1,000 gal or more (on land), or >42 gallons in each of 2 discharges within 12-month period	No	Yes (within 60 days)
USDOT	Any size from a regulated pipeline	Immediately	Within 30 days on DOT Form 7000-1 (http://phmsa.dot.gov)
WSDOT	Spill on WSDOT-regulated roadway	Immediately: Washington Traffic Safety Commission: 360-753-6197	None
Energy Facility Site Evaluation Council	• TBD by Site Certificate	TBD by Site Certificate	TBD by Site Certificate
Port of Vancouver	• Any amount on land or water requiring notification outside of Facility Management	Immediately Security 360-992-1120	As may be requested by the agency
Department of Ecology – Spills Program	• Any amount into or threatening state waters – inland, marine, or groundwater. • Any amount into a storm drain or ditch • Any amount onto snow • Any amount onto state highways and freeways. • Any amount onto land which could threaten waters of the state (including groundwater)	Immediately (within 30 minutes) WA Emergency Management Division: 800-258-5990	As may be requested by the agency
Department of Ecology – Dangerous Waste Program	• Any amount released to the environment which poses a threat to human health or the environment • Any amount released to containment which is not “promptly” cleaned up.	Immediately (within 60 minutes): Ecology Eastern Regional Office: 509-329-3400	As may be requested by the agency
Washington Utilities Commission	• Any release of product from a pipeline >5 gallons • Damage to a pipeline exceeding $25,000 • Other “significant occurrences” (especially if reported by news media) • Ref: WAC 480-75-630	Immediately (within 2 hours): Pipeline Safety Notification: 888-321-9144	Written report within 30 calendar days
	• Emergency pipeline shutdown, discovery of material defects, or physical damage that impairs pipeline	Immediately (within 24 hours): Pipeline Safety Notification: 888-321-9144	As may be requested by the agency
Washington Department of Natural Resources (DNR)	• Any amount which may impact state-owned aquatic lands	Immediately: WA Emergency Management Division: 800-258-5990 Rivers DNR Aquatic District: 360-577-2025	As may be requested by the agency

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4. Response Team Organization

4.1 Description

The Facility is owned and operated by Tesoro Savage Petroleum Terminal LLC (Company), a joint venture of Savage Companies and Tesoro Corporation. In addition to Facility employees, the Company provides staffing of Area 400, Marine Terminal, operations. Oil spill response at the Facility relies both upon Facility-specific resources, as well as the Company spill response organization and resources deployed region-wide.

The effective management of personnel and resources during a spill event is integral to the overall success of the response effort. The Facility and Company have developed its oil spill response organization around the Incident Command System (ICS), which provides the structure for effective management of spill resources. The duties and responsibilities of the ICS team members are described in **Figure 4.4.**

In addition, Facility is committed to follow the guidelines established by the Northwest ACP. The components of organization would be activated and mobilized in accordance with the size and complexity of the incident.

The Company's oil spill response organization consists of

- Facility Initial Response Team (IRT)
- Tesoro West Coast Regional Response Team (West Coast RRT)

If a response exceeds the Terminal IRT's capabilities, the Incident Commander may activate the West Coast RRT in all or part. Procedures are in place to activate this team.

4.1.1 Facility Initial Response Team

The Facility IRT consists of the Facility Manager and Operators, or Tesoro Area Manager and Marine Superintendent supported by the primary spill response contractors, Clean Rivers Cooperative (CRC) and the MSRC. The IRT is responsible for

- Local planning and preparation activities to enable effective response actions.
- Providing first and sustained response to a spill originating from the Terminal.

Phone numbers for the IRT are provided in **Figure 3.3 Part A**.

4.1.2 West Coast Regional Response Team

The Company has an established oil spill incident command and spill management team, which assists the Company's West Coast terminals and refining operations as needed. The West Coast RRT is available to support spill response activities at the Facility. Team members are made available, as needed, for a response at the Facility. Arrival time of the team members will vary depending on work schedules, but team members should typically arrive within 4 to 12 hours of notification. A roster of the West Coast RRT is provided in **Figure 4.2**. Adequate trained personnel are available to manage the first 7 days of response.

The West Coast RRT members have cellular telephones, portable radios, computers, printers, and fax machines immediately available to carry with them to the spill site. Team members are trained to work as commanders, officers, chiefs, and responders under the National Incident Management System (NIMS). The initial Incident Commander has the authority to activate any portion or all of the West Coast RRT. Once activated, the team will

- Assess the magnitude of the incident and its potential impact,
- Estimate the level of effort necessary for minimizing its impact, and
- Arrive on scene, if necessary, as soon as possible.

Once on scene, West Coast RRT members will integrate with the terminal initial response personnel and contractors on scene. The terminal IRT organization is provided in **Figure 4.1**.

4.1.3 Contractor Equipment, Personnel, and Services

Facility and/or the Company have contracted with MSRC as a primary response contractor (PRC) to provide spill response services at the Facility. Contact information for each PRC is provided in **Appendix B**. Spill response equipment and a projected deployment schedule for MSRC equipment is described in **Section 7** and **Appendix B**. Written agreement of the contract relationship is contained in **Appendix B**.

- Within 2 hours of notification, MSRC will have response equipment on site.
- Upon arrival at the spill site, representatives from MSRC will lead on-water operations until relieved.
- MSRC will also assist in logistics to assure that equipment arrives on the scene as needed.
- Within 6 hours of notification, MSRC will provide 10 additional responders through their subcontractors.
- Within 10 hours of notification, MSRC will provide 16 additional personnel through their contractors.
- The Facility Manager will continue to be the Incident Commander. He will rely on MSRC and their subcontractors to help address initial health and safety and environmental concerns. He will also look to members of the Company West Coast RRT to provide help or guidance as needed.

4.1.4 Volunteers

The Facility does not intend to use citizen volunteers for spill response. All people who volunteer will be referred to persons designated by the federal and state OSCs.

Members of MSRC have trained personnel who may be available to provide mutual assistance during an oil spill. These people will be directed to report to the Facility Incident Commander for job assignments.

4.2 Activation Procedures

Activation of the West Coast RRT may be accomplished in stages as described below and illustrated in **Figure 4.3**.

- Spill Observer (most likely vessel or terminal personnel) reports spill to West Coast or Terminal Manager, who then assumes the role of Incident Commander.
- Incident commander directs certain members or entire Facility/Company West Coast RRT to travel to the spill site and evaluate the spill.
- Incident Commander follows established Facility Response Plan (FRP) checklists and uses Facility/Company IRT and Oil Spill Removal Organizations (OSROs) to initiate a response to the oil spill.

4.3 Team Member Response Times

During normal business hours, the IRT would organize immediately; during night operations, the IRT could be mobilized within 1 hour. Initial deployment of equipment and personnel at the spill site will occur within 1 hour of discovery given suitable safety conditions.

Transition of Response Staff

Shift change and the transition of initial staff to incoming local or away team personnel shall occur in an orderly and deliberate manner. The incoming staff shall be sufficiently briefed by the outgoing staff before the outgoing staff is relieved. The briefing shall include a review of the ICS-201 or the Incident Action Plan. The incoming staff will acknowledge understanding of the transition briefing in writing. The outgoing

staff shall ensure that both the organizational chart and communication plan reflect appropriate personnel changes.

4.4 Command Post

4.4.1 Location

It is vitally important to establish a central location to serve as a base for each of the functional groups (i.e., Command, Operations, Planning, Logistics, and Finance) and to conduct meetings, post spill/response-related information, and to handle response communications.

Command post features should include

- Sufficient size to allow response personnel to operate effectively and comfortably.
- Conference/media room.
- “Situation room” with wall maps to track the spilled oil, response equipment, sensitive resource areas, personnel, etc.; erasable boards for phone numbers to track equipment; and posted organizational charts.
- Secure phone line and fax phone line for Incident Commander and response managers.
- Full security.
- Office support systems (e.g., fax machines, copiers, phone lines, computers, file system, AM radios, VHF/UHF radio, telephones, base communication station, pagers, courier services, and secretarial service).

In the event of a major spill, both an off-site corporate command post and a facility command post will be established. For a minor spill, the facility command post will be established in one of the following locations.

- Primary Command Post - Facility Office
- Alternate Command Post - Hilton Hotel Vancouver

Depending on the area affected by the spill, additional field command posts may be established.

If the incident involves events that impact the community and require the involvement of government agencies, Unified Command meetings would be conducted at a Joint Operations Center. Members of the response team, along with personnel from the governmental agencies would assume responsibility for the overall management of the spill incident under an ICS Unified Command structure.

In the unlikely event the designated facilities are unavailable, an alternate location that would be considered for use is

Hilton Hotel Vancouver
301 West Sixth Street
Vancouver, WA 98661

Phone number: (360) 993-4500

This facility generally meets all of the aforementioned criteria for a command post.

During a major spill response, a number of warehouses may also be necessary to receive, maintain, store, and distribute response equipment and/or supplies. Warehouses would be located in areas readily accessible by land, air, and/or water, and preferably in proximity to the site(s) where equipment/supplies would be used. The amount of warehouse space required would depend largely upon the incident but it should have, or have the capability for obtaining, the following services.

- Electricity
- Telephones
- Security
- Sanitation facilities

The warehouse would be manned 24 hours per day and have defined shipping and receiving areas, appropriate inventory control mechanisms, and maintenance equipment.

4.4.2 Staging Areas

In a major spill response, numerous staging areas may be required to support containment and cleanup operations. The Port facility may be used as staging.

In selecting a suitable staging area, the following criteria should be considered.

- Direct access to impacted areas.
- Proximity to secure parking, airports, docks, pier, or boat launches.
- Ability to be a secured area.
- Proximity to populated areas or environmentally sensitive areas.
- Adequate lighting.

Access/staging areas for personnel and equipment within the location boundaries of this OSCP are identified in Response Maps as part of the *Lower Columbia River Geographic Response Plan*. These access/staging areas should meet the following criteria.

- Be readily accessible to large trucks and trailers, which may be used to transfer equipment and should be located near the waterfront.
- Be in a large open area in order to provide storage for equipment and not interfere with equipment loading and offloading operations.
- Have a dock/pier on site for deploying equipment. In addition, moorage should be available for vessels to facilitate the loading/offloading of personnel.

4.5 Unified Command System

The Unified Command Structure will be used as a method of integrating federal, state, and local agencies with the Incident Management Team (IMT). The purpose of this system is to organize the variety of agencies that may be involved in a response into a consistent team that performs their duties in a concerted, unified effort. An organizational chart for the IMT is shown in **Figure 4.1**.

The Unified Command Structure consists of four key On-Scene Coordinators: Federal On-Scene Coordinator (FOSC), State On-Scene Coordinator (SOSC), Local On-Scene Coordinator (LOSC), and Tribal On-Scene Coordinator (TOSC), each assisting the Responsible Party/Incident Commander (RP/IC). These five entities will share decision-making authority as Incident Commanders in the Command Center and will consult with each other regarding spill response management issues. The FOSC will coordinate all federal agencies involved in the response. The SOSC will coordinate all state and local agencies involved in the response activities. The LOSC will coordinate all local and 911 response activities. The TOSC will evaluate and input on sensitive tribal issues, and the RP/IC will coordinate all company activities.

Depending upon the size and complexity of the incident, additional federal and state agency personnel may integrate into the other functions of the SMT.

4.6 Qualified Individual

The Qualified Individual oversees the management of the entire response, establishes the response priorities and objectives, serves as the liaison with corporate management, and works with the SOSCs and FOSCs in Unified Command. The Qualified Individual is an English-speaking representative of the Facility, available on a 24-hour basis, familiar with the implementation of this OSCP, and trained in responsibilities outlined in this section.

The Incident Commander/Qualified Individual is the primary senior contact person for the Deputy Incident Commander. The Incident Commander/Qualified Individual has the access to senior management personnel that will establish company policies and ensure that the Deputy Incident Commander, Operations Section Chief, Logistics Section Chief, Finance Section Chief, and Planning Section Chief all have the resources and support necessary to mount and sustain response operations.

The Incident Commander/Qualified Individual will keep the Deputy Incident Commander and command staff fully advised of decisions that may impact oil spill response strategies.

The designated Company Incident Commander/Qualified Individual is the Company West Coast RRT or Facility Manager.

Arrival Time: **TBD hours**.

The Qualified Individual has the following responsibilities and authorities as required by the OPA 90 (40 CFR Parts 9 and 112).

- Activate internal alarms and hazard communications systems to notify all appropriate personnel;
- Notify all response personnel as needed;
- Identify character, exact source, amount and extent of the release, and other necessary items needed for notifications;
- Notify and provide information to appropriate federal, state, and local authorities;
- Assess the interaction of the spilled substance with water and/or other substances stored at the Facility and notify on-scene response personnel of assessment;
- Assess possible hazards to human health and the environment;
- Assess and implement prompt removal actions;
- Coordinate rescue and response actions;
- Access company funds to initiate cleanup activities;
- Initiates a claims process where oil is uncontained and ensures claims information is made public; and
- A direct cleanup activity until properly relieved of responsibility or incident is terminated.

The Qualified Individual and alternates have adequate knowledge and/or have received sufficient training or experience in the following areas.

- Applicable Federal/Occupational Safety and Health Administration standards for emergency response operations (29 CFR 1910.120);
- How to implement the OSCP;
- Requirements of the National Contingency Plan and Northwest ACP;
- Overall spill prevention and response provisions in the OSCP and the specific responsibilities assigned to the Qualified Individual position;
- Resources committed or that could be potentially committed during an incident;
- Procedures for obtaining and obligating funds to carry out the necessary or directed response activities; and the persons or offices to contact outside or within the Company who would facilitate and expedite such actions;
- Ability to perform liaison duties between the Company and the FOSC and SOSC; and
- Ability to assess the needs for additional resources, and to make the appropriate notifications and contractual agreements.

If for any reason the responsibility of the Qualified Individual is transferred to an alternate during spill response activities, the SOSC and FOSC will be notified. The process by which the Qualified Individual's responsibility is transferred also includes internal notification of the IMT. Notification procedures are provided in **Section 3**.

Figure 4.1. Facility/Company Incident Management Team

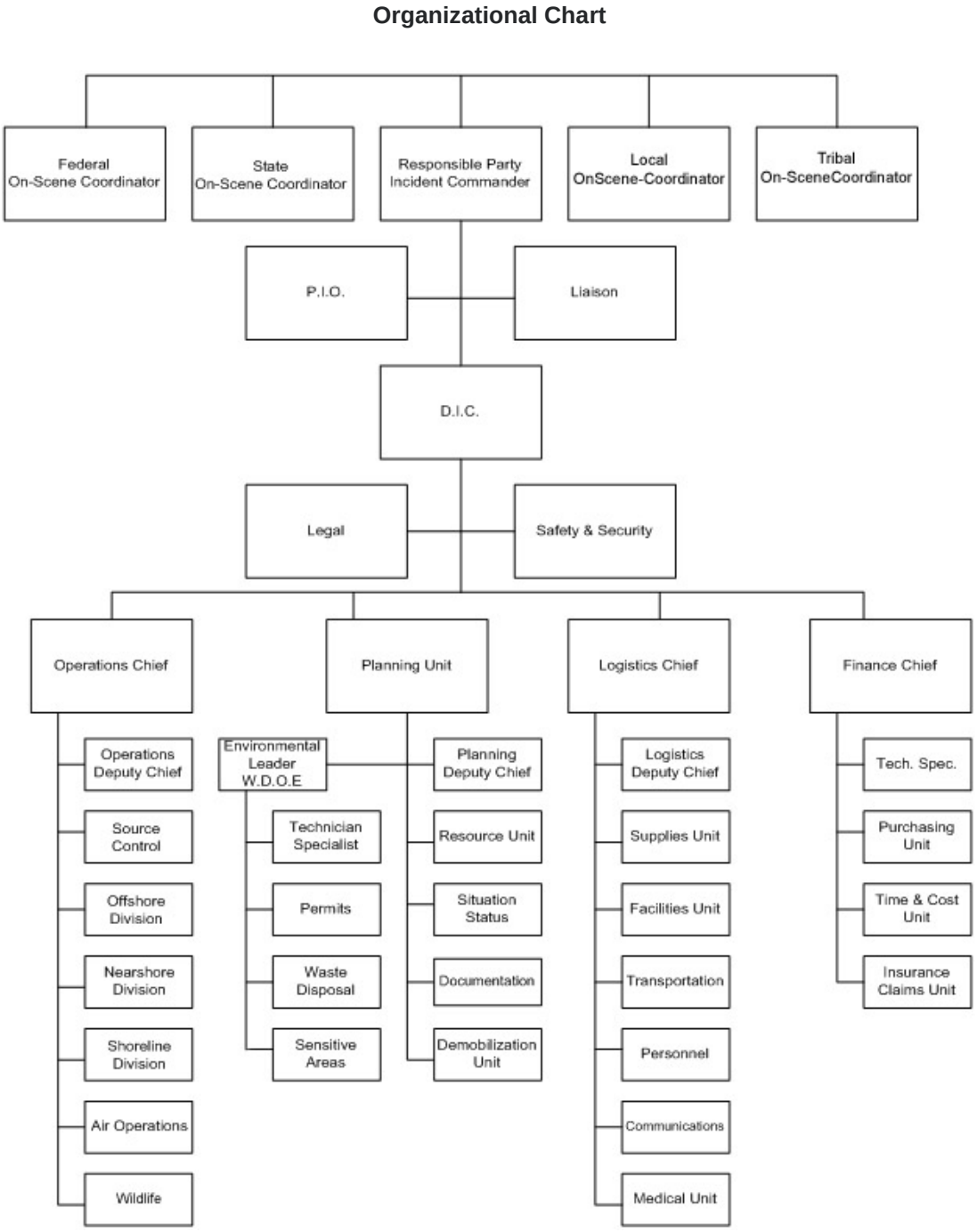

Figure 4.2. Company West Coast Regional Response Team

(Primary and Alternate Leaders)

Position	Last name	First name	Office	Cell	Location
Incident Commander/Deputy IC	Brown	Shawn			AK
	Carter	Jeffrey			AK
	Haugstad	Eric			TX
	Schumacher	John			WA
	Walker	John			CA
Legal	Haffner	Jeff			TX
	Harriss	Heather			TX
	Vail	Vanessa			TX
	Vining	Stoney			TX
Public Information Officer	Barbee	Christina			TX
	Marcy	Mike			CA
	Saletta	Jill			TX
Liaison	Bean	Jack			CA
	Dami	Kenneth			CA
	Gill	Matt			AK
	Marcy	Mike			CA
	Riley	Daniel			TX
	Sotelo	Brissa			CA
Safety	Alder	Anne			UT
	Larrigan	Harry			TX
	Pineda	Gerald			TX
Intelligence	Kohler	Jeffry			AK
Operations	Alleyn	Michael			WA
	Carter	Brock			UT
	Markee	Thomas			TX
	McCaughey	Robert			CA
	Miller	Bob			CA
	Rosin	Scott			AK
	Waldron	Clark			UT
Planning	Carter	Brock			UT
	Helberg	Pamela			WA
	Jungbluth	Robert			TX
	Miller	Bob			CA
	Shea	Mike			WA
	Waldron	Clark			UT
Environmental	Baker	Jeff			WA
	Donovan	Robert			WA
	Scheetz	Doug			ND
	Norcross	Neil			WA
	Ribbens	Peter			AK
	Spencer	Claire			CA
	Stockdale	Robert			CA
	Trujillo	Sharon			CA

Position	Last name	First name	Office	Cell	Location
Documentation	Courtney	Jeannie			HI
	Cox	Gloria			UT
	Grinton	Leilani			CA
	Stigall	Amanda			AK
	Straus	Michelle			WA
	Young	Carol			WA
Resources	Carter	Brock			UT
	Kestenbaum	Robert			CA
Situation	Cowan	Tracy			TX
	Harris	Sherry			UT
	Pedroza	Roel			WA
Logistics	Carroll	Jason			ND
	Havard	Tara			WA
	Kohler	Jeffry			AK
	Tingey	Roy			UT
Security	Burris	Mark			WA
	Griffin	Bonnie			TX
Finance	Devito	Aleja			AK
	Elsberry	Jamie			CA
	Gillett	Bruce			WA
Human Resources	Kimmel	Ryan			TX
	Sambrano	Rose			TX
IT	Keith	Kris			CA
	Necessary	Lance			AK

Figure 4.3. Spill Management Team Activation Procedure

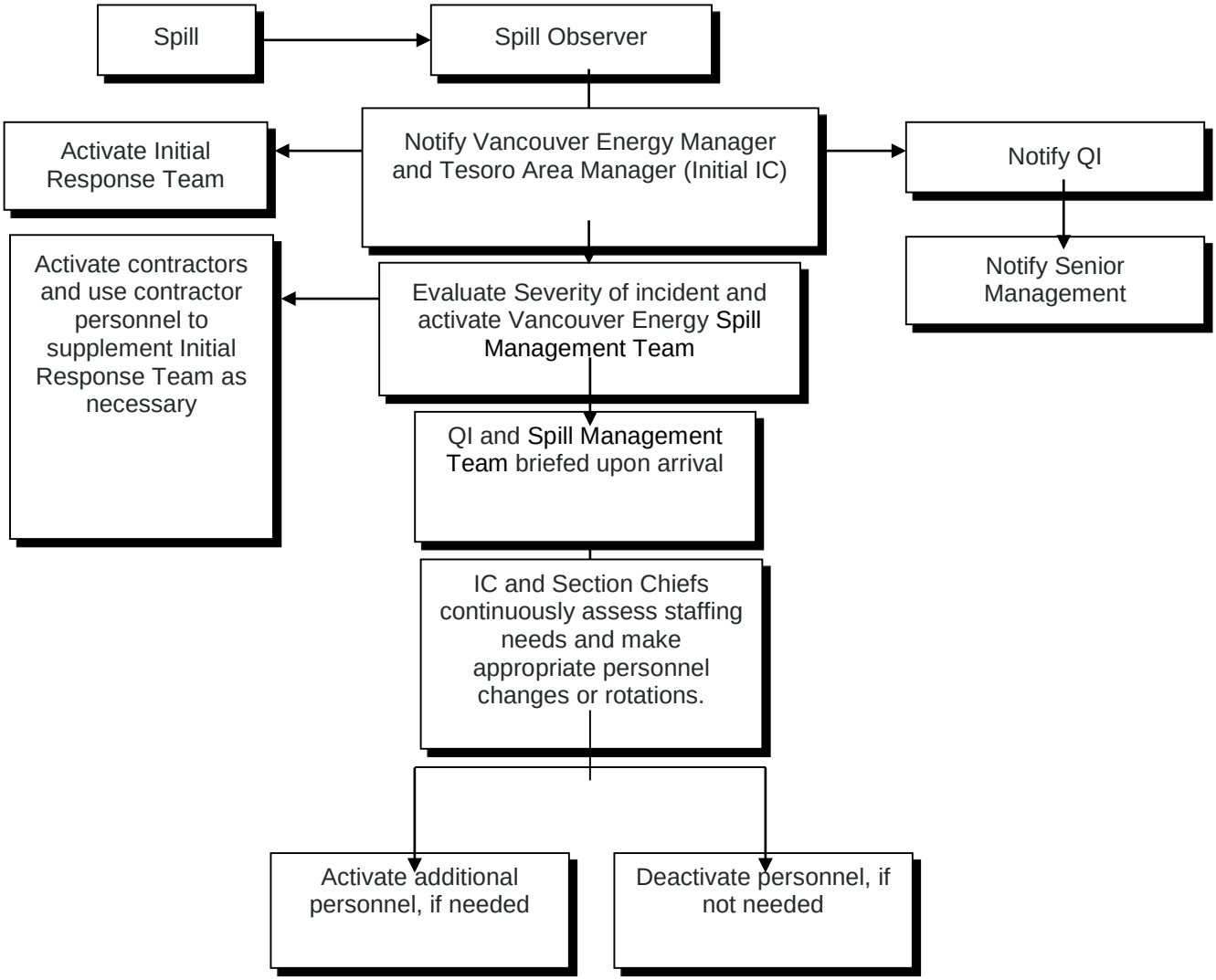

Figure 4.4. Incident Command Team Duties and Responsibilities

Facility positions and roles described in the Facility Response Plan (FRP) are intended to be representative of the positions and roles described in the most currently updated Northwest ACP. For the purpose of training and/or role clarification, the Facility plan will refer to the Northwest ACP roles that apply to our ICS positions. Abbreviated role descriptions in the FRP are intended to help reduce the bulk of the plan. Facility may, from time to time, elect to fill certain ICS support positions with approved PRC or contract personnel; **at no time will these individuals be cast in the role of Incident Commander or Section Chief.** Reference **Appendix C** of the approved PRC Application.

Facility and Company will follow a planning cycle consistent with the Northwest ACP.

SPILL RESPONSE MANAGER

Incident Commander/ Responsible Party (IC/RP): Responsible for managing the crisis including the development and implementation of strategic decisions. The IC/RP may designate a Deputy to delegate the duties and responsibilities found on the checklist of positions identified in the IMH.

Deputy Incident Commander (Deputy IC): Assists by carrying out assignments and duties as given by the IC/RP. In the event the IC/RP could no longer perform required duties, the Deputy IC would assume those duties. The Deputy IC is trained to perform the role of the IC/RP.

COMMAND STAFF

Legal Officer: Provides advice to the Incident Commander on certain aspects of an oil spill incident. The Legal Officer ensures that information that may be relevant to the defense and/or settlement of future claims against the company is gathered and preserved. The Legal Officer also assists other members of the SMT upon request in making legal judgments and decisions related to safe and expedient resolution of the response.

Liaison Officer: Responsible for communicating with local, state, and federal government agencies not involved in the unified command structure. Also advises interested groups, corporations, and organizations of the actions that the SMT and/or Unified Command is taking to address concerns. This position may be filled by an agent of Ecology rather than the Company, unless otherwise directed by the Unified Command.

Information Officer: Responsible for the formulation and release of information about the crisis to the news media. Is expected to work in concert with other members of the Joint Information Center when the magnitude of an event warrants formation of a Joint Information Center. Provides Company-based information to be used in dissemination of facts and information regarding a crisis event. This position may be filled by an agent of Ecology rather than the Company unless otherwise directed by the Unified Command.

Safety Officer: Responsible for monitoring and assessing hazardous and unsafe situations and developing measures for ensuring personnel safety. Follows prescribed guidelines detailed in the IMH and Northwest ACP in an effort to anticipate potential hazardous working conditions and prevent exposures to the public and response personnel.

Security Officer: Responsible for providing safeguards needed to protect personnel and property from loss and damage. Specific "Post Orders" are developed to custom-fit the security needs of the crisis. Generally keeps watch over areas defined by the Unified Command as limited or no-access areas. May work directly with LOSC or other local authority upon request.

Staff Assistants: Staff assistants support the Incident Commander team by performing administrative secretarial duties, such as photocopying, taking notes, and recording action items at all meetings, delivering general messages, and assisting with records management, at the direction of the Documentation Unit Leader. Company provides a staff assistant for each Section and the Command staff in an effort to improve the flow of information throughout the response activity. **(Not included in the IMH and Northwest ACP)**

OPERATIONS SECTION

Operations Chief: Responsible for the management of all operations directly applicable to control, containment, recovery, clean up, and rehabilitation. Activates and supervises organizational elements in accordance with the response objectives set forth in the Incident Action Plan (IAP). Follows the guidance of the IMH and Northwest ACP by drafting primary and alternative response strategies, work assignments, and identifiable resources necessary to sustain a long-term response activity.

Operations Specialist: Assists and provides information for field operations.

Field Supervisors: Responsible for the implementation of an assigned portion of the IAP, assignment of resources within the progress of control operations, and the status of resources.

Air Ops Branch: Primarily responsible for preparing the air operations portions of the IAP. The plan reflects Company or agency restrictions that have an impact on the operations capability of utilization of resources.

PLANNING SECTION

Planning Section Chief: Responsible for the collection, evaluation, dissemination, and use of information about the development of the spill and status of resources. The information is needed to understand the current situation, predict the probable course of incident events, and prepare alternate strategies and control operations for the incident. The Planning Chief will follow the Planning Cycle as outlined in the Northwest ACP Section 2100.

Resources Unit: Responsible for establishing all check-in activities; preparation and maintenance of displays, charges, and lists that reflect current status; the preparation and processing of resources status change information and the location of incident resources.

Situation Unit: Collects and organizes spill status and situation information. Responsible for the evaluation, analysis, and display of that information.

Documentation Unit: Maintains accurate and complete historical files, provides duplicating services, and stores incident files for legal, analytical, and historic purposes.

Environmental Unit: Company recognizes the Environmental Unit Leader position will initially be filled by an IC/RP designee until such time that Ecology or other trustee agency of the state of Washington arrives. At this point, Unit Leader responsibilities may be passed to the State until it is deemed appropriate to return this function to the IC/RP designee, or until such time the IC/RP or Unified Command directs the change to be made.

The Environmental Unit determines the extent of environmental damage and evaluates the effects of cleanup methods on the environment, obtains necessary permits, coordinates with government agencies to arrange for disposal of recovered oil and waste, and implements wildlife protection and treatment plans.

Technical Specialist: Technical specialists are advisors with special skills needed to support incident options. They may report to the Planning Section Chief. They function within an existing unit such as the situation unit, form a separate unit if required, or can be reassigned to other parts of the organization. Filled by contract services personnel.

LOGISTICS SECTION

Logistics Section Chief: Responsible for providing facilities, services, and materials in support of all phases of the incident response.

Supply Unit: Orders personnel, equipment, and supplies; receives and stores supplies; maintains inventories and distributes supplies as requested.

Facilities Unit: Provides for office work areas, living quarters and storage buildings; provides sanitation facilities, manages remote camps and general maintenance to facilities.

Group Support Unit: Provides for transportation of personnel, supplies, food, and equipment; performs fueling, service and repair work to vehicles and other ground support equipment; implements traffic plan for the incident.

Medical Unit: Develops a medical emergency plan and renders medical aid for injured and ill personnel assigned to the spill.

Food Unit: Determines feeding requirements at all spill locations and facilities; provides drinking water and contractor oversight.

Communications Unit: Develops plans for the effective use of spill communications equipment and facilities; installs and tests equipment, and operates an Incident Communications Center.

Radio Dispatch: Maintains communication links between command post and field supervisors. Provides for recording of all communications and routing of hard copy to required parties.

Procurement Unit: Administers and establishes, as necessary, vendor contracts for operations support-related supplies, services, and technical consultants.

FINANCE UNIT

Finance Section Chief: Responsible for all financial and cost analysis aspects of the spill.

Time/Cost Unit: Provides time/cost reporting of labor, materials, and supplies used during spill containment and repair.

Insurance Unit: Manages claims activities and works with insurance company to ensure claims are accurately documented and evaluated. Initiates investigation and documentation on all claims other than personal injury and arranges for damage surveyors and adjusters.

4.7 Response Team Training Program

The Facility training program for spill response, including training for the Spill Management Team (SMT), is included in **Appendix A** of this OSCP.

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5. Incident Planning/Documentation

5.1 Documentation Procedures

Facility and Company have adopted the NIMS as their response management system. The Company Supervisor of Contingency Planning maintains a set of all forms for documentation during an exercise or actual spill event. In addition, each section chief maintains the forms specific to their functional group.

Documentation of all events of an oil spill is important in order that management can keep informed, and that accurate reports can be provided to government agencies and the media. The following provides considerations to ensure that effective documentation practices are followed.

Documentation of an oil spill will provide a record of the events as they occur. It will provide the necessary data to determine the accuracy of trajectory analysis, spill size predictions, success of containment, and cleanup operations. Thorough documentation of all events will aid in determining adequacy of spill response plan, modifications needed, and potential improvements for future response operations.

Documentation should begin immediately upon notification of an oil spill and continue until post spill assessments have been made. Initial response actions are documented using Forms provided in **Section 3.2**, which include a Notification Information Reporting Form (provided as **Figure 3.2)** for reporting to NRC, a Notification Summary and Documentation Form (provided as **Figure 3.3)** for summarizing all parties that were notified of the incident, and **Figure 5.1** an Incident Briefing Form used to document the incident and response actions taken (this form complies with Incident Command System Form 201). The type of information required to provide adequate documentation are discussed in the following subsections.

5.1.1 Origin of Spill

All factors, which led to a failure resulting in a spill, should be documented. This should include the following information, if applicable.

- Description of exact piece of equipment that failed.
- Persons responsible for causing spill, including their affiliation with contractors or other organizations.
- Apparent cause of equipment failure.
- If safety or operations practices were not followed, state details.
- If act of vandalism, report any indications leading to identity of persons involved.

5.1.2 Spill Characteristics

All relative information pertaining to the oil spill should be recorded throughout the incident. Records should include, but not be limited to, the following information.

- Person discovering the spill.
- Date and time spill occurred or was first observed.
- Location of spill occurrence and area covered by oil.
- Actual or estimated spill volume and direction of movement.
- Type of pollutant.
- Rate of release, known or estimated.
- Effectiveness of containment.

5.1.3 Photographic Surveys

Photographic coverage of the oil spill incident could provide important documentation of the incident, if warranted and feasible. Consideration should be given to photographing important activity/events.

All photographs should properly be identified with respect to location, date, subject, time, direction, photographer's name, and any witnesses present.

5.1.4 Climatological Reports

Climatological data to be gathered for the affected areas during the incident would include

- Temperature.
- Precipitation.
- Wind direction and speed.
- Surface currents (estimate velocity).
- Ice and/or snow cover.

5.1.5 Cost Information

A complete record of all costs incurred during the oil spill incident should be maintained, including costs of

- Equipment.
- Contractual support (labor and equipment).
- Supplies and materials.
- Property damage claims.
- Repair.
- Support services (photographic, sample analysis, transportation, food, etc.).
- Legal services.

5.1.6 Equipment Utilization and Evaluation

Records should be maintained of all equipment used during the spill incident and necessary data and information should be gathered to allow an evaluation of the performance of major equipment items, i.e., skimmers, booms, and sorbents. This information will allow updating of containment, exclusion and clean-up procedures and will indicate the need for obtaining additional and/or different equipment.

5.1.7 Logs

Copies of personal logs that individuals maintained during response operations should also be gathered as part of the documentation record. This information would be particularly useful during the post-spill assessment in determining the strengths and weaknesses of the response efforts.

5.1.8 Record of Contacts with and Permits Obtained from Regulatory Agencies

All contacts with and directives from regulatory agencies should be recorded and copies should be made of all permits obtained for specific operations that are subject to regulations, such as disposal of oil materials, utilization of government owned equipment, access to land.

5.1.9 Copies of Plans Prepared for the Incident

All of the plans that were prepared to guide response operations should be copied and maintained as part of the documentation records. This plan provides a chronological record of the significant decisions that were made and actions taken during the incident response.

Figure 5.1. Incident Briefing Form (ICS 201 Equivalent)

A. SITE DESCRIPTION

Location Date _____
Hazards _____
Area Affected _____
Surrounding Population _____
Topography _____
Weather Conditions _____

B. ENTRY OBJECTIVE

The objective of the initial entry to the contaminated area is to:

_____
_____

C. OFF-SITE ORGANIZATION AND COORDINATION

(SEE FACILITY INCIDENT COMMAND CHART)
The following personnel are designated to carry out the stated job functions on site. (Note: One person may carry out more than one job function.)

TASK FORCE LEADER _____

SITE SAFETY OFFICER _____

SECURITY OFFICER _____

FEDERAL AGENCY REPS _____

_____

STATE AGENCY REPS _____

_____

LOCAL AGENCY REPS _____

_____

CONTRACTORS _____

_____

_____

All personnel arriving or departing the site should log in and out with the Site Security Guard. All activities on site must be cleared through the Project Team Leader.

Figure 5.1. Incident Briefing Form (continued)

D. OFF-SITE CONTROL

_____ has been designated to coordinate access control and security on site. Safe perimeter has been established at _____

_____

No unauthorized person should be within this area.

The on-site Command Post and staging area have been established at _____

_____

prevailing wind conditions are _____. This location is upwind from the Exclusion Zone.

Control boundaries have been established, and the Exclusion Zone (the contaminated area), hotline, Contamination Reduction Zone, and Support Zone (clean area) have been identified and designated as follows:_____

_____

_____

_____

_____

These boundaries are identified by

_____

_____

_____

E. HAZARD EVALUATION

The following substance(s) are known or suspected to be on site. The primary hazards of each are identified.

Substances Involved	Concentrations (if known)	Primary Hazards

The following additional hazards are expected on site: _____

_____

_____

Hazardous substance information form(s) for the involved substance(s) have been completed and are attached.

Figure 5.1. Incident Briefing Form (continued)

F. PERSONAL PROTECTIVE EQUIPMENT

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks.

Location	Job Function	Level of Protection
Hot Zone		**A B C D Other**
Decontamination Area		**A B C D Other**

Specific protective equipment for each level of protection is as follows.

LEVEL A	LEVEL B	LEVEL C	LEVEL D	OTHER

If air-purifying respirators are authorized, _____ is the appropriate canister for use with the involved substances and concentrations. A competent individual has determined that all criteria for using this type of respiratory protection have been met.

NO CHANGES TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE APPROVAL OF THE SITE SAFETY OFFICER AND THE PROJECT TEAM LEADER.

G. ON-SITE WORK PLANS

Work party(s) consisting of _____ persons will perform the following task:

Project Team Leader _____
Work Party #1 _____
Work Party #2 _____
Rescue Team (required for IDLH entry) _____
Decontamination Team _____
The work parties were briefed on the contents of this plan at _____

Figure 5.1. Incident Briefing Form (continued)

H. COMMUNICATION PROCEDURES

Channel _____ has been designated as the radio frequency for personnel in the **HOT ZONE.** All other on-site communications will use Channel _____.

Personnel in the **HOT ZONE** should remain in constant radio communication or within sight of the Project Team Leader. Any failure of radio communication requires an evaluation of whether personnel should leave the **HOT ZONE**.

_____ is the emergency signal to indicate that all personnel should leave the **HOT ZONE**. In addition, a loud hauler is available if required.

The following standard hand signals will be used in case of failure of radio communications:

Hand gripping throat	Out of air - can't breathe
Grip partner's wrist or both hands around waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	I am alright, I understand
Thumbs down	Negative

Telephone communication to the Command Post should be established as soon as practical. The phone number at the Command Post is _____.

I. DECONTAMINATION PROCEDURES

Personnel and equipment leaving the **HOT ZONE** shall be thoroughly decontaminated. The standard level _____ decontamination protocol shall be used with the following decontamination stations: (1) _____
(2) _____ (3) _____ (4) _____
(5) _____ (6) _____ (7) _____
(8) _____ (9) _____ (10)_____
(Other) _____

Emergency decontamination will include the following stations: _____
_____
_____
_____

The following decontamination equipment is required: _____
_____
_____will be used as the decontamination solution.

Figure 5.1. Incident Briefing Form (continued)

J. SITE SAFETY AND HEALTH PLAN

1. Site Safety Officer

_____is the Site Safety Officer and is directly responsible to the Project Team Leader for safety recommendations on site.

2. Emergency Medical Care

_____ and _____are the qualified EMT's on site. _____ _____ was contacted at _____and briefed on the situation, the potential hazards, and the substances involved. A map of alternative routes to this facility is available at _____.

Local ambulance service is available from _____at phone number _____. Their response time is _____ minutes. Whenever possible, arrangements should be made for on-site standby.

First-aid equipment is available at the following locations.

First Aid Equipment	Location
First Aid Kit	_____
Emergency Eye Wash	_____
Emergency Shower	_____

Emergency medical information for substances present:

Substance	Exposure Symptoms	First-Aid Instructions

Figure 5.1. Incident Briefing Form (continued)

List of emergency phone numbers:

Agency/Facility	**Phone/Contact**
Police	_____
Fire	_____
Hospital	_____
Airport	_____
Public Health Advisor	_____

3. Personnel and Environmental Monitoring

The following environmental monitoring instruments shall be used on site at the specified intervals. (Strike if not applicable)

Combustible Gas Indicator	continuous/hourly/daily/other _____
O_2 Monitor	continuous/hourly/daily/other _____
Colorimetric Tubes	continuous/hourly/daily/other _____
HNU/OVA	continuous/hourly/daily/other _____
Other	continuous/hourly/daily/other _____

4. Emergency Procedures
(Should be modified as required for incident)

The following standard emergency procedures will be sued by on-site personnel. The Site Safety Officer shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed.

Personnel Injury in the HOT ZONE:
Upon notification of an injury in the HOT ZONE, the designated emergency signal _____ shall be sounded. All site personnel shall assemble at the decontamination line. The rescue team will enter the HOT ZONE (if required) to remove the injured person to the hotline. The Site Safety Officer and Project Team Leader should evaluate the nature of the injury, and the affected person should be decontaminated to the extent possible prior to movement to the Support Zone. The on-site EMT shall initiate the appropriate first aid, and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall reenter the HOT ZONE until the cause of the injury or symptoms is determined.

Figure 5.1. Incident Briefing Form (continued)

Personnel Injury in Support Zone:
Upon notification of an injury in the support Zone, the Project Team Leader and Site Safety Officer will assess the nature of the injury. If the cause of the injury or loss of the injured person does not affect the performance of on-site personnel, operations may continue, with the on-site EMT initiating the appropriate first aid and necessary follow-up as stated above. If the injury increases the risk to others, the designated emergency signal _____ shall be sounded and all site personnel shall move to the decontamination line for further instructions. Activities on site will stop until the added risk is removed or minimized.

Fire/Explosion:
Upon notification of fire or explosion on site, the designated emergency signal _____ _____ shall be sounded and all site personnel shall assemble at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

Personal Protective Equipment Failure:
If any site worker experiences a failure or alteration of protective equipment that affects the protection factor that person and his/her buddy shall immediately leave the HOT ZONE. Reentry shall not be permitted until the equipment has been repaired or replaced.

Other Equipment Failure:
If any other equipment on site fails to operate properly, the Project Team Leader and Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations on site. If the failure affects the safety or personnel or prevents completion of the work plan tasks, all personnel shall leave the HOT ZONE until the situation is evaluated an appropriate actions taken.

The following emergency escape routes are designated for use in those situations where egress from the HOT ZONE cannot occur through the decontamination line: _____
_____
_____

In all situations, when an on-site emergency results in evacuation of the HOT ZONE, personnel shall not reenter until:

(1) The conditions resulting in the emergency have been corrected.
(2) The hazards have been reassessed.
(3) The Site Safety Plan has been reviewed.
(4) Site personnel have been briefed on any changes in the Site Safety Plan.

5. Personal Monitoring:

The following personal monitoring will be in effect on site: _____
_____
_____
_____

Personal exposure sampling: _____
_____
_____

Medical monitoring: The expected air temperature will be _____ F. If it is determined that heat stress monitoring is required (mandatory if over 70 F), the following procedures shall be followed: _____

_____

_____

All site personnel have read the above plan and are familiar with its provisions.

Site Safety Officer _____

Project Team Leader _____

Other Site Personnel _____

5.2 Claims Process

The Facility and Company establishes the claims process when an incident poses a potential impact to personal injury and/or property, as determined by Unified Command. Responsibility for activating the claims process resides with the Director, Business Insurance within the Finance Section.

The individual ultimately responsible for managing the claims process is the Director, Business Insurance. In addition, the company contracts with a claims processing contractor to manage the claims process.

Actions to be taken by Finance Section:

- Contact Director, Business Insurance to notify him/her of the incident.
- Provide a point of contact for Director, Business Insurance within the Finance Section (Should be Finance Section Chief, Deputy, or Claims Unit).
- Provide Public Information Officer with the predefined Claims phone number (1- 800-753-6737) to post on the company incident response website (www.tesoronews.com) and also communicate it to the local media via news release.
- Inform the response team of the predefined claims number.

Actions to be taken by Director, Business Insurance:

- Contact Broadspire to initiate their management of the claims process.
- Appoint a representative to provide supervision and guidance for the claims processing contractor.
- Keep Incident Commander informed by providing regular updates through the designated Finance Section liaison.

Actions to be taken by the claims processing contractor:

- Monitor the predefined claims phone number and provide a report of activity when requested.
- Provide claim forms (**FIGURE 5.2 Oil Spill Claim Form**) to claimant.
- Document, evaluate, and adjudicate claims. There is no time limit for filing claims.

Company captures incident data on the Incident Notification Form to communicate to Broadspire for claims activation.

Broadspire can handle third-party injury and damage claims resulting from explosions, fires, chemical releases, and oil spills. They also offer a cost containment program that uses bar-coders to identify and track cleanup resources. This database is used to provide logistics reports, cost estimation reports, and reconcile contractor billings through invoice review.

Broadspire adjusters work under the supervision and guidance of the Company's Business Insurance Group (Finance Section/Claims Unit).

How to Initiate Claim:

Broadspire can be activated by contacting the 24-hour teleplus line number at 800-753-6737.

Be prepared to provide the following information.

- Your name, company name
- Telephone and fax number
- Nature and location of the emergency
- Nearest airport
- If the public has been evacuated or threatened and if so how many
- If would you like to establish an “800” phone number

Your call will be returned by a Broadspire Claims Adjuster who will act as the point of contact and coordinator of response.

The team will immediately appoint a representative to provide supervision and guidance for Broadspire.

5.3 Dispersant Plan

The Facility is located in an area that is not under pre-approval for dispersant use and the Company does not intend to use dispersants unless directed by Unified Command.

5.4 Bioremediation

A bioremediation checklist is provided as **Figure 5.2** and should be used for bioremediation processes initiated at the Facility. See **Section 7.3.5** for a discussion of bioremediation processes.

5.5 In-Situ Burning

The Facility is located in an area that is not under pre-approval for in-situ burning and the Company does not intend to use in-situ burning unless directed by Unified Command.

5.6 Decanting

Decanting procedures are summarized in the Recovered Oil and Water Management Plan contained in **Section 5.8**. An Oil Spill Request for Decanting Authorization is included as **Attachment 1** in the Recovered Oil and Water Management Plan (**Section 5.8**).

Figure 5.2. Bioremediation Checklist

Bioremediation Checklist	
SPILL DATA/INCIDENT INFORMATION	
Cause (specific):	
Date/Time:	
Location:	
Volume and Type of Release (cont., intermittent):	
Potential Volume to be Released:	
Confidence in Data (high, medium, low):	
CHARACTERISTIC OF SPILLED OIL	
Oil Type/Name:	
Specific Gravity:	Flash Point:
Pour Point:	Viscosity:
% Aromatics:	% Saturates:
% Asphaltness:	
WEATHER AND WATER CONDITIONS/FORECAST (48-HR)	
Water Temp:	Air Temp:
Current Info:	Wind Speed:
Salinity:	Wind Direction:
Water Depth:	Sea State:
Tide Info:	
Comments:	

Figure 5.2. Bioremediation Checklist (continued)

	Product 1	Product 2	Product 3
Name			
Manufacturer			
EPA Listed			
State Licensed			
Stockpile Location			
Point of Contact			
When Available			
Amount Available			
Amount Needed			
Amount on Hand			
Toxicity			
Type (concentrate/mix)			
Physical Reactivity			
Applicability on Oil			
Efficiency (% projected)			
Application Means			
Positive Dosage Control			
Dosage Rate Settings			
Dosage Charts Available			
Bioremediation Application Information/Evaluation:			
Proposed Bioremediation Application Plan:			

5.7 Disposal Plan

Figure 5.3. Sample Incident Disposal Plan

Model Disposal Plan for Oil Spills in Washington State

_____
(Incident Name)

Responsible Party: _____
Spilled Material: _____
Spill Volume (estimate): _____
Spill Location: _____
Spill Date/Time: _____
Report Update Time: _____

Disposal Plan Authorization
This plan is written at the request of the USCG and/or EPA and Ecology. The responsible party will recover the maximum feasible amount of oil spilled during the above named incident. In addition, an unknown quantity of oily waste debris (including plastics, sands, etc.) will be recovered. When disposing of this material, the responsible party will abide by all applicable state, local, and federal laws and regulations. Disposed material will be tracked to provide an accurate means of estimating total oil recovered. Each section of this incident specific disposal plan addresses and corresponds with the waste disposal "Guideline" found in Section 9620 of the Northwest ACP.

This plan may be amended as necessary to ensure compliance with all applicable laws and regulations. Amendment may occur only upon mutual agreement of the responsible party, the federal OSC (USCG/EPA), and/or the state OSC (Ecology).

Submitted By: _____ Date: _____

Approved by Ecology: _____ Date: _____

Reviewed by USCG/EPA: _____ Date: _____

Approved by Responsible Party: _____ Date: _____

Approved by other Local Government Representative(s) (Optional):

_____ Date: _____

SECTION I WASTE HANDLERS
The following licensed transporters and approved treatment and disposal facilities are to be used for waste handling and disposition unless otherwise directed by Ecology. All waste handlers have read and are working in accordance with this plan.

Name of Company *Disposal Functions* *Company Representative Signature.*

SECTION II DESIGNATION
The spilled material was deemed (non-) dangerous waste based on the following:

SECTION III INTERIM STORAGE, SEGREGATION, AND TRACKING

A. INTERIM STORAGE OF SOLID MATERIAL

Interim storage sites will be located at: _____
_____
_____

Provide a description each site, lined roll-off boxes, etc. Describe how each site was constructed, bermed, covered, etc. to minimize infiltration of rainwater and prevent leaching.

Describe measures that will be taken to return sites to their original condition

Ecology's authorization

B. SEGREGATION
Describe measures taken to ensure material recovered was properly segregated. Material recovered must be segregated in the following manner unless otherwise directed by the State or Federal OSC:

1. Oil collected from sources other than state waters/shorelines (e.g. on vessels or pier)
2. Oil and oil/water mixtures recovered from state waters/shorelines
3. Oiled organic debris: wood, aquatic vegetation... Oily debris should be placed in **clear plastic bags** for ease of identifying contents and segregation. To the extent possible efforts should be made to homogenize recovered organic debris e.g., heavily oiled eel grass should be kept separate from dissimilar debris
4. Oiled sorbent material: oil snares, pads, and booms
5. PPE and other typically non-sorbent materials

C. WASHINGTON STATE OIL RECOVERY CREDIT FOR NATURAL RESOURCE DAMAGES
Detail measures taken to ensure segregation as per oil spill recovery credit. See Washington Department of Ecology document "Compensation Schedule Credit for Oil Recovery, RDA Committee Resolution 96-1".

D. TRACKING
Describe the waste tracking system used during this response. Include copies of waste tracking forms.

E. DECANTING
Decanting authorization form (if approved) should be attached.

SECTION IV DECONTAMINATION
Describe the areas designated for decontamination including location, set up, and pollution prevention measures.

SECTION V ANIMAL CARCASSES

If applicable, describe the number of animal carcasses disposed of and methods used for their disposal.

SECTION VI WASTE DISPOSITION AND FINAL DISPOSAL

ICS Form 209 Final Waste Status Summary

Type	Recovered	Stored	Disposed of
Oil (bbl)			
Oily Liquids (bbl)			
Oily Solids (tons)			
Solids (tons)			

Include copies of waste tracking forms for final disposal if used, (See Appendix A for example). Also, include copies of receipts from disposal facilities.

A. RECOVERABLE OIL

Oil recovered will be transported by_____ to _____.

Company names and Contacts

_____

_____

_____

B. BURNABLE MATERIAL:

Burnable material includes oily wood, debris, PPE, sorbents, oil snares and other suitable organic material collected during cleanup operations. The debris will be transported from the interim storage site by _____ to _____.

Transporter(s)	Facility

C. OTHER MATERIAL:

This material may consist of sand and tar balls and other assorted material that has been collected from the cleanup effort and has been stored at interim storage sites. All of this material will be transported to a licensed facility

Transporter(s)	Facility

Final Disposal Tracking					
	Disposal Facility Location(s)	**Received From:** Location(s)	**Time:** Received	**Volume** (Gallons*)	**Type of Waste**
Totals>					

* Cubic Yards for Solids
**Means to address demand per location per time

5.8 Recovered Oil and Water Management Plan

This section provides a format for a recovered oil and water management plan.

Incident Name: _____

Responsible Party: _____

Spilled Material: _____

Spill Volume (estimate): _____

Spill Location: _____

Spill Date/Time: _____

Report Update Time: _____

Submitted By: _____

Approved By: _____

Tesoro Savage Petroleum Terminal LLC
901 West Legacy Center Way
Midvale, Utah 84047
801-944-6600

Vancouver Energy
5501 Northwest Old Lower River Road
Clark County
Vancouver, Washington 98660

TABLE OF CONTENTS

1.0 RECOVERED OIL

2.0 OILY WATER

2.1 Oily Water Decanting

3.0 DISPOSAL OF RECOVERED OIL AND OILY WATER

LIST OF ATTACHMENTS

Attachment 1 **Oil Spill Request for Decanting Authorization**
Attachment 2 **Northwest Area Contingency Plan, Form 7.3.2 Oil Spill Decanting Authorization**

1.0 RECOVERED OIL

Oil, oil and seawater, and oil and freshwater mixtures will be collected from the spill area using oil recovery equipment deployed by the Oil Spill Response Organization (OSRO) and/or a vacuum truck supplied by another response contractor. Recovered oil and water mixtures will be immediately transported to designated waste staging areas to bulk storage fractionation tanks (frac tanks) used in the spill response operations**. Tank gauging must be conducted at that time to document the volumes of oil and water recovered**.

Shoreside storage at the terminal may vary according to current terminal operations. In the event that adequate shoreside storage is not available at the terminal, Facility will use frac tanks, vac trucks, and floating storage to enable recovery operations to continue while oil is transferred to a location where it can be refined.

Proper tank, drum, and container gauging is a critical component of all response actions. **Third-party certified gauging contractors must be mobilized so that accurate documentation of recovered oil and oil/water volumes can be achieved.**

No recovered oil or oil/water mixtures can be discharged or disposed of prior to gauging and volume inventory reconciliation completion.

Once oil has been transferred to frac tanks and allowed to settle, as much liquid oil as possible will be separated. Potential management methods for recovered liquid hydrocarbons include: re-injection or recycling into a crude or bunker fuel process stream, oil reclamation, and/or recycling at other oil industry facilities. The volume and the presence or absence of other potential contaminants in the oil must be determined prior to recycling.

Crude oil recovered early in the clean-up operation will be the easiest to process. Injection of recovered crude into a product stream after a spill will be a preferred option.

2.0 OILY WATER

Oily water recovered as part of the cleanup process will be managed by one of the following methods:

A. Reclaimed along with entrained oil by a third party oil reclaimer retained by the Facility,

B. Injected into Facility process water treatment facilities, if available,

C. Injected into a nearby publicly owned treatment works wastewater influent stream (local, state, or federal approval required), or

D. Treated on site in a portable, temporary wastewater treatment system in accordance with applicable surface water quality standards and discharged (state/federal permit approval required). Where possible, oily freshwater and oily saltwater (ocean) should be segregated because the salinity of ocean water limits its treatability.

2.1 Oily Water Decanting

Decanting of water from oily mixtures is a common procedure used during a spill response. Decanting is the process of draining off recovered water from portable tanks, barges, collection wells, or other containers to increase available recovered oil storage capacity.

During a response, it may become necessary for Facility to request the FOSC/SOSC authority to decant water while recovering oil so that response operations do not become impaired. Authorization from FOSC is required in all cases; authorization from the SOSC is required for decanting activities in state waters. Expeditious review and approval of such requests is necessary to ensure efficient recovery operations. The request, decision and permission to decant **must** be documented. Decanting permit applications appear as **Attachment 1**.

The following criteria should be considered when determining whether decanting is applicable, unless circumstances dictate otherwise:

A. All decanting should be done in a designated response area within a collection area, vessel collection well, recovery belt, weir area, or directly in front of a recovery system.

B. Vessels employing sweep booms with recovery pumps in the apex of the boom should decant forward of the recovery pump.

C. All vessels, motor vehicles, and other equipment not equipped with an oil/water separator should allow retention time for oil held in internal or portable tanks and should transfer oil/water mixtures to a vessel or onshore equipment with approved oil/water separation technology. Unequipped vessels should not decant oil/water mixtures.

D. Visual monitoring of the decanting area shall be maintained at all times so that discharge of oil in the decanted water is detected promptly.

3.0 DISPOSAL OF RECOVERED OIL AND OILY WATER

Recovered oil and oily water will be transported by company-owned vacuum trucks to on-site tankage. Approved oil reclamation contractors are identified in **Attachment B** of the Oil Spill Waste Management and Disposal Plan. Applicable company names and contacts for the off-site disposal of recovered oil and oily water are as follows.

1. _____

2. _____

3. _____

ATTACHMENT 1

OIL SPILL REQUEST FOR DECANTING AUTHORIZATION

Responsible Party (RP): _____ Date: _____

The RP hereby requests permission to decant free water from its on-water storage systems. The free water collected during skimming operations will be decanted back into a contaminated area (i.e., into containment boom).

The following information is provided for your consideration:

Name of Oil Spill: _____

Location of Spill (latitude/longitude): _____

Vessel Names: _____

Product: _____

Skimming Platforms: _____

Weather: _____

Tides: _____

☐ Approved ☐ Disapproved

RP Representative Signature: _____

Dates Approval Effective: _____

Conditions (circle numbers that apply):

1. All decanting should be done in a designated response area within a collection area, vessel collection well, recovery belt, or weir area, or directly in front of a recovery system.
2. Visual monitoring of the decanting shall be maintained at all times so that discharge of oil in the decanted water is detected promptly.
3. Decanting in areas where vacuum trucks, portable tanks, or other collection systems are used for shore cleanup will be subject to the same rules as vessels.
4. Additional site-specific conditions (continue on reverse side if necessary).

_____ _____

USCG SOSC

5.9 Recovered Oil Quantification Plan

This section provides a format for a Recovered Oil Quantification Plan.

Incident Name: _____

Date: _____

Submitted By: _____

TABLE OF CONTENTS

1.0 ESTIMATION METHODS FOR QUANTIFICATION OF RECOVERED OIL

1.1 Oiled Media Sampling
1.2 Estimates of Recovered Oil and Oily Water
1.3 Estimates of Recovered Oil from Booms/Swipes/Absorbents and PPE
1.4 Estimates of Recovered Oil from Decontamination Water
1.5 Estimates of Recovered Oil from Contaminated Soil
1.6 Compilation of Recovered Oil Estimates and Reporting

TABLES:

Table 1 – Recovered Oil Summary

1.0 ESTIMATION METHODS FOR QUANTIFICATION OF RECOVERED OIL

The amount of spilled oil recovered during cleanup operations must be estimated. The amount of free oil, oily water, oil recovered from absorbents and decontamination water, and oil trapped in contaminated soil will be estimated separately. Materials identified as contributing to the total recovered hydrocarbons include, but are not limited to, oil collected in skimming tanks, oil from decontamination procedures, recovered oil tar balls, oily absorbents, oily debris, and oiled personal protective equipment (PPE) such as gloves and coveralls. **Table 1** should be used to document the total amount of oil recovered in a given spill response.

1.1 Oiled Media Sampling

All samples for analysis of chemical concentrations or calculation of oil must be collected according to established sampling protocols and sent for analysis using chain of custody forms. Upon request, the responsible party will provide a copy of the material safety data sheet for the hydrocarbon product released for all sampling exercises. Proper PPE, Level D minimum, will be used at all times during sampling. Sampling guidelines are presented in a separate document entitled *The Spill Response Sampling Plan*.

1.2 Estimates of Recovered Oil and Oily Water

During spill activities, a qualified third-party contractor will be retained to record the data needed to estimate total oil recovery. Oil-containing media generated and estimates of the amount of recovered oil include free liquids recovered from surface waters (oil and water mixture) and oily water. Various containers may be used to collect and store recovered oily water containing recovered liquid hydrocarbons.

Free liquids will be measured according to the following procedure:

- Liquid will be removed from the water by pumping into ballast tanks, fractionation or other storage tanks on-shore.

- The liquids will be allowed to sit for a minimum of 30 minutes to 3 hours to allow separation into the two fractions (water and oil).

- The still liquid will be gauged to determine the total depth of liquid, the thickness of the water layer, and the thickness of the oil layer. Gauging will be done with a ruler or tape measure and water finding paste or similar product. Measurements will be made to the nearest 1/4 inch. Where possible in clean oil/water interfaces, American Petroleum Institute (API) tank gauging methods (e.g., a reel and water paste) will be used in conjunction with engineering data such (e.g., strapping tables) to determine the oil levels and volumes in the container. When practical, multiple tank gauges will be conducted, with the results averaged for final calculations. For pure water or oil/water emulsions, multiple samples will be taken and analyzed for total petroleum hydrocarbon content. The averaged analytical results, coupled with engineering data, will be used to determine the oil content of the liquid.

- Using the height of each layer of liquid and the surface area of the frac tank, the volume of each liquid will be calculated using the formula: **1 cu. ft. = 7.48 gal**. Calculated values will be reported on the summary.

- After measurement and unified command approval, the recovered oil/water will be managed in accordance with the methods selected for the spill event, typically to an approved reclaimer/recycler.

A qualified contractor will collect a representative sample from each hold or container of recovered oil according to established sampling protocol for each vessel arriving at the facility intending to offload recovered spill material. Each sample will be submitted for a bottom sediment and water (BS&W) analysis. From the result, subtract percent solids and water to yield the total estimated percent oil.

Equation 1

(% oil from BS&W) (hold/container volume in gallons) = oil volume (gallons)

This information should be included in **Table 1**. At hour 33 after the spill occurs, a qualified contractor will initiate collecting representative samples from all containers in the field until hour 36, in accordance with established sampling protocol. At hour 36, all sampling ends and all collected samples will be submitted for BS&W analysis as per above paragraph. This process is repeated for longer spill requiring longer response periods.

1.3 Estimates of Recovered Oil from Booms/Swipes/Absorbents and PPE

The oil in booms, swipes and absorbents may be estimated separately from the oily debris and PPE. All oily material is typically collected and placed into heavy-duty garbage bags. The garbage bags are then placed into a lined container, such as a roll off container, for transport to a waste handling and processing facility. It is assumed that the bags of oily material will not have any free liquid, as characterized by the type of spilled oil.

Manufacturers' estimates for the amount of oil on swipes/absorbents can be determined by assuming half the recovered absorbents' weight may be attributed to oil loading. The oiled booms/swipes/absorbents need to be weighed. Calculation can then be made as follows to calculate the volume of the oil in gallons:

Equation 2

(absorbent weight in lbs) (50%) (0.018 ft^3/lb oil) (7.48 gal/ft^3) = oil volume (gallons)

Oil collected from sorbent pads will be estimated by multiplying the known absorbency of the pads (gallons per pad) by the number of pads. Since the sorbent pads have, on average, been saturated to approximately 50 percent, this value will be divided by two.

Equation 3

(pad absorbency in gallons) (# of pads) (50%) = oil volume (gallons)

The procedure for determining the amount of liquid hydrocarbons on oily material will be as follows:

(a) Visually check all garbage bags to make a determination of the contents.

(b) Sort the garbage bags by waste type (tar balls, absorbent pads, etc.), as determined by the majority of the contents of the garbage bag into separate roll-off containers.

(c) For each waste type, use the following guidelines for collecting a representative sample:

- Mark off a 4-foot-square grid pattern in each roll-off.
- Within each grid, collect a grab sample from a garbage bag at three different layers (top, middle, and bottom).
- Combine the individual grid samples into one composite sample.
- Collect three 16-ounce samples from the composite sample. Submit one for analysis and keep two for retains.

(d) Analyze each sample for total hydrocarbon content using a third party analytical laboratory facility. The samples will be analyzed for total petroleum hydrocarbons (TPH) using the specific method the state regulatory agency recommends to characterize TPH.

(e) For each waste type, weigh the garbage bags of oily material to obtain a gross weight.

(f) Determine the calculated weight of the recovered oil in the material by multiplying the weight of the oily material by the hydrocarbon content result of the composite sample (converted to kg by dividing by 1,000,000 mg/kg). Determine the oil volume in liters by multiplying by the density of water (1 liter/kg) divided by the specific gravity of the oil. Convert to gallons by dividing by 3.785 L/gallon. The information should be included in **Table 1**.

Equation 4

$$\frac{\text{(weight of recovered oily material [kg])} \times \text{(TPH concentration [mg/kg])} \times \text{(1 L/kg)}}{\text{(1,000,000 mg/kg)} \times \text{specific gravity of oil} \times \text{(3.785 L/gallon)}} = \text{gallons of oil}$$

1.4 Estimates of Recovered Oil from Decontamination Water

Decontamination water will be collected on site and the total volume will be recorded. The amount of liquid in each container will be determined by using engineering data available on the container such as strapping tables or construction drawings, by actual field measurements, or by weighing the containers. Representative composite samples of the wash water should be collected and analyzed for TPH using the specific method the state regulatory agency recommends to characterize TPH. The amount of recovered oil contained in the decontamination water will be estimated by using the average total petroleum hydrocarbon (as measured by Environmental Protection Agency [EPA] Method 418.1) analytical results from analysis of representative composite samples collected. The estimate of oil recovered in decontamination waters will not account for variables such as evaporation or operational losses. The average TPH will be converted into total gallons of oil by the following equation:

Equation 5

$$\text{(TPH mg/L)} \times \text{(decon volume gal)} \times (1\times10^{-6}\ \text{kg/mg}) \times \text{(8.34 lbs/gal)} \times (0.018\ \text{ft}^3\text{/lb oil}) \times (7.48\ \text{gal/ft}^3) = \text{total gallons of oil recovered}$$

1.5 Estimates of Recovered Oil from Contaminated Soil

Stockpiled contaminated soil will be cross-sectioned by on-site survey personnel and the total volume in cubic yards will be recorded. Representative samples of the stockpiled soil should be collected and analyzed for TPH. The amount of recovered oil contained in contaminated soil will be estimated by using the average TPH analytical results. The estimate of oil recovered in soil will not account for variables such as soil moisture or losses due to volatilization so the estimate will be conservative. The average TPH will be converted into gallons of oil by the following equation:

Equation 6

(TPH mg/kg) x (Volume) x (1-COARSE) x ($1x10^{-6}$ kg/mg) x (125 lbs/ft^3 soil) x (27 ft^3/yd^3) x (0.018 ft^3/lb oil) x (7.48 gal/ft^3) = gallons of oil

Where:

TPH =	Unweighted mean of TPH results (including duplicate) to date in mg/kg
Volume =	Volume of recovered contaminated soil in yd^3
COARSE =	Discount for coarse material >2 inches (default estimated at 20 percent or 0.2 for the formula)

1.6 Compilation of Recovered Oil Estimates and Reporting

The total estimated amount of liquid oil recovered, oil recovered in contaminated soil and in sorbent pads/booms, and oil recovered with decontamination water will be combined into an overall oil recovery estimate. This estimate will be calculated and/or measured from recovered oil skimmings and recovered oily materials. The estimate of oil recovered is not an estimated of spill size. An estimate of spill size will not be possible until the complete extent of surface and/or subsurface contamination has been determined at a later date.

A report must be prepared containing all calculations of the total oil recovered, including free liquid and oil contained in contaminated soils. **Table 1**, completed with pertinent information from this spill, should be included in the report. The report will contain estimated volume of contaminated soil recovered, conversion factors for estimating the amount of oil in the contaminated soil, estimated volume of oil recovered in sorbent pads, and total estimate of total oil recovered.

Table 1 – Recovered Oil Summary

EVENT NAME: _____ Page 1 of 2

Source/Media Of Material	Type of Material	Amount Collected	Material Discarded	Amount Of Material Discarded	Recovered Oil Volume
Free Liquid Vac Truck 1					
Free Liquid Vac Truck 2					
Free Liquid Vac Truck 3					
Free Liquid Frac Tank 1					
Free Liquid Frac Tank 2					
Free Liquid Frac Tank 3					
Free Liquid Barge 1					
Free Liquid Barge 2					
Free Liquid Other (tote tanks, drums, etc.)					
Free Liquid Other (tote tanks, drums, etc.)					
Absorbent Booms					
Absorbent Booms					
Absorbent Booms					
Absorbent Pads					
Absorbent Pads					
Absorbent Pads					

Table 1 – Recovered Oil Summary

EVENT NAME: _____

Source/Media of Material	Type of Material	Amount Collected	Material Discarded	Amount of Material Discarded	Recovered Oil Volume
Sand/Sediment/Soil					
Sand/Sediment/Soil					
Personal Protective Equipment					
Garbage Bags Waste Storage Area 1					
Equipment Decontamination Water Decon Area 1					
Equipment Decontamination Water Decon Area 2					
Personnel Decontamination Water Decon Area 1					
Personnel Decontamination Water Decon Area 2					
Personnel Decontamination Water Decon Area 3					
Other					
Other					
Other					
TOTAL					

6. Facility Sensitive Areas/Response Tactics

6.1 Introduction

This section describes different ecologically and culturally/economically sensitive resources, which may be impacted by a spill from this Facility. These sensitivities are identified in the Northwest Area Committee Geographic Response Plans (GRPs); specifically the Lower Colombia River GRP. Sensitive resources that may be impacted by a spill, and protection strategies and priorities for allocating response resources must be identified. **Figure 6.1** presents an implementation sequence for protection of sensitive areas. Methods for protecting these sensitive resources are also described in **Appendix F** and in the Northwest ACP.

A link to Ecology's GRP website is: http://www.ecy.wa.gov/programs/spills/preparedness/GRP/index.html

6.2 Types of Sensitive Resources

Key sensitive resources may include fish and wildlife species, sensitive habitats, and recreationally, culturally, and economically important areas.

- Sensitive species may include shorebirds and other water fowl, seals and other marine mammals, shellfish, and commercially important finfish.
- Sensitive habitats range from protected bays with marshes and tidal flats to open coast areas used as marine mammal or bird breeding sites.
- Areas of more direct importance to humans include native lands, sole source aquifers, waterfront parks and recreational areas, as well as harbors and anchorages.

These sensitive resources are discussed below and in **Figure 6.2** with a presentation of NOAA's Environmental Sensitivity Index (ESI) classification scheme.

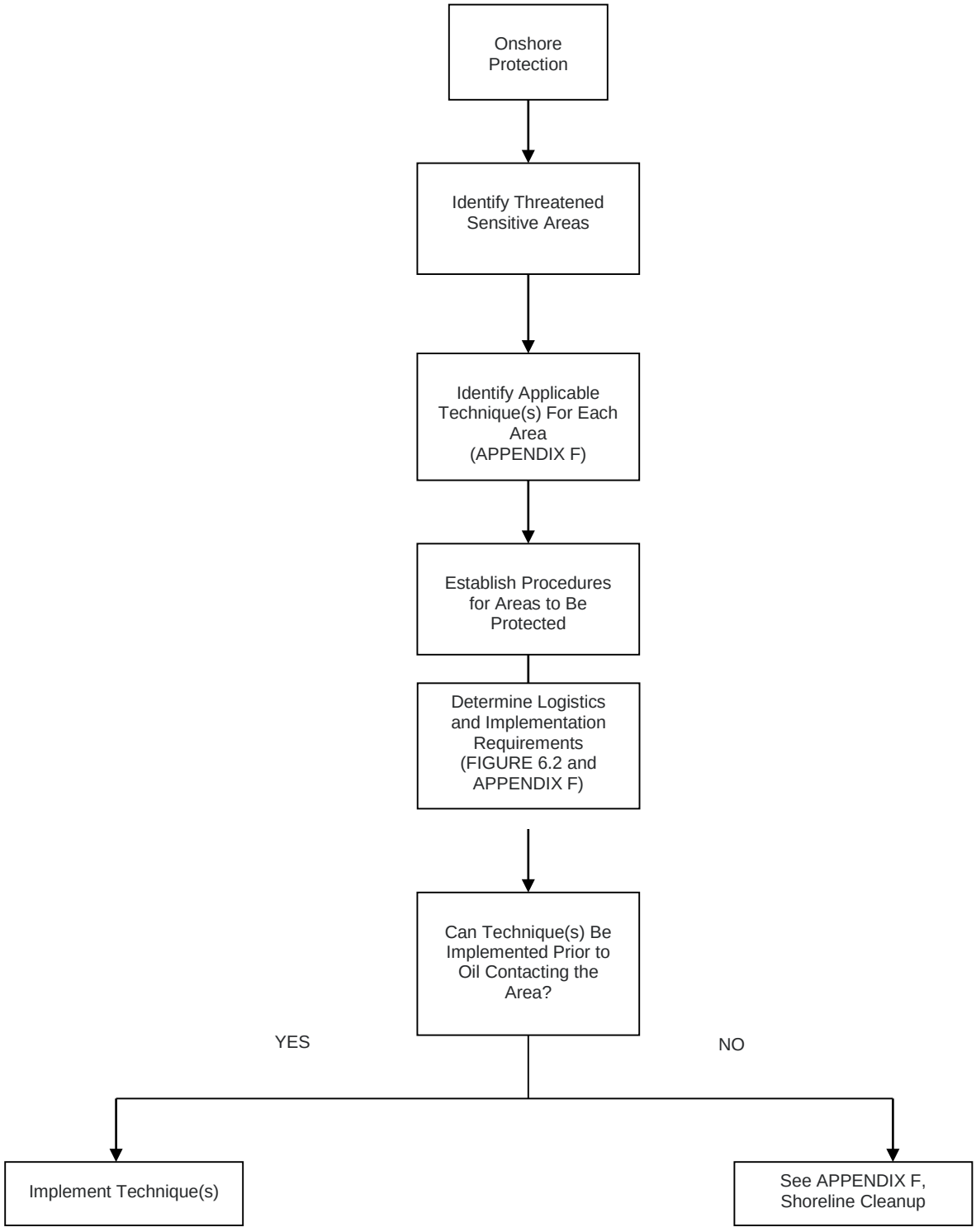
6.2.1 Key Sensitive Resources

Upstream from the Facility, there are minor shoreline environmental sensitivities, as well as shorebird habitat, sensitive marshes, and critical wetland habitat. Downstream from the Facility, key sensitive resources include Bachelor Island Slough, the mouth of the Willamette River, Sauvie Island, and Multnomah Channel. Bachelor Island Slough is a great blue heron spring nesting location, waterfowl nesting area, and sandhill crane wintering spot.

The 15-mile segment of the Columbia River downstream from the Facility dock is a critical wetland habitat. The mouth of the Willamette River, Sauvie Island, and Multnomah Channel are home to waterfowl, shorebirds, cranes, and egrets. These areas also provide winter feeding grounds for eagles and a fish entry point. The Multnomah Channel is a critical sensitive area.

Another critical wetland area is the flushing channel to Vancouver Lake. Entry of any oils into the lake could affect several waterfowl species.

Figure 6.1. Sensitive Area Protection Implementation Sequence



6.2.2 General Sensitive Resources

For shoreline areas that are not associated with a particular sensitivity, a general sensitivity ranking system known as the Ecological Site Inventory (ESI) has been adopted by NOAA and can be used for prioritization. The ESI system ranks various shoreline types in order of their increasing potential for long-term persistence and biological damage (i.e., an ESI ranking of 2 has a higher overall sensitivity than a ranking of 1). A summary of the shoreline types and associated rankings is provided in **Figure 6.2**.

Protection strategies should also consider the impact of oil on the general intertidal biological community. The level of impact is often dependent on the type of shoreline as different shoreline/substrate types support different intertidal communities. Shore types affect oil deposition within the intertidal area, as well as oil persistence. Description of the most common types of shorelines, their associated biological communities, and the potential impacts of oil spills are provided in **Appendix F**. Shoreline types indicative of the Lower Colombia River area may be found in the Northwest ACP.

Figure 6.2. ESI Shoreline Types and Rankings

ESI Ranking	Shoreline Type	Persistence Potential	Comments
1	Exposed Rocky Headlands/ Cliffs/Seawalls/ Bulkheads/Pilings	Low	Wave-induced cleansing generally removes oil in several weeks.
2	Exposed Wave-Cut Rock Platforms	Low	Wave-induced cleansing generally removes oil in several weeks.
3	Exposed Fine-Grained Sand Beaches	Low	Penetration is usually minimal and wave-induced erosion can expedite oil removal.
4	Exposed Coarse-Grained Sand Beaches	Moderate	Penetration is usually moderate and oil may be retained for months.
5	Exposed Mixed Sand/Gravel Beaches	Low	Most oil naturally removed in several months.
6	Sheltered Sand Beaches (Coarse or Fine)	High	Oil can persist for years.
7	Exposed Gravel/Boulder Beaches	High	Significant penetration can result in long-term oil persistence.
8	Sheltered Rocky Shores and Riprap	High	Oil may persist for many years.
9	Sheltered Tidal Flats	Moderate	Oil may persist for a significant period of time.
10	Marshes	Very High	Oil may persist for several years.

6.3 Area Description

The Facility is located in the Port, directly adjacent to other industrial facilities and within approximately 1-1/2 miles of residential neighborhoods. The Port is zoned as a heavy industrial area.

The Facility receives crude oil by rail, stores it on site in storage tanks, then pumps through pipelines to the terminal where it is loaded onto marine vessels for shipment. The terrain directly adjacent to the terminal is relatively flat with undefined drainage patterns. The dock is located on the Columbia River, an important conduit for oceangoing tank, freight, and passenger vessels that move a variety of products up and downstream.

Downstream areas from the terminal are heavily populated and industrialized. Recreational boating and fishing are common activities throughout the Columbia River system, and annual salmon migrations occur in the river waters.

Flight restriction zones exist in the area to protect sensitive wildlife species. Additional information about the natural resources in the lower Columbia River area are located in the Northwest ACP.

6.3.1 Tide and Current Considerations

The river currents in the Willamette and Columbia rivers will be a deciding factor when planning for oil spill containment and cleanup operations. For planning purposes, the average current in the Columbia River is 2 knots; however, current velocity in the main channel of the lower Columbia and Willamette rivers typically varies from 1 to 6 knots. In upper segments of the lower Columbia River, currents have been recorded as high as 7 knots during seasonal floods. Current flow in the sloughs and back channels are generally much less than the main channels. This velocity is highly variable and is heavily influenced by seasonal runoff levels, the strength of the tidal current, and the volume of water released by the dams.

Tidal influence is a consideration for most of the lower Columbia and Willamette rivers. The diurnal rise and fall of the tides create a tidal current that, during low river flow conditions, can create a reversal in the downstream current. It will then increase significantly on an outgoing tide, especially when coupled with a heavy spring runoff. During high river flows, current reversals by tidal influences are limited to the Columbia River estuary.

Saltwater intrusion at the mouth of the Columbia River and the estuary has an effect on water movement, usually by creating a two-layered circulation pattern. Saltwater will flow inland near the bottom of the river and estuary while the river continues to flow downstream at the top layer. The extent of saltwater intrusion is largely influenced by the rate and volume of river discharge, tides, and water depth.

Offshore or coastal currents along the Oregon/Washington coast may also affect oil movement if it travels to the river mouth and is discharged into the ocean. Generally, the surface currents drift southward along the Oregon coast in the summer and are pushed northward along the coast of Washington during the winter. However, the prevailing winds, tidal forces, and the local topography will continue to affect the surface movement of water and oil, creating a complex and constantly changing pattern of movement.

The Multnomah Channel runs from the Willamette River to the Columbia River on the southwest side of Sauvie Island near Portland. During the spring and early summer when flow rates down the Columbia River are high, the water level of the Columbia River may be higher than the level in the Willamette River at the junction where both rivers meet. When this occurs, part of the Columbia River will actually flow up the Willamette River until it reaches the Multnomah Channel where the combined flow of both rivers will be directed downstream through the Multnomah Channel until it converges again with the mainstream of the Columbia River.

At the junction of the Willamette River and Multnomah Channel, the converging currents create a slack water that tends to disperse the pollutants to both sides of the Willamette River. Areas that will be affected by the Multnomah Channel during an oil spill are Kelly Point Park, Columbia Slough, numerous marines and houseboat moorages, and log rafts along Multnomah Channel.

6.3.2 Climate

Local weather is determined primarily by the region's topography, prevailing wind direction, and proximity to the Pacific Ocean. Maritime air dominates the area creating a climate with mild temperatures, heavy precipitation from October to May, and dry summers. The mean annual temperature is approximately 51°F. Typical temperatures for the region are

Summer Maximum	70 to 80°F
Summer Minimum	45 to 55°F
Winter Maximum	35 to 45°F
Winter Minimum	10 to 20°F

Annual precipitation around the lower Columbia River is characterized by an intermittent dry season in the summer followed by a wet winter season. Precipitation increases inland with the rise in elevation from the

coast range then decreases in the valley between the coast range and the Cascade Mountain range. Precipitation increases again going up the western slopes of the Cascade Mountains. Average annual rainfall in the Vancouver-Portland metropolitan area is approximately 42 inches.

Winds along the coast at the mouth of the Columbia River are steady onshore winds that shift from a summer northwesterly direction to a southwesterly direction in the winter. Further inland along the Columbia River, the summer winds are typically from the northwest with some diurnal variations in direction. During the winter months, the prevailing flow is from the east as the colder air drains out of the inland basin of eastern Washington. Wind with steady velocities 15 to 20 miles per hour are not uncommon. Maximum wind velocities have been recorded at 50 to 60 miles per hour.

A summary of the local climatic and hydrographic conditions are provided in **Figure 6.12**.

6.3.3 Birds

Marine birds and shorebirds are the primary wildlife concern in the area. Many species are either residents or seasonal visitors of this area. Seabird and waterfowl nesting areas are scattered throughout the region, particularly concentrated in marsh and wetland areas. Bald eagles nest within the area and feed at the mouth of the Willamette during the winter months.

In addition to supporting a wide variety of resident birds, the lower Columbia River is an important waterfowl wintering area on the Pacific flyway for waterfowl.

Most of the migrating bird species follow the coast during their southward movement; many species winter around local bays, while others stop briefly to rest and feed before continuing their migration to Southern California, Mexico, Central America, or South America. During fall and spring migration, as well as winter, large populations of shorebirds and waterfowl inhabit nearshore areas in the vicinity of the lower Columbia and adjacent coastal areas. Consequently, in the event of a spill, certain protective measures may be required to minimize the impact on waterfowl. During a spill response, initial efforts should attempt to repel birds from the site with equipment, such as bird canons. Depending on the species involved some repelling devices will successfully deter individuals from the affected area, while others will be ineffective.

Subsequent efforts can be reorganized on the basis of these results. The degree of effectiveness decreases as birds become accustomed to the sound system; this process is referred to as habitation. Activities, such as people, boats, and machinery, usually are the most effective deterrents.

6.3.4 Marine Mammals

Common species of whales and dolphins found in the coastal Oregon and Washington areas include gray whale, orca, Dall's porpoise, and harbor porpoise. In addition, the harbor seal is a permanent resident of local coastal areas. Three additional species occur as regular seasonal residents or migrants: the Steller sea lion, California sea lion, and northern elephant seal. The Columbia River provides suitable foraging habitat for Steller sea lion. This region also supports a large population of river otters.

6.3.5 Priority Habitats and Species

The Washington Department of Fish and Wildlife (WDFW) publishes a list of Priority Habitats and Species (PHS) and Species of Concern to catalog the habitats and species considered to be priorities for conservation and management.

Priority species include endangered, threatened, sensitive, and candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable. Priority habitats are those habitat types or elements with unique or significant value to a

diverse assemblage of species. These species and habitats should be given special consideration and protection during a spill response, to minimize impacts to these critical areas and organisms.

Updated information on PHS data is available through the WDFW.

6.3.6 Inlets, Intakes, Harbors, and Marinas

Inlets, intakes, harbors, and marinas are inhabited by a variety of fish, invertebrates, and waterfowl that would be at risk if an oil spill occurs near any of these facilities. Marinas have a great potential for public exposure to hazards and damage claims and should be boomed to exclude oil. Intakes for commercial, industrial and municipal water usage areas are subject to impact due to safety hazards, loss of use and damage claims. Protective measures could include exclusionary booming to prevent or exclude oil from entering these areas. Many of the entrances or channels have tidal currents exceeding 1 knot or surf breaking in the opening.

In these cases, booms should be deployed landward from the entrance in quiescent areas. Booms should be placed at an angle to the current to guide oil to an area where it can be recovered.

The deployment of a second boom behind the first may be desirable to contain any oil that escaped under the primary boom.

Publicly accessible recreation areas generally have good water/shoreline access for logistical purposes.

6.3.7 Sole Source Aquifers

The Facility is located within the limits of the EPA-designated Troutdale Sole Source Aquifer. **Figure 6.3** shows the boundaries of this aquifer, with identification of the Facility's location.

The types and geographic extent of the substrate associated with the Troutdale Sole Source Aquifer is described in the 2006 EPA Final Support Document for Sole Source Aquifer Designation of the Troutdale Aquifer System, which sites Columbia et al, 2005. The description is summarized below.

"The upper sedimentary subsystem consists of the unconsolidated sedimentary aquifer and the Troutdale Gravel aquifer. This subsystem is the primary source of drinking water in the aquifer service area. The unconsolidated sedimentary aquifer consists primarily of flood deposits of late Pleistocene age varying from bouldery gravel to silt. It includes flood plain and terrace deposits along major tributaries and glacial outwash in some areas. The top of the unit is land surface, and its thickness is mostly between 50 and 100 feet although deposits range up to 300 feet thick in some areas. Wells completed in these deposits have maximum yields between 1,000 and 6,000 gallons per minute near Washougal, Camas, and Vancouver, Washington, and up to 10,000 gallons per minute north of Blue Lake in Oregon.

The Troutdale Gravel consists of principally of sandy gravel, silty sand, sand, and clay. The altitude of the top of the unit ranges from about 700 feet in the Prune Hill area in Camas to minus 600 feet northwest of Gresham in Oregon. The maximum thickness of this unit is about 800 feet and well yields are as large as 3,000 gallons per minute in some areas.

The lower sedimentary subsystem consists of two confining units, the Troutdale Sandstone, and sand and gravel beds within the Sandy River Mudstone geologic unit. Swanson et al (1993) identify portions of this subsystem as the Undifferentiated Fine-Grained Unit where data were not available to differentiate the units. In the aquifer service area the confining units and the Troutdale Sandstone unit are mapped as overlying each other. They extend from Camas up to Meadow glade and west to the Orchards area.

The upper confining unit (identified as Confining Unit 1) is a grayish olive-green clay and silt with lenses of silt and fine-to-medium-grained sand. The altitude of the unit ranges from about 900 feet in the area

south of the City of Sandy to about minus 300 feet near the center of the basin. The thickness is generally less than about 200 feet.

The lower confining unit (identified as Confining Unit 2) is lithologically similar to Confining Unit 1. The altitude of the top of the unit ranges from about 900 feet in the Tickle Creek area to about minus 500 feet toward the center of the basin. The thickness of the unit ranges from about 200 feet in the southeastern part of the basin to about 800 feet toward the center of the basin.

The Troutdale sandstone aquifer consists of coarse sandstone and conglomerate with lenses and beds of fine-to-medium sand and silt. The altitude of the top of the aquifer is about 1,000 feet in the area east of the Sandy River and dips westward to about minus 400 feet near downtown Portland. The thickness of the aquifer ranges from 100 to 200 feet but is about 400 feet in the southeastern part of the basin. Wells completed in this unit yield up to 2,500 gallons per minute.

The consolidated gravel aquifer is composed of a poorly to moderately cemented sandy conglomerate and includes local accumulations of lavas and a mantling soil horizon. This unit is mapped as only extending into the aquifer service area near Camas. However, it has recently been investigated as a groundwater source in the western part of the service area where Swanson et al (1993) were apparently not able to differentiate it from other units. Its elevation appears to be lower than in the southern part of the basin as described in the following sentences taken from McFarland and Morgan (1996B). The altitude of the top of the unit is about 1,400 feet east of the Sandy River; however, the top of the unit is between altitudes of 100 and 200 feet throughout most of the basin, and its thickness ranges from 100 to 400 feet in most of the area. Wells completed in this unit can yield about 1,000 gallons per minute.

The undifferentiated fine-grained sediments are lithologically similar to Confining Units 1 and 2. This unit includes all the sediments overlying the older rocks and underlying the consolidated gravel aquifer wherever individual units cannot be discerned either because the individual units are not present or because information is insufficient to map them. Altitude of top of the unit ranges from about 1,200 feet east of Sandy, Oregon, to minus 300 feet near the center of the basin, where its thickness is about 1,200. The unit is generally a poor water-bearing formation.

The older rocks unit includes generally low permeability, Miocene and older volcanic and marine sedimentary rock that underlie and bound the basin-filling sediments. The altitude of the top of the unit ranges from land surface in the exposed areas to minus 1,600 feet beneath Vancouver, Washington. This unit bounds the service area on the east and much of the north.

U.S. Geological Survey describes the hydraulic conductivities of the aquifers as follows: The four sedimentary aquifers in the basin have the highest median hydraulic conductivities. The unconsolidated sedimentary aquifer has the highest median value of hydraulic conductivity (200 feet per day) and also the greatest variation in values (0.03 to 70,000 feet per day). It is the most permeable aquifer, as well as the most heterogeneous unit. The Troutdale gravel aquifer, Troutdale sandstone aquifer, and the sand and gravel aquifer all have similar median values of about 7 to 16 feet per day. The Troutdale sandstone and the sand and gravel aquifer have low variation in hydraulic conductivity relative to some of the other units. The Troutdale gravel aquifer, however, has values of conductivity ranging over six orders of magnitude."

Figure 6.3. Troutdale Sole Source Aquifer Boundary

6.4 Vulnerability Analysis

A vulnerability analysis was performed to address the potential effects of an oil spill on the following areas.

- Water intakes
- Schools
- Medical facilities
- Residential areas
- Businesses
- Wetlands or other sensitive environments
- Fish and wildlife
- Lake and streams
- Endangered flora and fauna
- Recreational areas
- Transportation routes (air, land, water)
- Utilities
- Other applicable areas

Vulnerabilities located in the area were identified and are described below.

6.4.1 Water Intakes

A discharge from the Facility would not threaten a public drinking water intake. The closest downstream public drinking water intake from the Columbia River is located in Rainier, Oregon.

6.4.2 Schools, Medical Facilities, Residential, and Business Areas

The Facility is located within 1-1/2 miles of residential neighborhoods; however, a release from the Facility would not likely travel in such a direction as to threaten a residential area.

The Facility is located in the Port in an area zoned for heavy industrial use. A release from the Facility would threaten adjacent businesses, which include other terminals and industrial uses.

The Clark County Jail Work Center is located between the elements of the Facility. The jail work center is a 224-bed minimum security setting facility. A release from the Facility may have the potential to impact the Jail Work Center.

There are several schools located within a 5-mile radius of the Facility; however, a release would not likely travel in a direction to threaten any schools. There are no medical facilities within a vulnerable area.

6.4.3 Sensitive Environments and Wetlands

Willamette River

- Multnomah Channel/Sturgeon Lake – waterfowl, eagle winter feeding area, shorebirds, cranes, sensitive marshes
- Sauvie Island/Smith and Bybee Lakes – critical wetland area

Columbia River

- Caterpillar Island/Dairy Creek – wetland habitat and waterfowl concentrations
- Willow Bar Islands and Post Office Lake – wetland habitat
- Hathaway Lake– waterfowl
- Bachelor Island Slough – sandhill crane wintering, great blue heron spring nesting
- Shillapoo Wildlife Area
- Vancouver Lake Wildlife area
- Columbia River Wetland Mitigation Bank

In addition, two shoreside wetland complexes are located adjacent to or near Facility elements:

- Port of Vancouver Parcel 1A wetland mitigation site
- Port of Vancouver Parcel 2 wetland mitigation site

6.4.4 Economically Important Resources

Recreational and economically important areas in the lower Columbia River area, which may require special protection in the event of an oil spill, include fishing areas, lakes and streams, and other recreational areas and marinas.

Marinas in the area include

- Hayden Island
- Boat ramps and marinas upstream to the Interstate 205 bridge on both sides of the river.
- Kadow's Marina

Recreational areas include

- Vancouver Lake and Shillapoo wildlife areas
- Caterpillar Island
- Cedar Creek – Pigeon Springs
- Two Forks Access Point

Commercial Fishing areas include

- Big Creek – Salmon
- Westport Slough/Clatskanie River – Salmon
- Altoona – Salmon
- Germany Creek – Salmon
- Abernathy Creek – Salmon
- Globe/Tide Creeks – Salmon

Additional information, as well as protection and response strategies, are available in the Northwest ACP and through WDFW.

6.4.5 Endangered Flora and Fauna

The following state and federally listed endangered and threatened species are located in the vicinity of the Facility and may be impacted by a release.

Species	Listing Designation	
	Federal	State
Sandhill Crane (Grus canadensis)		Endangered
Streaked Horned Lark (Eremophila alpestris strigata)	Threatened	Endangered
Oregon Spotted Frog (Rana pretiosa)	Threatened	Endangered
Western Pond Turtle (Actinemys marmorata)	Species of Concern	Endangered
Chinook salmon (Oncorhynchus tshawytscha)	Threatened/Endangered	Concern
Steelhead (Oncorhynchus mykiss)	Threatened/Endangered	Concern
Chum Salmon (*Oncorhynchus keta*)	Threatened	Concern
Coho Salmon (*Oncorhynchus kisutch*)	Threatened	
Sockeye Salmon (*Oncorhynchus nerka*)	Endangered	Concern
Bull Trout (*Salvelinus confluentus*)	Threatened	Concern
Pacific Eulachon (Smelt) (*Thaleichthys pacificus*)	Threatened	Concern

Species	Listing Designation	
	Federal	State
North American Green Sturgeon (*Acipenser medirostris*)	Threatened	
Columbian White-tailed Deer (Odocoileus virginianus leucurus)	Endangered	Endangered
Stellar Sea Lion (Eumetopias jubatus)		Threatened

Note: Evolutionary Significant Units (ESU) of Chinook salmon and steelhead have different federal listing stating. This table does not distinguish by ESU as all ESUs have migratory corridors within the Columbia River at the project site.

The bald eagle is listed as a state sensitive species, a priority species, and a Species of Greatest Conservation Need by WDFW. The species was removed from the federal endangered species list in 2007. However, it remains under the protection of the federal Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act.

6.4.6 Utilities

Various submerged pipelines, elevated power lines, and other utilities cross the Willamette and Columbia rivers. These utilities are not expected to be impacted by a spill, but their presence may need to be considered during spill response.

6.4.7 Transportation Routes

The Willamette and Columbia rivers are key shipping corridors. There are several automobile and rail transportation bridges that cross these rivers. The Interstate 5 bridge and the Columbia River rail bridge cross both rivers within a 5-mile radius of the facility and might be impacted by a spill.

6.5 Sensitive Area Protection

The information necessary to identify, prioritize, and protect sensitive areas is as follows.

- Implementation sequence for protection of sensitive areas
- Different ecologically and culturally/economically sensitive areas
- Various coastal marine habitats presented in order of their relative sensitivity to oil spills based on the ESI system used by NOAA
- Methods for protecting these sensitive resources
- Guidelines for selecting the appropriate protection methods for each resource
- Prioritization schemes for determining the order for protecting the resources
- Booming strategies for specific areas within the spill envelope of the evaluated spills

Figure 6.4 provides a list of proposed booming and collection strategies contained on the Northwest ACP for areas within the overall spill envelope for the Company. The information in the updated Lower Columbia River GRPs would be used to develop response priorities. The GRPs include the following.

- Site descriptions;
- Resources of concern and seasonal concerns;
- Suggested protection strategies, resources and collection points; and
- Access to areas.

Figure 6.4. Environmental Response Map Index

4.2.1 Lower Columbia River Priority Tables

Map # 1 - Ilwaco	
Priority	Strategy Number
1	LCR-7.1
2	LCR-6.8
3	LCR-7.5
4	LCR-4.0
5	LCR-3.3
6	LCR-1.8
7	LCR-1.6

Map # 2 - Astoria	
Priority	Strategy Number
1	LCR-17.7
2	LCR-14.1
3	LCR-13.0
4	LCR-10.8
5	LCR-14.6
6	LCR-14.8
7	LCR-14.3
8	LCR-12.9
9	LCR-12.6
10	LCR-12.3

Map # 3 – Grays Bay	
Priority	Strategy Number
1	LCR-26.4
2	LCR-24.1
3	LCR-22.4
4	LCR-22.3
5	LCR-23.6
6	LCR-17.8
7	LCR-27.5
8	LCR-27.2
9	LCR-20.3
10	LCR-20.0
11	LCR-19.9
12	LCR-19.3

Map # 4 - Cathlamet	
Priority	Strategy Number
1	LCR-37.9
2	LCR-37.2
3	LCR-36.0
4	LCR-35.0
5	LCR-34.6
6	LCR-34.7
7	LCR-34.4
8	LCR-33.3
9	LCR-32.2
10	LCR-38.8
11	LCR-38.5

Map # 5 – Crims Island	
Priority	Strategy Number
1	LCR-55.5
2	LCR-54.4
3	LCR-55.9
4	LCR-55.7
5	LCR-54.2
6	LCR-53.9
7	LCR-49.1
8	LCR-48.1
9	LCR-55.6
10	LCR-55.4
11	LCR-48.8
12	LCR-48.6
13	LCR-49.4

Map # 6 – Longview	
Priority	Strategy Number
1	LCR-64.0
2	LCR-71.4
3	LCR-70.0
4	LCR-58.7
5	LCR-58.9
6	LCR-60.2

Figure 6.4 – Environmental Response Map Index (continued)

4.2.1 Lower Columbia River Priority Tables

Map # 7 – Kalama	
Priority	**Strategy Number**
1	LCR-81.2
2	LCR-81.0
3	LCR-81.8
4	LCR-82.4
5	LCR-79.5
6	LCR-79.8
7	LCR-76.0
8	LCR-73.7

Map # 8 – St. Helens	
Priority	**Strategy Number**
1	LCR-94.3
2	LCR-92.3
3	LCR-91.0
4	LCR-87.6
5	LCR-94.5
6	LCR-87.3

Map # 9 – Portland	
Priority	**Strategy Number**
1	LCR-100.8
2	LCR-98.6
3	LCR-97.5
4	WR-0.9

Map # 11 – Government Island	
Priority	**Strategy Number**
1	LCR-114.8
2	LCR-113.3

Map # 12 – Camas	
Priority	**Strategy Number**
1	LCR-120.6
2	LCR-122.6
3	LCR-120.7
4	LCR-119.1

Map # 14 – Bonneville	
Priority	**Strategy Number**
1	LCR-142.8
2	LCR-141.4
3	LCR-137.0
4	LCR-143.1
5	LCR-142.4

6.6 Oiled Wildlife Care

In the event of a spill, wildlife may come into contact with oil especially on the surface of water or along shorelines. The numbers and types of animals affected will depend on a number of factors, such as size of the spill, weather, wind and currents, habitats affected, and time of year the spill occurs. Birds are the most likely wildlife to be affected during on-water spills, although aquatic or marine mammals may also be affected. Terrestrial mammals are more likely to be secondarily affected when they scavenge other animals that are stressed or have died.

Operations and Wildlife Branch personnel should refer to the Northwest Wildlife Response Plan and Policy, as found in Chapters 3000 and 9000 of the Northwest ACP, regarding wildlife response operations, which are incorporated into this OSCP by reference.

6.6.1 Notifications

Any observations of oiled wildlife made prior to the establishment of an ICS, will be reported to the Washington Emergency Management Division (800-258-5990).

Once an ICS has been established, all observations of oiled wildlife must be reported to the Operations Section, Wildlife Branch Director (or their designee) and to the Planning Section, Environmental Unit Leader (or their designee).

The MSRC will be notified when oiling of wildlife is eminent or has been reported. The Washington State regulatory planning requirement for wildlife rescue and rehabilitation will be met by MSRC who will be responsible, through contracts, for the operational setup and accommodations of oiled wildlife recovery and treatment.

Once an ICS has been established, the U.S. Fish and Wildlife Service (USFWS) Response Coordinator in Lacey, Washington, will be contacted to initiate the process of obtaining spill-specific authorizations related to oiled wildlife activities (see Migratory Bird Treaty Act below). The main office phone number is 360-753-9440. A 24-hour pager number (360-971-6000) is available for after business hours and weekends.

Private oiled wildlife care contractors (listed below) will be notified as required depending on the number and types of species affected. These contractors have varying abilities to provide service and personnel during response activities.

- Focus Wildlife, 310-386-5965 or 800-578-3048, http://www.focuswildlife.net/
- International Bird Rescue Research Center, 503-338-7490 or 888-447-1743, http://www.ibrrc.org/index.htlnl
- Oiled Wildlife Care Network, 530-979-7561 or 800-645-1911 (oil spill) or 877-823-6926 (oiled animal), http://www.vetmed.ucdavis.edu/owcn/
- Progressive Animal Welfare Society (PAWS), 425-412-4040 or 425-787-2500 ext. 815, http://www.paws.org/find-rehab.html
- Tri-State Bird Rescue, 302-737-7241, http://www.tristatebird.org/

The following organizations have mobile wildlife rehabilitation trailers capable of being on site within 24 hours - as required under WAC 173-182-540 and may be contacted 24/7.

- Clean Rivers Cooperative (Portland, OR), 503-220-2040, http://www.cleanriverscooperative.com/
- Marine Spill Response Corporation, 800 645 7745 or 800 259 6772 (off hours), http://www.msrc.org/
- Washington Department of Fish and Wildlife (Olympia, WA), 360-534-8233 (pager) or 360-902-8124 (office number)

6.6.2 Permits

All oiled wildlife activities conducted during a spill response will be conducted in compliance with applicable state and federal regulations. The purpose of this section is to identify the state and federal permits required for activities related to the collection and care of affected wildlife.

Migratory Bird Treaty Act (Federal) – Oiled bird activities conducted during a spill response will be conducted in compliance with the Migratory Bird Permit requirement and spill specific authorizations. This act makes it illegal for anyone to take or possess any migratory bird except under the terms of a valid Migratory Bird Permit. As authorized by the Migratory Bird Treaty Act, USFWS issues Migratory Bird Permits to qualified applicants to recovery, temporarily possess, transport, and rehabilitate oiled migratory birds.

A rehabilitator must secure two separate *spill-specific* authorizations (in association with their Migratory Bird Rehabilitation Permit) in order to work with oiled birds during a response. The first authorization permits the rehabilitator (or their designee) to recover and rehabilitate oiled (live) birds during the specific event. The second authorization permits the rehabilitator (or their designee) to collect and store dead oiled birds. The purpose of this second authorization is to ensure that the dead birds are handled, documented, and stored as "evidence" for later use. Spill-specific authorizations for Western Washington may be requested from the USFWS Response Coordinator in Lacey. The main office phone number is 360-753-9440. A 24-hour pager number (360-971-6000) is available for after business hours and weekends.

Endangered Species Act (Federal) – Oiled animal activities conducted during a spill response will be conducted in compliance with the Endangered Species Act (ESA) requirements. A Migratory Bird Rehabilitation Permit (see above) authorizes the recovery, temporary possession, transport, and rehabilitation of oiled threatened and endangered species of migratory birds with no additional ESA permits required. In the event of an oil spill or hazardous substance release, the Endangered Species Act (ESA) must be considered in the development of federal response activities and actions during an oil spill response (Section 4314 of Northwest ACP).

As the spill response occurs, the FOSC must consult with the natural resource trustees as laid out in Section V.B of the *Inter-agency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities Under the Federal Water Pollution Control Acts National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act (ESA MOA).* The Environmental Unit will address ESA Section 7 Consultation requirements, as outlined in the ESA MOA.

Marine Mammal Protection Act (Federal) – Oiled marine mammal activities conducted during a spill response will be conducted in compliance with the Marine Mammal Protection Act (MMPA). Under the MMPA (16 USC 1361-1407), federal, state, and local government officials, or designees of the relevant Secretaries of the departments of the Interior and Commerce, may take marine mammals during the course of official response duties if such taking is for the protection or welfare of the mammal, the protection of public health and welfare, or the nonlethal removal of nuisance animals (16 USC 1379 Section 109(h)(1)).

Government contractors conducting officially authorized oiled wildlife spill response-related activities and acting under the direct supervision of the Wildlife Branch Director are regarded as spill response employees and may take marine mammals *if the Wildlife Branch is activated* and if the Wildlife Branch Director is authorized pursuant to Section 109(h) of the MMPA and implementing regulations (USFWS, NOAA National Marine Fisheries Service [NMFS], state wildlife agency, or is designated by the NOAA Regional Administrator under 16 USC 1382 Section 112(c)). “Take” is considered appropriate for the purposes of recovery and transport of marine mammals (live or dead) to a designated location, rehabilitation by an authorized facility, return to the wild, or for the collection of evidence.

If oiled wildlife spill response field personnel are contract employees of a nongovernment agency and not otherwise authorized pursuant to Section 109(h) or 112(c) of the MMPA, authorization to take oiled marine mammals during spill response activities must be obtained directly from the appropriate federal trustee (USFWS or NOAA NMFS). Likewise, if the Wildlife Branch is not activated, authorization to take oiled marine mammals must be obtained directly from the appropriate federal trustee (USFWS or NOAA NMSF) pursuant to 16 USC 1382 Section 112(c).

Washington State Rehabilitation Permit (Washington State) – Oiled animal operations and facilities used during a spill response will be in compliance with Washington State Rehabilitators Permit requirements (WAC 232-12-175). WAC 232-12-175 states that it shall be unlawful for any person to possess wildlife for the purpose of rehabilitation unless they have a valid wildlife rehabilitation permit or they are working under the supervision of a person who has a valid wildlife rehabilitation permit. The permit is valid so long as the information in the permit remains current, the permit holder continues to meet the conditions and requirements of the permit, and provisions of the rule are followed.

6.6.3 Wildlife Branch

The Wildlife Branch is contained within the Operations Section of the ICS and its organizational chart may be found within the Northwest ACP.

It is the policy of the Northwest Area Committee that representatives of USFWS will assume the positions of Director and Deputy Director of the Wildlife Branch. WDFW representatives will assume these positions if a USFWS representative is not available, or if designated by a USFWS representative. Appointment of other parties, including Responsible Parties representatives, to one or both of these positions may be made by a USFWS representative or their designee at any time during an incident, and for such periods of time as may be deemed appropriate.

Unless otherwise indicated by USFWS, the Wildlife Branch Director position will be delegated to WDFW for spills that occur in Washington State. Delegation of the position may change during a spill of extended duration. The Wildlife Branch Director is responsible for overseeing all activities related to oiled wildlife recovery and rehabilitation during a response.

Currently, private wildlife contractors are typically used to provide the care for affected wildlife. *All* persons who will serve as part of the rehabilitation or field crews, however, must be trained in accordance with the site-safety plan established for the incident and should be familiar with generally accepted published guidelines for collecting, cleaning, and rehabilitating oiled birds.

6.6.4 Oiled Wildlife Care Procedures

Federal (USFWS) policy requires that spill responders comply with the care standards outlined in *Best Practices for Migratory Bird Care During Oil Spill Response,* which is incorporated by reference as a requirement of the Northwest ACP. Additional information may be obtained in *Protocols for the Care of Oil-Affected Birds.*

- Best Practices for Migratory Bird Care During Oil Spill Response. U.S. Fish and Wildlife Service. 2002
- *Protocols for the Care of Oil-Affected Birds*. Oiled Wildlife Care Network (UC Davis). 2000.

6.6.5 Oiled Wildlife Facilities, Equipment, and Personnel

The Northwest ACP has established four response levels with regards to oiled bird operations: Level 4 (up to 15 animals), Level 3 (up to 100 animals), Level 2 (up to 500 animals), and Level 1 (more than 500 animals). The equipment and facility infrastructure for oiled wildlife operations will be made available as needed during a spill response as established by Ecology in WAC 173-182-540.

Specific oiled bird rehabilitation facility requirements associated with space, water, and ventilation, have been established by WDFW in WAC 232-12-275. Current planning standards require that the equipment and facility infrastructure for Level 4 and Level 3 responses be capable of being on site within 24 hours of spill awareness. The space, equipment, and personnel needs identified for these response levels are listed in the table at the end of this section.

One or more of the regional Mobile Rehabilitation Units (MRUs) currently under development by the Mobile Facility Workgroup for use by regional PRCs will be used to meet the space and equipment requirements listed in the table. The personnel requirements listed in the table will be met through the use of the oiled wildlife care contractors listed in **Section 6.6.1**.

In the event of a spill originating from the Facility resulting in impacted wildlife, one or more MRUs (as necessary) will likely be established at a designated staging area. Additional support and staging space will be made available as necessary. This may include buildings, trailers, or tents.

Electrical power will be provided by one or more stand-alone diesel powered generators. Freshwater will be supplied through hoses connected to a water source inside the Bioremediation Building or the nearby fire hydrant.

Wastewater generated by the cleaning operations will likely contain surfactants and oils and may not be suitable for discharge into the on-site sanitary sewer system. Therefore, wastewater will be stored in temporary storage tanks delivered to the site. Based upon the results of sampling and analysis, the wastewater will be disposed of on site or transported to an off-site disposal facility. This determination will be made by the Disposal Group Supervisor and approved by Ecology.

Figure 6.5 shows MRU operational requirements. **Figure 6.6** is a Data Sheet for Collection of Live Contaminated Wildlife. **Figure 6.7** is a Data Sheet for Collection of Dead Contaminated Wildlife.

Figure 6.5. MRU Operational Requirements

Infrastructure/Personnel	15 Birds (NWACP Level 4)	100 Birds (NWACP Level 3)
Ventilated and heated interior space (total sqft)	800	2400
Interior personnel support space (total sqft) [1]	400	2500
Exterior space for pools (total sqft)[2]	300	1800
Search and collection space (total sqft)	280	280
Number of pens (combined pre-wash and drying, 4'x8'each)	5	10
Number of wash/rinse stations	1	2
Number of 12' diameter pools	1	6
Maximum daily volume of conditioned fresh water (wash stations) required (gallons)[3]	900	6,000
Maximum daily volume of unconditioned fresh water (pools) required (gallons) [4]	14,450	86,700
Number of management level personnel	4[5]	9[6]

1 This space is required for administrative activities, volunteer/workforce support and coordination, and laundry services associated with a response but is not required to be on the same site as the rehabilitation facility.

2 This space required for the pools and their associated surrounding workspace (at least 4 feet).

3 Conditioned water refers to water that has been adjusted to a hardness of 2 to 3 grains (if needed) and is maintained at a temperature of 104°F to 106°F, with a pressure 40 to 60 psi, and a flow rate of 4 gallons per minute.

4 Each pool is required to have an exchange rate of 4.25 x per day to eliminate oil and waste products. The volumes of water listed assume that no filtration and recirculation systems will be used. It is anticipated that required water volumes could be decreased substantially (>90 percent) if appropriate filtration, oil-separation, and recirculation systems were used.

5 One each, Wildlife Branch Director, Wildlife Veterinarian, Bird Recovery and Transportation Unit leader, and Rehabilitation Unit leader. Additional management functions to be performed by these staff: Deputy Wildlife Branch Director, Bird Recovery and Rehabilitation Group Supervisor, Wildlife Reconnaissance Group Supervisor, Hazing Unit leader, and Volunteer Unit leader.

6 One each, Wildlife Branch Director, Deputy Wildlife Branch Director, Wildlife Veterinarian, Bird Recovery and Rehabilitation Group Supervisor, Wildlife Reconnaissance Group Supervisor, Volunteer Unit leader, Hazing Unit leader, Bird Recovery and Transportation Unit Leader, and Bird Rehabilitation Unit leader.

Figure 6.6. Data Sheet for Collection of Live Contaminated Wildlife

Date: _____ Oil Spill Incident: _____

Rehabilitation Identification Number: _____

Specific Capture Location: _____

Specimen Common Name: _____

Species Found: _____

Was Specimen Obviously Oiled? Yes _____ No _____

Extent of Oiling (check one):
___ Completely covered ____ Discrete spots
___ Ventral or dorsal surface only ____ No obvious oil

Date of Arrival at Treatment Center: _____

Date Cleaned: _____ Date Released: _____
Location of Release: _____ Date Died: _____

Collected By:

Printed Name: _____
Signature: _____ Date: _____
Telephone #: _____
Affiliation: _____
Address: _____

Relinquished To:

Printed Name: _____
Signature: _____ Date: _____
Telephone #: _____
Affiliation: _____
Address: _____

Figure 6.7. Data Sheet for Collection of Dead Contaminated Wildlife

Date: _____ Oil Spill Incident: _____

Specific Capture Location: _____

Specimen Common Name: _____

Species Found: _____

Was Specimen Obviously Oiled? Yes _____ No _____

Was Specimen Scavenged? Yes _____ No _____

Comments: _____

Collected By:

Printed Name: _____
Signature: _____ Date: _____
Telephone #: _____
Affiliation: _____
Address: _____

Relinquished To:

Printed Name: _____
Signature: _____ Date: _____
Telephone #: _____
Affiliation: _____
Address: _____

6.7 Protection/Response Strategies

The current GRP for the lower Columbia River will be used for location of sensitive areas and response strategies. Those strategies to protect and respond to sensitive areas immediately around the terminal are provided in the following locations.

- **Figure 6.7** contains proposed booming and collection strategies for the Columbia River in areas near the terminal.
- **Figure 6.10** identifies the GRP booming strategies included in this OSCP and summarizes the length of boom required to carry out each strategy.
- **Figure 6.11** identifies locations along the Columbia and Willamette rivers, near the facility, where boom has been pre-staged to support the GRP strategies in those locations.

6.8 Spills to Ground

Immediate assessment of ground spills are addressed in the Facility's spill prevention, control, and countermeasure plan.

6.8.1 Reportable Spills to Ground

Spills to ground greater than 42 gallons shall be reported immediately using the contact information in **Section 3**. If the spilled quantity is unknown, or the release is ongoing, a report shall be made. The form in **Figure 6.4** can be used to document the decision process for spills to ground notification and includes factors, such as whether the spill is ongoing, whether it is in an area with environmental conditions that make groundwater impact more likely.

A spill is considered to have not impacted ground if it occurs on a paved surface, such as asphalt or concrete. A spill to dirt or gravel is considered to have impacted ground and is reportable. Surface waters inside the Facility are collected and routed to the effluent plant, where water is separated from oil and treated before being pumped out. This helps to prevent oil from reaching surface water or groundwater of the state during rain events.

All spills are considered reportable spills except spills that are known to be less than 42 gallons that do not impact surface or groundwater.

- Comprehensive Environmental Response, Compensation and Liability Act of 1980 releases
- On-facility air releases to the atmosphere only
- Releases from underground storage tanks regulated under Chapter 173-360 WAC
- Preexisting sources of releases identified as Resource Conservation and Recovery Act (of 1976) solid waste management units
- Spills contained within areas controlled by National Pollutant Discharge Elimination System
- Permitted systems that are not likely to threaten groundwater and do not exceed applicable federal reportable quantities

Spills to ground will be assessed as soon as practicable using the following procedures.

All spills involving a reportable quantity (RQ) of a hazardous substance will be immediately reported following the notification process detailed in **Section 3**. In the event that a release is known or suspected of impacting soil and/or groundwater notification will be made to the Ecology Toxics Cleanup Program within 90 days in accordance with the Model Toxics Cleanup Act (WAC 173-340). As soon as practicable, a groundwater spill assessment will be performed. The goals of the assessment will be to determine the nature and extent of the impact, the gradient and flow direction of groundwater in the vicinity of the release, identify down-gradient sensitive receptors that may require protection, and identify potential preferential pathways that may be in proximity to the release location. The following paragraphs describe the general methods to fulfill the goals of the groundwater spill assessment.

- Groundwater assessment will be performed using existing wells if they are in the vicinity of the release, and with additional grab sampling via direct-push or other intrusive techniques if the impact is known or suspected of extending beyond the existing monitoring well network.
- If existing wells are not present, then assessment will be performed using grab samples collected via direct-push drill rig or other intrusive methods. Wells will be installed as appropriate to supplement data from grab samples and to collect data to evaluate groundwater flow direction and gradient. Wells will be installed by a well driller licensed in Washington State and installed according to Ecology regulations.

Samples selected for chemical analysis will be submitted to an analytical laboratory licensed by Ecology. Chemical analysis methods will include methods approved by Ecology or the EPA.

- A sensitive receptor survey will be performed to evaluate the location of municipal water supply wells, wetlands, surface water bodies, and/or other sensitive receptors that may be adversely impacted by the release. Sensitive receptor surveys may include, but not necessarily be limited to: reviewing appropriate maps, reviewing Ecology well records, and visual reconnaissance.
- Where groundwater discharges or is suspected to discharge to surface water, visual inspection of surface water and/or surface water sampling and analysis will be performed to evaluate the groundwater to surface water pathway.
- If underground utilities, pipelines, or other buried infrastructure are located in proximity to the spill, their locations will be confirmed and their potential to act as preferential pathways will be evaluated.

The Facility maintains a contract with Pacific Groundwater Group (PGG) for the management of spill response involving releases to groundwater. Pacific Groundwater Group is also the Facility's contractor for ongoing soil and groundwater remediation projects.

Spills to a paved surface are not considered to have impacted ground. Spills to gravel or dirt surfaces are considered to have impacted ground.

6.8.2 Spills to Ground of Unknown Volume

When a spill is of an unknown volume, best professional judgment may be used to determine whether the spill is reportable due to its volume, and such judgment should also include the following considerations.

- Is the spill ongoing?
- Is the spill located adjacent to waters of the state, or where a pathway to waters of the state exists?
- What are the environmental conditions that might determine whether the waters of the state could be impacted (rain events, known shallow groundwater).

Immediate assessment of groundwater spills is addressed in the Facility's spill prevention, control, and countermeasures plan, as required by 40 CRF 112.

6.8.3 Procedure for Reporting Spills to Ground

Reportable spills to ground, as defined in **Section 6.8.1**, shall require the notification procedures summarized in **Section 3**. The decision process for determining when to report spills to ground is summarized in **Figure 6.8.**

Figure 6.8. Decision Process for Spills to Ground Notification

Yes	No	Potential Notification Triggers	Notes:
		The source of the spill is unknown.	
		The volume of the spill is uncertain.	
		The volume of the spill is greater than 42 gallons and is not entirely contained on an asphalt or concrete surface that drains to an oily water sewer.	
		The spill is uncontained.	

Yes	No	Potential Notification Triggers	Notes:
		The spill is located in an area where there is a pathway to waters of the state, and environmental conditions, such as rain events, make an impact to state surface or ground water likely.	
		The spill has the potential to impact groundwater.	

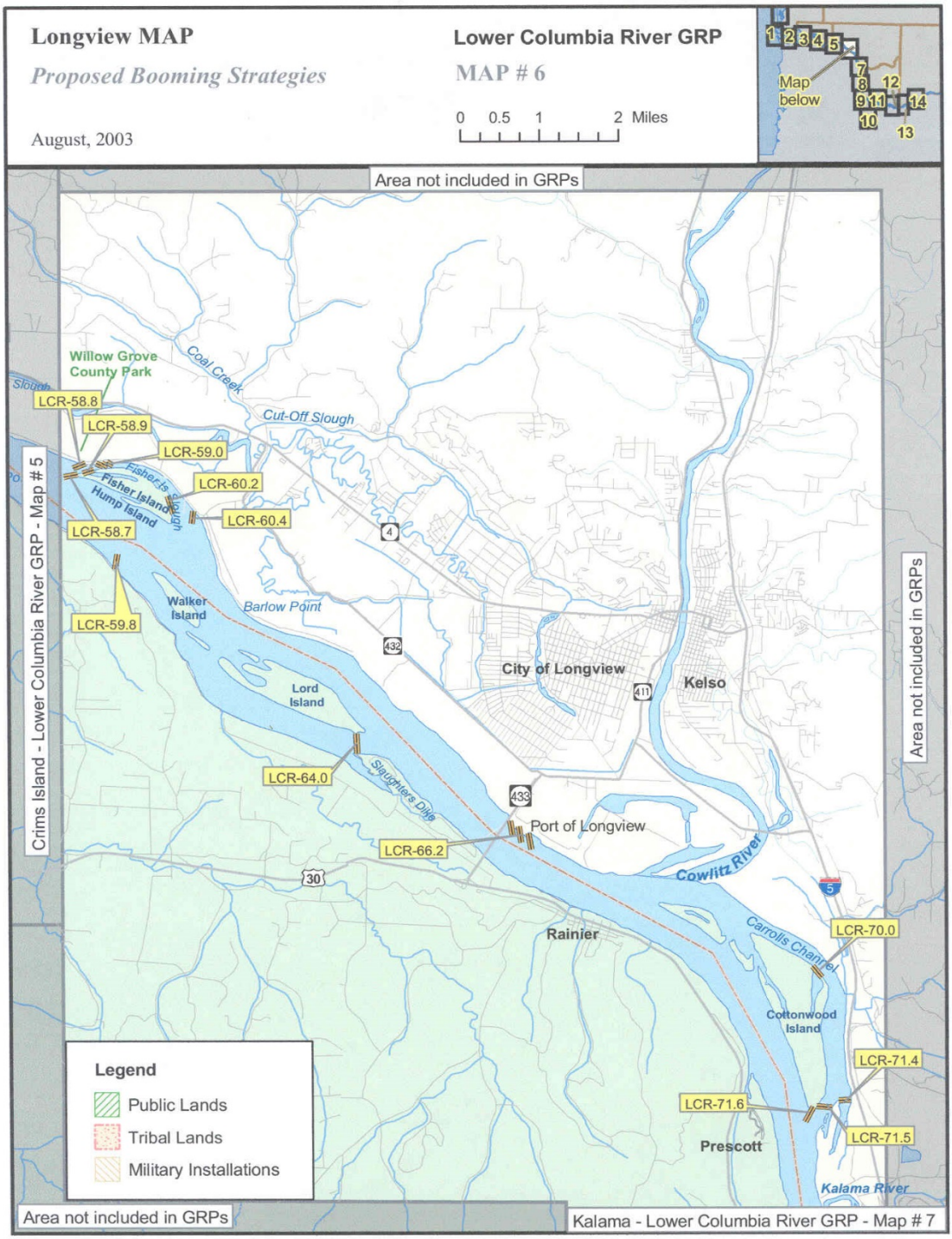
If any of the boxes are marked yes, WDEM must be notified immediately, see Section 3.

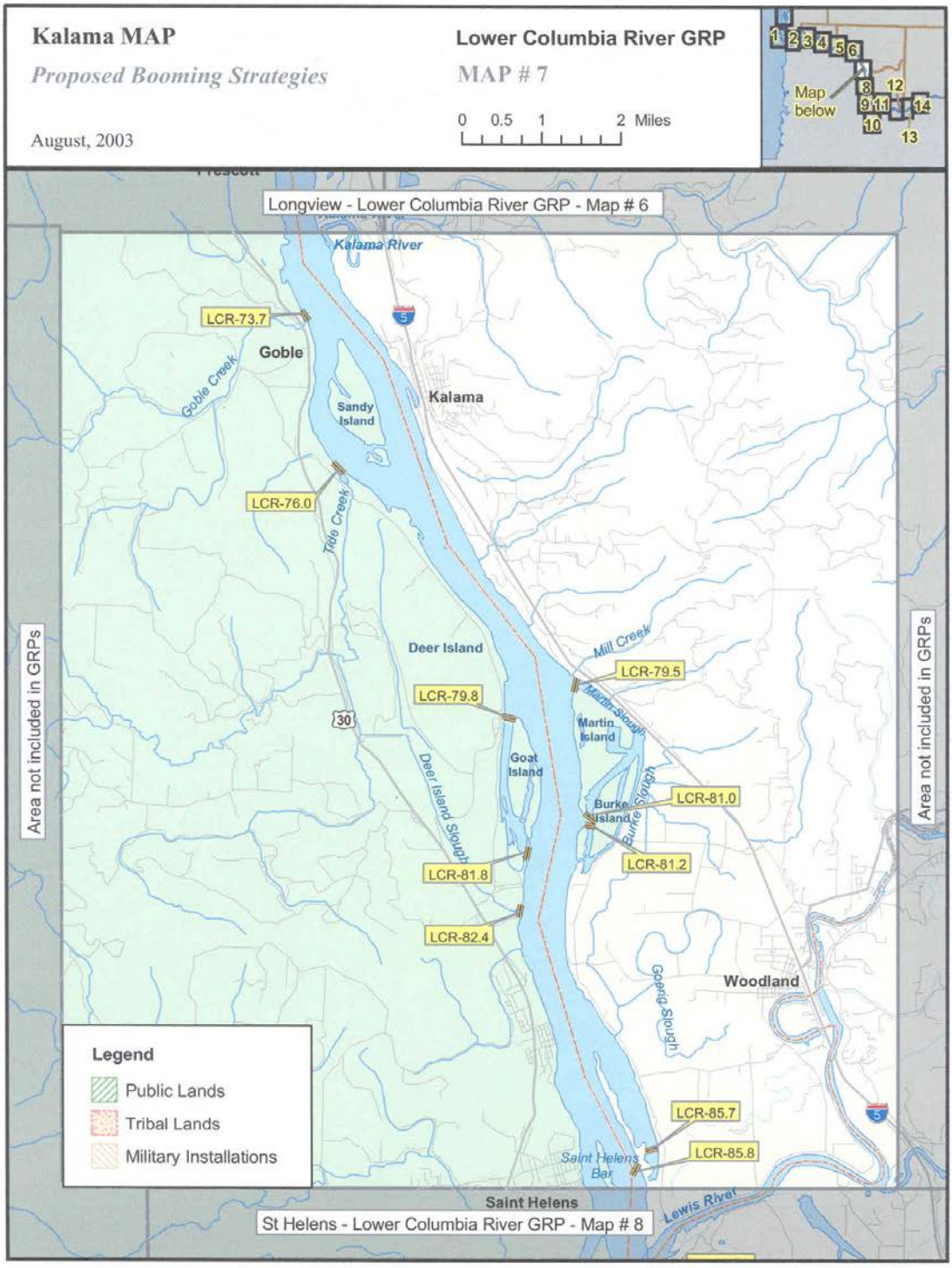
6.8.4 Impacted Groundwater Mitigation Protocol

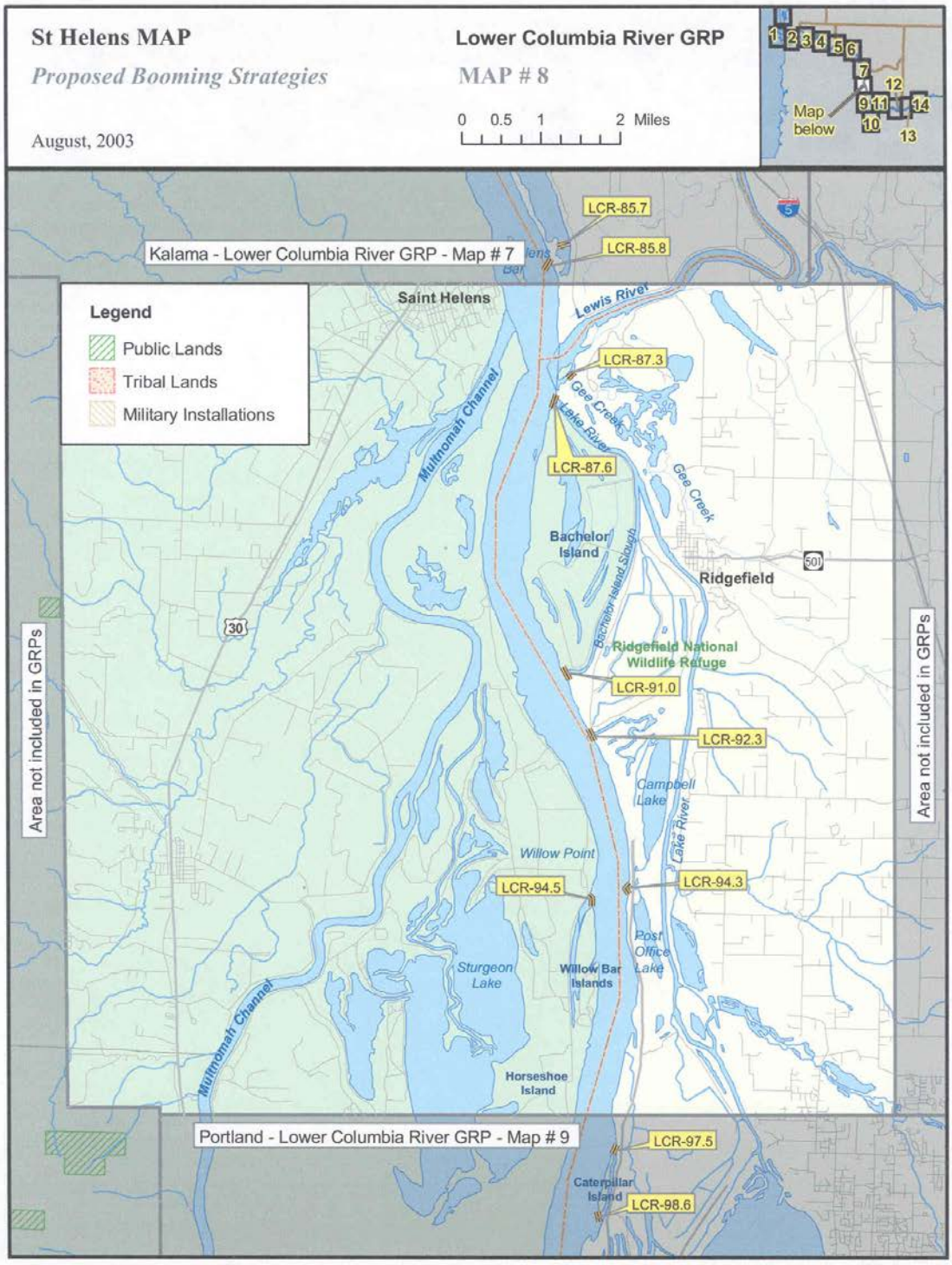
Upon discovery or imminent threat of impacts to groundwater at or around the Facility, several proactive steps are taken to ensure that any actual impacts are minimized and cleaned up in a cost-effective manner. The following steps are implemented to respond to an actual or suspected threat to groundwater:

- Facility contacts one of several pre-approved groundwater remediation consulting firms, provides an overview of the site situation and characteristics of the material potentially released. This information transfer may occur via providing an ICS 201 Form briefing or by means of other discussions.
- Facility and groundwater consultant review site-specific subsurface conditions, including geology and regional groundwater flow direction.
- Groundwater consultant prepares a Phase 1 work plan to assess area around suspected groundwater impact. Approach is site specific but in general, involves several direct push borings and collection of soil and groundwater samples.
- Groundwater samples are analyzed for suspected site-specific contaminants of concern.
- Data are evaluated to determine nature, extent and severity of suspected impact.
- Based on data review, additional direct-push borings and/or permanent groundwater monitoring wells are installed to delineate and quantify impact. Depending on depth to groundwater, this step may also include excavation of soil in attempt to control/minimize the contaminants of concern source.
- Once impact area and media are defined, data are used to evaluate/select/design potential site-specific remediation alternatives.
- Remediation alternative of choice is pilot tested to determine suitability for full-scale application at the site.
- Remediation system is expanded to full-scale system, procured, installed and started up.
- Remediation system is operated and monitored to determine effectiveness of system with respect to site cleanup. Data are provided to Regulatory Agency with oversight responsibility.
- Remediation system is operated, monitored, and optimized during project to expedite cleanup. Cleanup is achieved to oversight agency standards. System is decommissioned, wells plugged, and abandoned (if present), site is restored to pre-release conditions.

Figure 6.9. Proposed Booming Strategy Maps




Kalama MAP
Proposed Booming Strategies
August, 2003
Lower Columbia River GRP
MAP # 7
0 0.5 1 2 Miles
Map below
Longview - Lower Columbia River GRP - Map # 6
Kalama River
LCR-73.7
Goble
Goble Creek
Sandy Island
Kalama
LCR-76.0
Tide Creek
Deer Island
Mill Creek
LCR-79.5
LCR-79.8
Martin Slough
Martin Island
Goat Island
Deer Island Slough
Burke Island
Burke Slough
LCR-81.0
LCR-81.2
LCR-81.8
LCR-82.4
Gobeg Slough
Woodland
LCR-85.7
LCR-85.8
Saint Helens Bar
Saint Helens
Lewis River
St Helens - Lower Columbia River GRP - Map # 8
Area not included in GRPs
Area not included in GRPs
Legend
Public Lands
Tribal Lands
Military Installations


St Helens MAP
Proposed Booming Strategies
August, 2003
Lower Columbia River GRP
MAP # 8
0 0.5 1 2 Miles
Map below
Kalama - Lower Columbia River GRP - Map # 7
Portland - Lower Columbia River GRP - Map # 9
Legend
Public Lands
Tribal Lands
Military Installations
Area not included in GRPs
Area not included in GRPs
Saint Helens
Lewis River
Multnomah Channel
Gee Creek
Lake River
Bachelor Island
Bachelor Island Slough
Ridgefield
Ridgefield National Wildlife Refuge
Campbell Lake
Willow Point
Post Office Lake
Sturgeon Lake
Willow Bar Islands
Horseshoe Island
Caterpillar Island
LCR-85.7
LCR-85.8
LCR-87.3
LCR-87.6
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LCR-98.6
30
501
5

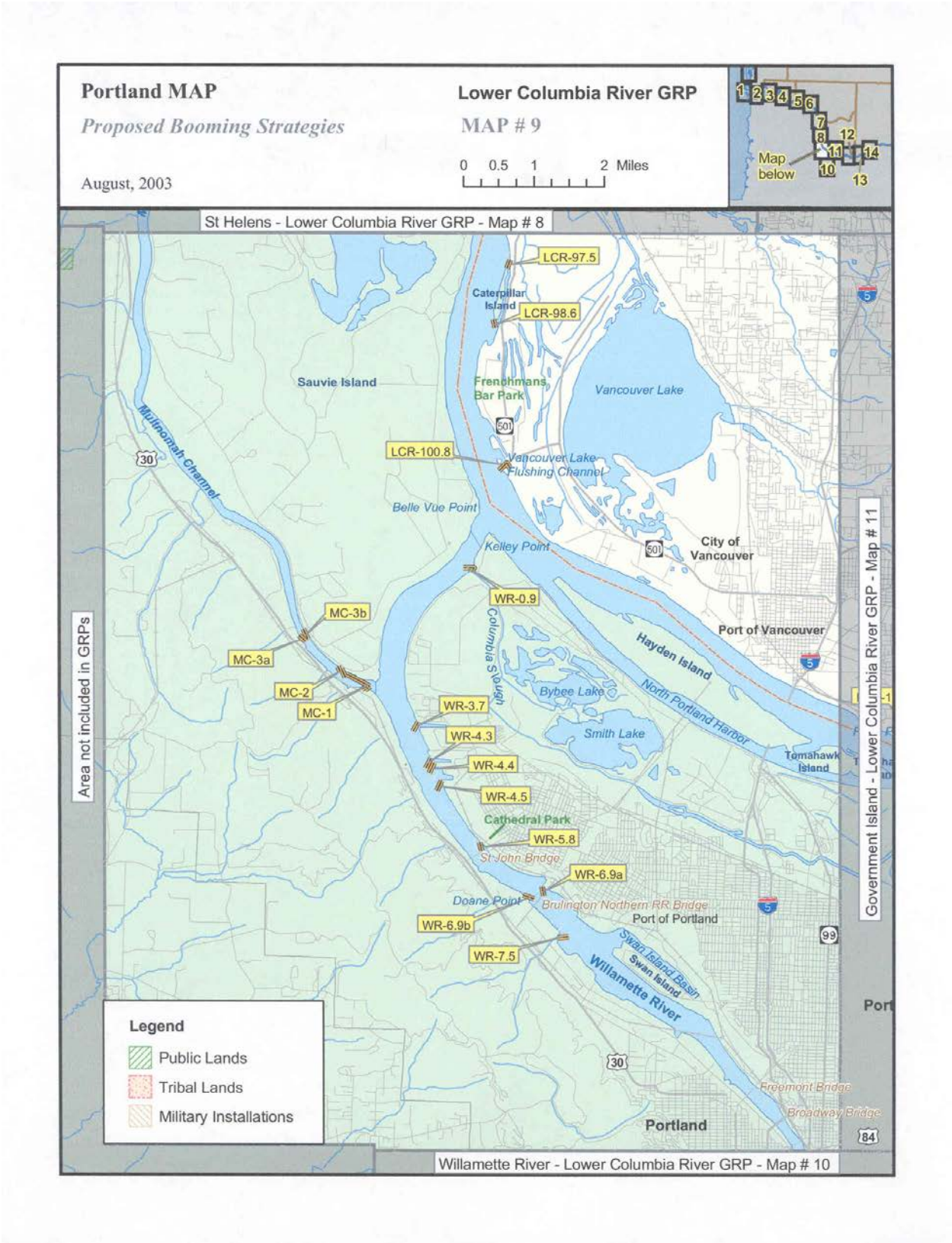
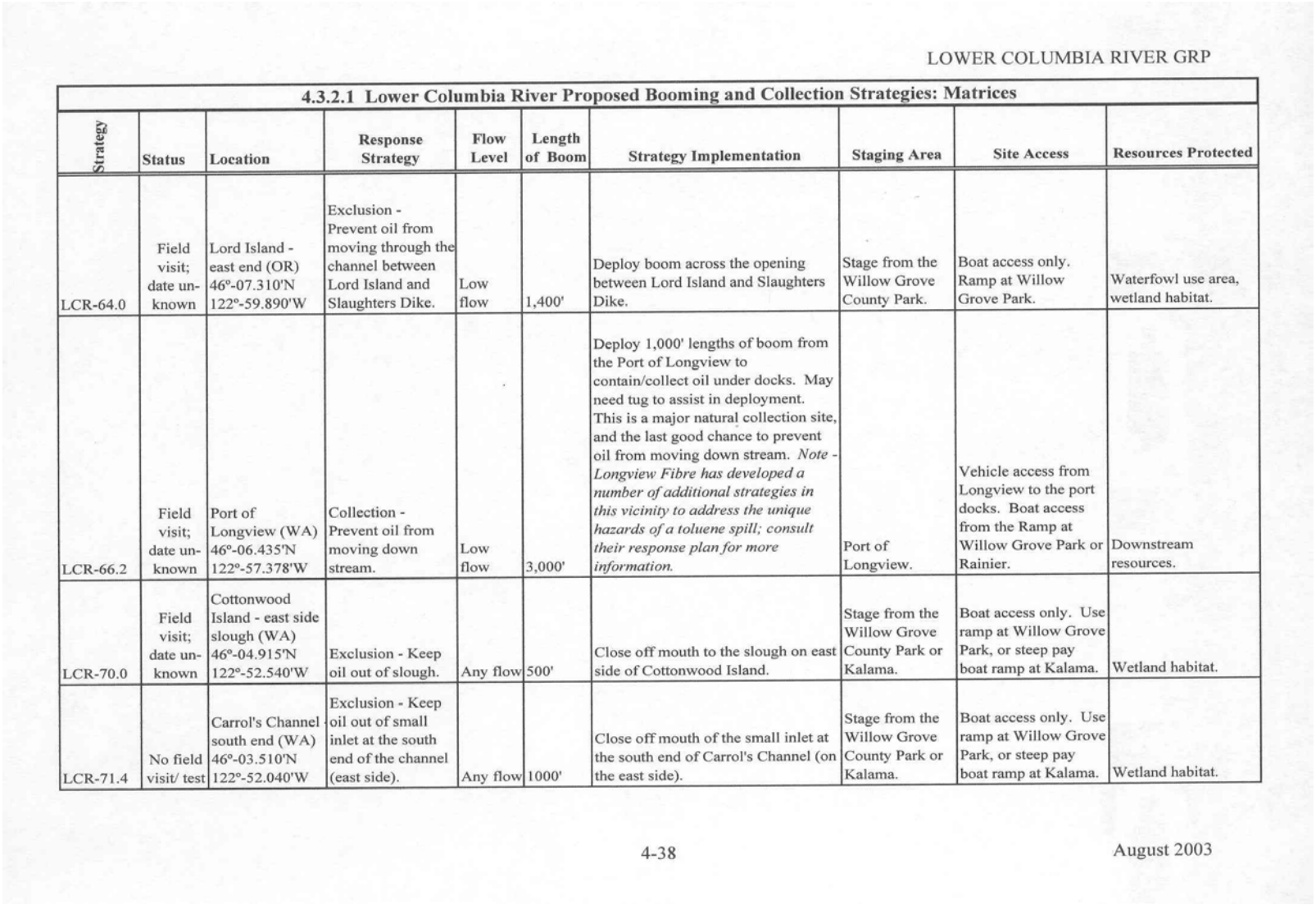

Portland MAP
Proposed Booming Strategies
August, 2003
Lower Columbia River GRP
MAP # 9
0 0.5 1 2 Miles
Map below
St Helens - Lower Columbia River GRP - Map # 8
Area not included in GRPs
Government Island - Lower Columbia River GRP - Map # 11
Willamette River - Lower Columbia River GRP - Map # 10
LCR-97.5
Caterpillar Island
LCR-98.6
Sauvie Island
Frenchmans Bar Park
Vancouver Lake
Multnomah Channel
LCR-100.8
Vancouver Lake Flushing Channel
Belle Vue Point
Kelley Point
City of Vancouver
WR-0.9
MC-3b
MC-3a
MC-2
MC-1
Columbia Slough
Port of Vancouver
Hayden Island
Bybee Lake
North Portland Harbor
WR-3.7
WR-4.3
Smith Lake
WR-4.4
Tomahawk Island
WR-4.5
Cathedral Park
WR-5.8
St John Bridge
WR-6.9a
Doane Point
Burlington Northern RR Bridge
Port of Portland
WR-6.9b
WR-7.5
Swan Island Basin
Swan Island
Willamette River
Legend
Public Lands
Tribal Lands
Military Installations
Freemont Bridge
Broadway Bridge
Portland

Figure 6.10. Proposed Booming and Collection Strategies – Lower Columbia River



LOWER COLUMBIA RIVER GRP

4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-64.0	Field visit; date un-known	Lord Island - east end (OR) 46°-07.310'N 122°-59.890'W	Exclusion - Prevent oil from moving through the channel between Lord Island and Slaughters Dike.	Low flow	1,400'	Deploy boom across the opening between Lord Island and Slaughters Dike.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Waterfowl use area, wetland habitat.
LCR-66.2	Field visit; date un-known	Port of Longview (WA) 46°-06.435'N 122°-57.378'W	Collection - Prevent oil from moving down stream.	Low flow	3,000'	Deploy 1,000' lengths of boom from the Port of Longview to contain/collect oil under docks. May need tug to assist in deployment. This is a major natural collection site, and the last good chance to prevent oil from moving down stream. *Note - Longview Fibre has developed a number of additional strategies in this vicinity to address the unique hazards of a toluene spill; consult their response plan for more information.*	Port of Longview.	Vehicle access from Longview to the port docks. Boat access from the Ramp at Willow Grove Park or Rainier.	Downstream resources.
LCR-70.0	Field visit; date un-known	Cottonwood Island - east side slough (WA) 46°-04.915'N 122°-52.540'W	Exclusion - Keep oil out of slough.	Any flow	500'	Close off mouth to the slough on east side of Cottonwood Island.	Stage from the Willow Grove County Park or Kalama.	Boat access only. Use ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat.
LCR-71.4	No field visit/ test	Carrol's Channel south end (WA) 46°-03.510'N 122°-52.040'W	Exclusion - Keep oil out of small inlet at the south end of the channel (east side).	Any flow	1000'	Close off mouth of the small inlet at the south end of Carrol's Channel (on the east side).	Stage from the Willow Grove County Park or Kalama.	Boat access only. Use ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat.

4-38

August 2003

4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-71.5	New strategy 3/03	Carrol's Channel south end (WA) 46°-03.365'N 122°-52.333'W	Collection/ Exclusion - Natural collection area, prevent oil from moving up the channel.	Any flow	1200'	Deploy boom across the south end of Carrol's Channel to direct collected oil to the east shore, and to prevent oil from moving through Carrol's Channel. Current may be too strong to deploy boom across channel. If so, deploy as much boom as possible to divert oil to the east shore for collection.	Stage from the Willow Grove County Park or Kalama.	Vehicle access from east shore. Boat access from ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat.
LCR-71.6	New strategy 3/03	Carrol's Channel south end (WA) 46°-03.345'N 122°-52.540'W	Collection - Enhance natural collection into south end of Carrol's Channel.	Low flow	500'	Deploy boom from the south end of Cottonwood Island to enhance natural collection.	Stage from the Willow Grove County Park or Kalama.	Boat access only. Use ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat.
LCR-73.7	No field visit/ test	Goble Creek (OR) 46°-01.250'N 122°-52.522'W	Exclusion - Keep oil out of the creek.	Any flow	100'	Deploy boom across creek mouth.	Stage from the Willow Grove County Park or Kalama.	Possible vehicle access from Highway 30. Boat access from ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Salmonid concentrations and habitat (peak times are Sep-Oct, Apr-May).
LCR-76.0	No field visit/ test	Tide Creek (OR) 45°-59.660'N 122°-51.920'W	Exclusion - Keep oil out of the slough and creek.	Any flow	1000'	Deploy boom across small slough at the creek mouth.	Stage from the Willow Grove County Park or Kalama.	Boat access only. Use ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat, salmonid concentrations and habitat (peak times are Sep-Oct, Apr-May).
LCR-79.5	No field visit/test	Martin Island - north end (WA) 45°-57.375'N 122°-47.985'W	Exclusion - Keep oil out of Martin Slough.	Any flow	600'	Deploy boom across the north end of Martin Slough.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).

4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-79.8	New strategy 3/03	Goat Island - north end (OR) 45°-56.945'N 122°-49.168'W	Exclusion - Keep oil out of slough behind Goat Island.	Any flow	600'	Deploy boom across the north end of the slough behind Goat Island.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).
LCR-81.0	No field visit/test	Martin Island - south end (WA) 45°-56.065'N 122°-47.850'W	Exclusion - Keep oil out of Martin Slough.	Any flow	600'	Deploy boom across the south end of Martin Slough.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).
LCR-81.2	No field visit/test	Burke Island - south end (WA) 45°-55.863'N 122°-47.823'W	Exclusion - Keep oil out of Burke Slough.	Any flow	300'	Deploy boom across the south end of Burke Slough.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).
LCR-81.8	New strategy 3/03	Goat Island - south end (OR) 45°-55.518'N 122°-48.865'W	Exclusion - Keep oil out of slough behind Goat Island.	Any flow	500'	Deploy boom across the south end of the slough behind Goat Island.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).
LCR-82.4	No field visit/test	Deer Island Slough (OR) 45°-54.860'N 122°-48.965'W	Exclusion - Keep oil out of slough.	Any flow	300'	Deploy boom across the mouth of the slough on the south end. Ensure tide gates are closed at each end.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Creek; freshwater clams; wetland habitat.
LCR-85.7	No field visit/test	Goerig Slough - collection (WA) 45°-52.400'N 122°-46.725'W	Collection - Prevent oil from moving down stream.	Low flow	1000'	Deploy boom from the southeast corner of the islands off Goerig Slough to the mainland shore for collection with a skimmer or vac truck.	Stage from St. Helens.	Possible vehicle access from Dike Road. Boat access from ramp at St Helens.	Downstream resources.
LCR-85.8	No field visit/test	Goerig Slough - diversion (WA) 45°-52.200'N 122°-46.905'W	Diversion - Prevent oil from moving down stream.	Low flow	700'	Deploy boom at an angle from the southwest corner of the islands off Goerig Slough, up-stream into the main channel of the river to divert oil into the area behind the islands for collection.	Stage from St. Helens.	Boat access only. Use ramp at St Helens.	Downstream resources.

4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-87.3	New strategy 3/03	Gee Creek (WA) 45°-50.895'N 122°-46.560'W	Exclusion - Keep oil out of the creek and slough up-stream.	Any flow	100'	Deploy boom across the mouth of the creek. Will likely require a shallow-draft boat.	Stage from the Ridgefield Marina or St. Helens.	Boat access only. Use ramp at the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Wetlands habitat.
LCR-87.6	Field test 4/97	Ridgefield NWR/ Bachelor Island Slough - north entrance (WA) 45°-50.540'N 122°-46.685'W	Exclusion - Keep oil out of slough	Any flow	600'	Deploy boom across the down-river (north) end of Bachelor Island Slough. Note - oil may collect here naturally. Minimize disturbance of shoreline and back-beach areas. Use established roads only for vehicle access.	Stage from the Ridgefield Marina or St. Helens.	Boat access only. Use ramp at the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Waterfowl, sand hill crane wintering, great blue heron spring nesting, bald eagle nests, wetlands habitat. Sensitive shoreline and back-beach.
LCR-91.0	Field test 4/97	Ridgefield NWR/ Bachelor Island Slough - south entrance (WA) 45°-47.625'N 122°-46.385'W	Exclusion - Keep oil out of slough	Any flow	600'	Deploy boom across the up-river (south) end of Bachelor Island Slough. Note - oil may collect here naturally. *Contact the USFWS to have 3 input pumps shut off - pager, 360-971-6000.*	Stage from the Ridgefield Marina or St. Helens.	Boat access only. Use ramp at the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Waterfowl, sand hill crane wintering, great blue heron spring nesting, bald eagle nests, wetlands habitat. Sensitive shoreline and back-beach.
LCR-92.3	Field test 4/97	Campbell Lake (WA) 45°-46.972'N 122°-46.083'W	Exclusion - Keep oil out of the lake.	High flow	300'	Deploy boom across the entrance to Campbell Lake.	Stage from the Ridgefield Marina or St. Helens.	Boat access only. Use ramp at the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Sandhill crane roost area, waterfowl, wetlands habitat.

4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-94.3	Field visit 6/03	Post Office Lake (WA) 45°-45.275'N 122°-45.303'W	Exclusion - Keep oil out of slough adjacent to lake.	High flow	200'	Deploy boom in a chevron configuration to enclose the entrance to the culvert that connects the river to the lake. The culvert entrance on the river side is a grated concrete structure about 20-30 feet from shore that is nearly flush with the river bottom. *The entrance on the lake side has stop-logs, contact the USFWS at 360-971-6000 (pager) to have someone install the stop-logs.*	Stage from the boat ramp at Caterpillar Island, the Ridgefield Marina or St. Helens.	Vehicle access from the Lower River Road. Boat access from the ramp at Caperpillar Island, the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Waterfowl, wetlands habitat.
LCR-94.5	No field visit/test	Willow Bar Islands (OR) 45°-45.140'N 122°-46.060'W	Exclusion or Collection - Keep oil out of slough behind Willow Bar Islands or use for collection.	Any flow	800'	Deploy boom in a chevron configuration by placing one section from the north tip of the primary Willow Bar Island to the small island to the north, and then continuing northwest to Sauvie Island. If no waterfowl are present in the slough, deploy 600' of boom to divert oil into the north end of the slough for collection; deploy 200' of boom across the slough to prevent oil from moving into the south end of the slough.	Stage from the boat ramp at Caterpillar Island, the Ridgefield Marina or St. Helens.	Vehicle access from Brown Road on Sauvie Island. Boat access from the ramp at Caperpillar Island, the Ridgefield Marina or St Helens.	Wetland habitat.
LCR-97.5	Field test 11/97	Caterpillar Island - north end (WA) 45°-42.565'N 122°-45.555'W	Exclusion - Keep oil out of slough behind island.	High flow	500'	Deploy boom from the north tip of Caterpillar Island to the mainland shore.	Stage from the boat ramp at Caterpillar Island.	Boat access only from ramps at Caperpillar Island, Vancouver, or Portland.	Wetland habitat.

4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-98.6	Field test 11/97	Caterpillar Island - south end (WA) 45°-41.660'N 122°-45.815'W	Exclusion - Keep oil out of slough behind island.	High flow	500'	Deploy boom from the south tip of Caterpillar Island to the mainland shore.	Stage from the boat ramp at Caterpillar Island.	Boat access only from ramps at Caperpillar Island, Vancouver, or Portland.	Wetland habitat.
LCR-100.8	Field test 10/01	Vancouver Lake/ Flushing Channel (WA) 45°-39.947'N 122°-45.528'W	Deflection/ Collection - Deflect oil into Flushing Channel for collection.	Low flow	800'	Angle a 400' section SW into the river to deflect oil into a collection site in channel. Double boom channel with two 200' sections to protect Vancouver Lake. If necessary, valves can be closed at River Road to prevent oil from entering Vancouver Lake. This strategy is most effective with a south wind at slack water or when oil is moving along the north (east) shore. Sand bars at the mouth of the channel are dynamic and may require modification of the strategy.	Stage from Vancouver, Portland, or the parking area at the west end of the flushing channel.	Vehicle access from Lower River Road. Boat access from Vancouver or Portland.	Vancouver Lake; down river resources.
LCR-108.4	Field visit 9/94	Marine Park Boat Ramp - upriver from Ryan Point (WA) 45°-36.747'N 122°-38.022'W	Collection - Collect oil in small cove.	Low flow	500'	Angle boom off boat ramp into river; divert oil to collection site.	Stage from Vancouver, Portland, or the boat ramp parking area.	Marine Park Boat Ramp access via Marine Parkway; good command post area.	Down river resources.
LCR-109.6	Field visit 9/94	Wintler Park (WA) 45°-36.667'N 122°-36.652'W	Collection - Divert oil to collection sites.	Low flow	500'	Angle boom upstream, off point just down river of Wintler Park (note - may not need full 500').	Stage from Vancouver, Portland, or the boat ramp parking area.	Boat access from the ramp near Lieser Point. Vehicle access off of Highway 14.	Resources down river (may be osprey nests in the area).

Figure 6.11. Clean Rivers Co-op Boom Site List

Environmental Resources	Columbia River Mile	Pre-staged Boom Available at	Boom Function and Estimated Length Required (feet)
Columbia Slough	0.9 (Willamette River)	RES Portland	400' deflection & 500' containment
Multnomah Channel	3.0 (Willamette River)	RES Portland	3,000' deflection & containment
Vancouver Lake Channel	101	RES Portland	400' containment
Hathaway Lake Entrance	92.3	St. Helens	300' protection
Bachelor Island Slough	91.5 & 87.6	St. Helens	1,200' deflection & containment
West Side of Lewis River	84.0 – 87.0	St. Helens	800' containment, 1,300' protection
Deer Island Slough	82.4	St. Helens	300' containment
Burke Island/Martin Island	81.0 – 81.3	St. Helens	1,600' deflection & containment
Kalama River	73.0	Rainier	500' protection
Carroll's Channel	71.5	Rainier	400' deflection & 800' containment
Longview Dock	67.5	Rainier	3,000' containment
Slaughters Dike Entrance	66.0	Rainier	400' containment
Cottonwood Island	70.0 – 72.0	Rainier	400' containment
Brix Marina	67.8	Rainier	800' protection
Fisher Island	60.4 – 60.0	Stella	800' deflection
Coal Creek, East	57.0	Stella	1,000' containment
Coal Creek, West	57.0	Stella	600' containment
Crims Island	57.0	Stella	1,200' deflection & 1,700' containment
Wallace Island	50.0	Stella	1,000' containment & protection
Cathlamet Channel	47.0	Cathlamet	2,000' deflection & 3,000' containment
Elochman Slough	37.0	Skamokawa	200' containment
Westport Slough	43.3	Wauna	1,000' deflection & containment
Wauna Channel	42.0	Wauna	1,000' containment
Puget Island	46.0	Wauna	1,600' containment
Steamboat Slough	35.0	Skamokawa	600' deflection & 600'containment
Brooks Slough	33.0	Skamokawa	300' containment
Skamokawa Marine	33.0	Skamokawa	1,000' containment
Big Creek Entrance	28.0	Tongue Point	200' containment
Karlson Island	27.0	Tongue Point	200' containment
Miller Sands Lagoon	24.0	Tongue Point	2,000 containment
Crooked Creek	23.0	Tongue Point	100' containment
Grays River	22.5	Tongue Point	1,000; protection
Deep River	21.0	Tongue Point	500' containment
Brix Bay Marsh	20.0	Tongue Point	500' containment
Portuguese Pt. Marsh	19.0	Tongue Point	3,00' containment
John Day River Entrance	18.0	Tongue Point	600' containment

Environmental Resources	Columbia River Mile	Pre-staged Boom Available at	Boom Function and Estimated Length Required (feet)
Clifton Channel	36.0	Astoria	2,000' deflection & 3,00'containment
West Basin Seal Haulout	15.0	Astoria	1,200' protection
West Basin Marina	13.0	Astoria	200' protection
Lewis & Clark River	13.0	Astoria	1,000' containment
Skipanon Waterway	11.0	Astoria	600' containment
Tansy Point	10.0	Astoria	600' deflection
Hammond Marina	8.0	Astoria	600' containment
Swash Lake Entrance	7.0	Astoria	600' containment
Youngs River	7.0	Astoria	700' containment
Ilwaco Marina	3.0	Astoria	400' containment, 4,100' sorbent & 1,000' deflection

Figure 6.12. Climatic Information Lower Columbia River Region

Parameter	Unit	Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr
Temp[1]	°F	Mean Daily Max	44	50	55	60	67	73	80	79	74	64	52	46	62
	°F	Mean Daily Min	34	36	37	41	46	52	56	56	51	45	39	35	44
Visibility[1]	Mean Number of Days	Heavy Fog Visibility ($^1/_2$ mile or less)	4.2	3.7	2.3	1.1	0.1	0.1	0.1	0.2	2.8	7.6	6.1	4.9	33.2
Precipitation[1]	Inches	Mean	6.16	3.93	3.61	2.31	2.08	1.47	0.46	1.13	1.61	3.05	5.17	6.41	37.39
Wind[1]	MPH	Mean Speed	9.9	9.1	8.3	7.3	7.1	7.2	7.6	7.1	6.5	6.5	8.6	9.5	7.9
		Prevailing Direction	ESE	ESE	ESE	NW	NW	NW	NE	NW	NW	ESE	ESE	ESE	ESE
Daylight[2]	Average Time	Sunrise	07:50	07:15	06:25	06:25	05:39	05:20	05:35	06:11	06:49	07:28	07:12	07:47	
		Sunset	16:53	17:38	18:17	19:59	20:37	21:04	20:59	20:21	19:23	18:26	16:40	16:26	
Current[3]	Average	Speed (kt)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.9
		Direction	343°E	343°E	343°E	343°E	343°E	343°E	343°E	343°E	343°E	343°E	343°E	343°E	343°E

1 – Source:1990 Local Climatological Data Annual Summary with Comparative Data, National Oceanic and Atmospheric Administration
2 – Source: Tide and Current Prediction Software, 1994, Micronautics.
3 – Average current speed measured at Kalama, WA 1994.

7. Vancouver Sustained Response Actions

7.1 Response Resources

7.1.1 Firefighting Equipment

Firefighting equipment is installed and maintained throughout the Facility to allow control of fires should they occur. Fire suppression equipment and systems are designed to National Fire Protection Association and API requirements, the more stringent Factory Mutual Global insurance requirements, and state and local regulations, and include automatic and engineered controls. Buildings are fireproofed, and emergency egress is provided in accordance with applicable fire and building codes. All fire suppression systems are designed to activate automatically and will be equipped with manual trip stations. The design of fire suppression systems for specific proposed project elements is discussed below.

Area 200 – Unloading and Office. The railcar unloading area is served with single interlock, pre-action 3 percent foam/water sprinkler systems designed to activate, as necessary, in five segments of the building. Design density is 0.30 gallon per minute/4,000 square feet with a hose allowance of 500 gallons per minute. The system includes linear heat detectors, gas detectors, temperature monitors, pump monitors, automatic exterior alarm horns and strobes, manual alarm stations, automatic and manual foam release systems, and tamper-resistant systems. Fire hydrants are located along the south side of the building at 300-foot intervals. All systems interface with the railcar unloading building control room.

The office and support buildings are equipped with extinguishers.

Area 300 – Storage. The storage tank area is served by six foam water sprinkler zones, one per storage tank. Each foam water sprinkler zone is designed to discharge into the inside of the storage tank it protects. The system includes linear heat detectors and warning horns and strobes, as well as manual alarm and foam release stations. A fire water loop is provided with hydrants and monitors spaced at a maximum of 300 feet and configured so that each tank can be reached by two hose streams. Each tank is protected by a fixed 3 percent foam/water suppression system on the seal area surface. All systems interface with the tank area control room. The storage building in Area 300 is served by adjacent hydrants. Smoke detectors, automatic and manual alarms, and hand held fire extinguishers are located as appropriate inside and outside the boiler building as required by local fire code. Based on the construction type and occupancy classification, sprinkler systems are not necessary for fire control in the east boiler building.

Area 400 – Marine Terminal. Two elevated fire monitors are installed at the marine loading dock, with hydrants connected to the existing on-site water supply. This system is primarily for fires on the berth, but can be used to assist in the event of a vessel fire.

The vessels berthing at the Marine Terminal are required to have onboard systems, as well as contracts with commercial marine firefighting companies, to respond in the event of a shipboard fire. Vessels will also have access to fire water from the dock via an international shore connection.

Area 500 – Transfer Pipelines. The pipeline area is served by existing and new (as constructed to serve specific Facility areas) hydrants in the vicinity of the pipeline alignment.

Area 600 – West Boiler. The boiler building and area is served by adjacent hydrants. Smoke detectors, automatic and manual alarms, and hand held fire extinguishers are located as appropriate inside and outside the boiler building as required by local fire code. Based on the construction type and occupancy classification, sprinkler systems are not necessary for fire control in the Area 600 boiler building.

Rail Infrastructure. The location of rail infrastructure improvements is served by existing and new (as constructed to serve specific Facility areas) hydrants in the vicinity of the rail loop alignment.

7.1.2 Facility Response Equipment

The Facility and Company maintain an inventory of equipment, which will be immediately available for a spill response. Contracted oil spill response equipment can also be made available almost immediately. A list of equipment at the facility is provided in **Figure 7.1**. A summary of equipment availability is provided in **Figure 7.3**.

On-site response equipment is inspected on a monthly basis by Facility/Company employees. The operability of this equipment is confirmed at least annually through testing and drills (see **Section 7.2**). Any inventory discrepancy or inoperable equipment is replaced or repaired when detected. Facility/Company-owned response equipment is maintained according to manufacturer specifications. The inspection checklist and maintenance schedule can be found in the Facility office. Facility/Company operations is responsible for retaining information on the operational status of all equipment for a minimum of five years and is responsible for ensuring that the following response equipment and testing procedures are implemented.

- **Containment Boom.** During semi-annual boom deployment exercises, boom will be inspected for signs of wear or structural deficiencies. If tears in the fabric or rotting are observed, the boom will be repaired or replaced.

In addition, end connectors will be inspected for evidence of corrosion. If severe corrosion is detected, equipment will be repaired or replaced.

- **Response Boats.** Primary response boats are deployed at least bimonthly. If any mechanical problems are detected, they will be repaired in a timely manner.
- **Miscellaneous Equipment.** Other response equipment identified in this OSCP will be inventoried and inspected to ensure that the stated quantities are in inventory and in proper working order. The equipment inspection and deployment exercises are recorded in a Response Equipment Log and maintained by the Terminal Manager. A blank form is provided in **Appendix A**.

Deployment of Facility equipment listed in **Figure 7.1** will begin almost immediately upon discovery of a spill while making all considerations for response personnel safety (i.e., inclement weather and water conditions). Equipment deployment guidelines and time frames are illustrated in **Appendix D**.

Figure 7.1. On-Site Oil Spill Response Equipment

Type	QTY	Date Purchased	Location	Operational Status	Equipment Design
CONTAINMENT					
Harbor Boom	TBD	TBD	Marine Terminal	In Operation	TBD
Containment Boom	TBD	TBD	Marine Terminal	In Operation	TBD
Sorbent Boom	TBD	TBD	Marine Terminal	In Operation	TBD
RECOVERY					
Sorbent pads	# bundles TBD	TBD	Marine Terminal	In Operation	TBD
Skimmers	TBD	TBD	Marine Terminal	TBD	TBD
ANCHORS					
Anchor systems	TBD		Marine Terminal	In Operation	N/A
Tow bridals	TBD	TBD	Marine Terminal	In Operation	N/A
TRANSPORTATION					
Aluminum Boat	TBD	TBD	Marine Terminal	In Operation	TBD
FIREFIGHTING					
Fire Foam System	TBD	TBD	Marine Terminal	In Operation	TBD
Fire Foam System	TBD	TBD	Storage Area	In Operation	TBD
Fire Foam System	TBD	TBD	Rail Unloading Area	In Operation	TBD
Fire extinguishers	TBD	TBD	Various	In Operation	20 lbs
COMMUNICATIONS					
Handheld radios	TBD	TBD	Office	In Operation	TBD
Radios	TBD	TBD	Office	In Operation - compatible with Clean Rivers Radio System	TBD
MISCELLANEOUS					
Rain gear	# Sets TBD	Unknown	Various	In Operation	N/A
Gloves	# Sets TBD	Unknown	Various	In Operation	N/A
Boots	# Sets TBD	Unknown	Various	In Operation	N/A

NOTE: Boom containment area will depend upon boom configuration, weather, tide and current conditions. Absorption capacity of sorbent boom and pads will vary depending upon recovery conditions, application, weather, etc. Facility/Company uses sorbents from several different manufacturers. Absorption capacities can be located in the International Spill Response Equipment Catalog.

7.1.3 Contractor Equipment and Manpower

Facility/Company's primary response contractors and telephone numbers for the Facility are noted in **Section 3**. Facility and Company have ensured by contract the availability of private personnel and equipment necessary to respond, to the maximum extent practicable, to the worst case discharge or the substantial threat of such discharge.

Section 3 also contains a list of additional contractors in the area who provide equipment and services that may be needed during a spill response operation. **Appendix B** describes equipment owned by these contractors. Where available, the response equipment lists contain the following equipment categories.

- Skimmer/pumps
- Boom
- Sorbents
- Tools and miscellaneous equipment
- Communication equipment
- Firefighting equipment and PPE
- Other heavy equipment and boats
- Chemicals stored and dispersant dispensing equipment

Where applicable and available, the following parameters are provided for response equipment.

- Skimmer/Pumps
- Operational Status
- Type, Model, and Year
- Number
- Capacity
- Daily Recovery Rate
- Storage Location

Evidence of Contracts with these response contractors are located in **Appendix B**.

Contractor's general roles and responsibilities are as follows.

- Providing booms, skimmers, temporary storage tanks, vacuum trucks, construction equipment, and other equipment necessary for containment and recovery of an oil spill.
- Providing trained personnel to operate the aforementioned equipment, and supervising response personnel.
- Interfacing with company Field Supervisors to implement tactical orders relating to the spill response.
- Providing appropriate safety equipment and ensuring personnel are operating according to the Company's safety guidelines and applicable federal, state, and local regulations.
- Providing transportation for necessary contractor personnel and equipment.

7.1.4 Marine Spill Response Corporation

Company is a member of MSRC, a "W3" category oil spill response organization. MSRC is a mutual benefit corporation with regional response centers and various propositioned equipment sites. MSRC is the Company's primary response contractor for containment and cleanup equipment and personnel. As an Ecology-approved PRC, CRC and MSRC have the equipment and resources available to meet the (most stringent) planning standard for WAC 173-182-420 Vancouver. Evidence of membership will be provided in **Appendix B**.

The planning standard webpage may be found at: http://www.ecy.wa.gov/programs/spills/preparedness/PlanningStandards/planningstandards.html.

The planning standard spreadsheet is include as **Figure 7.4.**

In order to build a more effective oil spill response system with greater accountability, MSRC and the Marine Fire and Safety Association (MFSA) have divided the Columbia River System into three geographic coverage zones.

- Astoria Zone - 3 miles across and beyond the Columbia River mouth to RM 90
- Longview Zone - Columbia RM 18 to RM 90
- Portland Zone - Columbia RM 80 to RM 120 and the Willamette River from its mouth

7.1.5 Clean Rivers Cooperative

Company is a member of CRC, a “W3” category Oil Spill Response Organization, and an approved primary response contractor with the state of Washington. CRC has a 2-hour response time to the Facility. Equipment list, contact information, and letter of intent to respond can be found in **Figure 7.2** and in **Appendix B**.

7.1.6 NRC Environmental Services

NRC Environmental Services (NRCES) is one of the primary response action contractors for members of CRC and MFSA. NRCES is an approved spill response contractor with the state of Washington.

The Company, as a member of CRC, will be able to use NRCES for response to spills from the Facility. Call out of NRCES will normally be conducted via CRC. Contracts and current inventories of CRC and NRCES spill response equipment and 24-hour contact information is provided in **Appendix B**.

Equipment and personnel maintained by NRCES may be used by CRC or MFSA members for response to spills from member vessels or facilities.

CRC and MFSA have awarded contracts to NRCES for the Portland, Astoria, and Longview coverage zones.

7.1.7 Other Resources

The USCG and the U.S. Navy also have stockpiles of equipment available to the private sector. The Facility and Company do not maintain contracts with these entities; however, these resources may be contracted if private contractor stockpiles are exhausted. The USCG stores material in Mobile, Alabama; Fort Dix, New Jersey; and Hamilton Field, California, while the Navy maintains equipment in Stockton, California, and Williamsburg, Virginia. The Navy also has salvage equipment. Requests for federal equipment can be expedited when made through USCG’s OSC.

7.1.8 Oil Spill Response Equipment

For the purposes of a worst-case spill scenario, the Facility's largest tank has a capacity of 380,000 barrels of crude oil. [1] Pursuant to the Vancouver Planning Standard, WAC 173-182-420, the Company must have oil spill response capability, including boom, oil recovery systems, and storage capacity, available to meet the following milestones.

- 2 hours 1,000 feet of boom
- 3 hours 2,000 feet of boom
- 6 hours 6,000 feet of additional boom
  - 12,000 barrels per day derated recovery capacity
  - 1 x Effective daily recovery capacity (12,000 barrels storage)
- 12 hours 20,000 feet of additional boom
  - 36,000 barrels per day derated recovery capacity
  - 1.5 x Effective daily recovery capacity (54,000 barrels storage)
- 24 hours 20,000 feet of additional boom
  - 48,000 barrels per day derated recovery capacity
  - 2 x Effective daily recovery capacity (96,000 barrels storage)
- 48 hours Additional boom as necessary
  - 60,000 barrels per day derated recovery capacity
  - Additional storage as necessary

The largest vessel for the Facility is 899 feet long. Therefore, the terminal must have the capability to initiate the deployment of four times the largest vessel (4 x 900 = 326,800 feet) or 2,000 feet of boom, whichever is less, within 3 hours. Facility has 3,000 feet (verify; see **Figure 7.2**) of containment boom and a boat stored at the vessel dock, which can be deployed by the Facility Operators within the mandated time frame.

As summarized in **Figure 7.2**, the availability of additional response equipment exceeds the requirements of WAC 173-182-420, the EPA and USCG.

Section 6, Appendices D and F, or the Northwest Area Committee GRP, may be consulted as planning guidelines for meeting these requirements. If the vessels identified in the OSCP are unavailable for response in which a substantial change in the ability to respond may be impacted, the Facility/Company will notify Ecology.

See **Appendix D** for Response Planning Standards calculation based on USCG, EPA, and Ecology criteria. Also see **Figure 7.4**.

Maintenance and inspection requirements for the response equipment is described in **Appendix G**.

[1] The shell capacity of approximately 380,000 barrels each; however, the maximum amount of product stored in each tank will be approximately 360,000 barrels, to take into account the presence of the internal floating roof and the additional headspace required to allow product movement in the event of seismic conditions.

Figure 7.2. Equipment Availability Summary

Response Goal	Equipment	Equipment Location	Derated Skimmer Capacity	Feet of Boom	Accumulated Derated Skimmers	Accumulated Boom	Accumulated Interim Storage Capacity
1 hr Response	18' Response Vessel 8" X 12" Kepner Sea Boom 20" Boom	Tesoro Dock, Vancouver		3,000 ft		3,000 feet	
2 hr Response	Fast Response Vessel with Skimming system and storage capacity 2 X 5,000 bbl Barge	C.R.C., Portland C.R.C., Portland	275 bbls/day	1,000 ft	275 bbls/day	5,600 feet	10,000 bbls
6 hr Response	Co-op Skimmers 8" X 12" Harbor Boom 14 X 500 bbl Storage Tanks 2 "X 100 bbl Barge	C.R.C., Portland C.R.C., Portland C.R.C., Portland	26,380 bbls/day	6,300 ft	26,380 bbls/day	11,900 feet	17,200 bbls
12 hr Response	Co-op Skimmers 8" X 12" Harbor Boom 8" X 12" Harbor Boom 8" X 12" Harbor Boom 8" X 12" Harbor Boom 2" X 100 bbl Barge	C.R.C., Longview C.R.C., St. Helens C.R.C., Longview C.R.C., Beaver C.R.C., Cathlamet C.R.C., Longview	11,047 bbls/day	4,500 ft 6,300 ft 6,300 ft 4,200 ft	37.427 bbls/day	33,200 feet	17,400 bbls
24 hr Response	Co-op Skimmers Co-op Skimmers 8" X 12" Harbor Boom 8" X 12" Harbor Boom 8" X 12" Harbor Boom 8" X 12" Harbor Boom 8" X 12" Harbor Boom 12" X 18" Ocean Boom Storage Tank (120,000 bbls)	C.R.C., Cathlamet C.R.C., Astoria C.R.C., Cathlamet C.R.C., Wauna C.R.C., Skamokawa C.R.C., Tongue Point C.R.C., Astoria C.R.C., Tonque Point Portland (POP)	275 bbls/day 13,599 bbls/day	1,000 ft 3,600 ft 2,500 ft 4,100 ft 7,700 ft 2,000 ft	58,127 bbls/day	54,100 feet	137,400 bbls
48 hr Response	MSRC Oregon Responder MSRC Barge 404	Astoria, Oregon	10,560 bbls/day	MA	68,687 bbls/day	54,100 feet	137,400 bbls

7.1.9 Non-Dedicated Workboats and Operators

The facility has contracted with MSRC to provide spill response support with non-dedicated workboats and operators to deploy GRPs, enhance skimming operations, and provide logistical support during a spill. Documentation of this contractual relationship is contained in **Appendix B**.

7.1.10 Communications Equipment

Initial Spill Communications

The Facility Manager is responsible for initially setting up communications and issuing radios during a spill response. Communications with Ecology, the EPA, and USCG will be initiated and maintained by telephone. The following telephones connections are available at the Facility:

Telephone	**TBD**	**Fax**	**TBD**
Telephone	**TBD**	**Cellular**	**TBD**
Telephone	**TBD**		

Terminal Communications Equipment

The Facility maintains nine portable radios. They are stored in the terminal office and are used in daily operations at the terminal.

- 6 each Motorola hand-held FM radios
- 3 each Motorola MT 2000 hand-held VHF radios – one truck mounted (compatible with CRC Communication System)

Field Spill Communication Systems

Communications between field operations and the command post will primarily use compatible portable radio systems that have been purchased by CRC members and the CRC response vessels. CRC also maintains an inventory of radios available to members.

Several members have equipped their boats with marine radios that can communicate with hand-held radios using Working Channel 81 (157.1000). CRC has response vehicles and boats in the Portland area equipped with VHF-FM transceivers capable of operating on several frequencies. CRC and MFSA pre-assigned radio frequencies are on file at the Terminal and are available through CRC.

The MFSA and CRC radio system is believed to have an adequate range to fully support the early phases of spill response. Through MFSA, CRC has access to four radio repeaters for extended spill communications coverage.

The Facility and Company may supplement the radio communications system through the use of cellular telephones purchased within 24 hours of initiation of the spill response.

7.2 Site Security Measures

Site security and control is necessary to provide safeguards needed to

- Protect personnel and property from loss or damage.
- Ensure that the general public does not interfere with the spill cleanup operation.
- Ensure adequate access for personnel and equipment to the access/staging areas and command centers.

Guidelines for site security during an oil spill are listed below.

Security personnel should be prepared to

- Establish a perimeter (zone of safety) around the spill.

- Establish a system for controlled access to the spill site (within the safety zone) for key spill response personnel and equipment.
- Establish a relationship with the general public, to
  - Ensure that public safety is a priority.
  - Eliminate potential interference to spill cleanup operations.
  - Ensure that all response equipment is safeguarded.
  - Develop a site security plan.

An effective spill site security operation should include a coordinated effort with local and state law enforcement agencies, as well as the USCG (dependent on the size and location of the spill).

The USCG may assist in security efforts by controlling water traffic in the spill zone, and by acting as a liaison with the Federal Aviation Administration to restrict air space over the safety zone. It may be necessary to restrict air traffic over the spill zone due to air traffic from aerial spill site surveillance, response, and news-media coverage. Rescue activities will be undertaken by qualified local police, fire, ambulance and rescue crews as dispatched through 911 emergency.

Request assistance from the Port or local law enforcement agencies, or in the event that traffic control is required, contact the Washington Highway Patrol to

- Set up roadblocks and/or beach closures where necessary to secure the safety zone.
- Provide access for spill cleanup equipment and personnel.

Consider the following spill site security measures

- Use barricades to establish a spill-site safety zone.
- Contract for additional security personnel or utilize local law enforcement agencies.
- Establish a pass system and distribute pre-prepared security passes to all spill-related personnel.
- Maintain a liaison with local and state police, as well as the EPA.
- Maintain a log that documents all security-related incidents and observations made at the spill site.

In addition, maintain strict control of all personnel and vehicular traffic entering the spill site by

- Positioning security personnel to effectively control non-responder access to the spill site.
- Barricading lesser traveled points with appropriate warnings against entry.
- Establishing periodic and regular checks at barricaded points to verify that site security is not compromised.
- Procuring additional security personnel when needed.

The Facility Manager is initially responsible for overseeing security matters, handling the media, and answering outside calls until the arrival of the Security Officer and Public Affairs Officer.

Security services would need to be provided at the following locations.

- Terminal
- Dock
- Spill site
- Field operations sites
- Command post(s)
- Staging areas
- Warehouses

When an emergency occurs at the Facility, all roads should be cleared and traffic carefully regulated and monitored to

- ensure that emergency crew vehicles have clear access to all critical areas;
- prevent unauthorized and excessive traffic at the facility; and
- direct personnel and resources to the desired locations.

Frequent communication between security and management enhances the effectiveness of on-site security efforts.

There is adequate facility lighting to conduct all necessary operations on a 24-hour basis. Facility operations are described in **Appendix C**.

Site security and control during an oil spill incident at the Facility is the responsibility of the Security Officer. Guidelines for monitoring site security and control are included in the job description for the Security Officer located in **Figure 4.4**.

7.3 Alternative Response Strategies

Non-mechanical methods for cleanup operations could involve bioremediation and natural recovery. Through contractual arrangement with MSRC, the Company's PRC, the Company has access to dedicated aircraft, vessels, associated equipment, and resources to meet the applicable planning standards provided in WAC 173-182-325and 173-182-330.

7.3.1 Dispersants

The Facility is located in an area that is not under pre-approval for dispersant use and Company does not intend to use dispersants unless directed by the Unified Command.

7.3.2 In-situ Burning

The Facility is located in an area that is not under pre-approval for in-situ burning and Company does not intend to use in-situ burning unless directed by the Unified Command.

7.3.3 Storage

The Facility's contract with MSRC includes provisions for meeting the requirements for storage under WAC 172-183-335, such as on water and shoreside storage facilities, and portable shoreside storage facilities. This contractual commitment in provided in **Appendix B**.

7.3.4 Group 5 Oils

The Facility does not handle Group 5 oils.

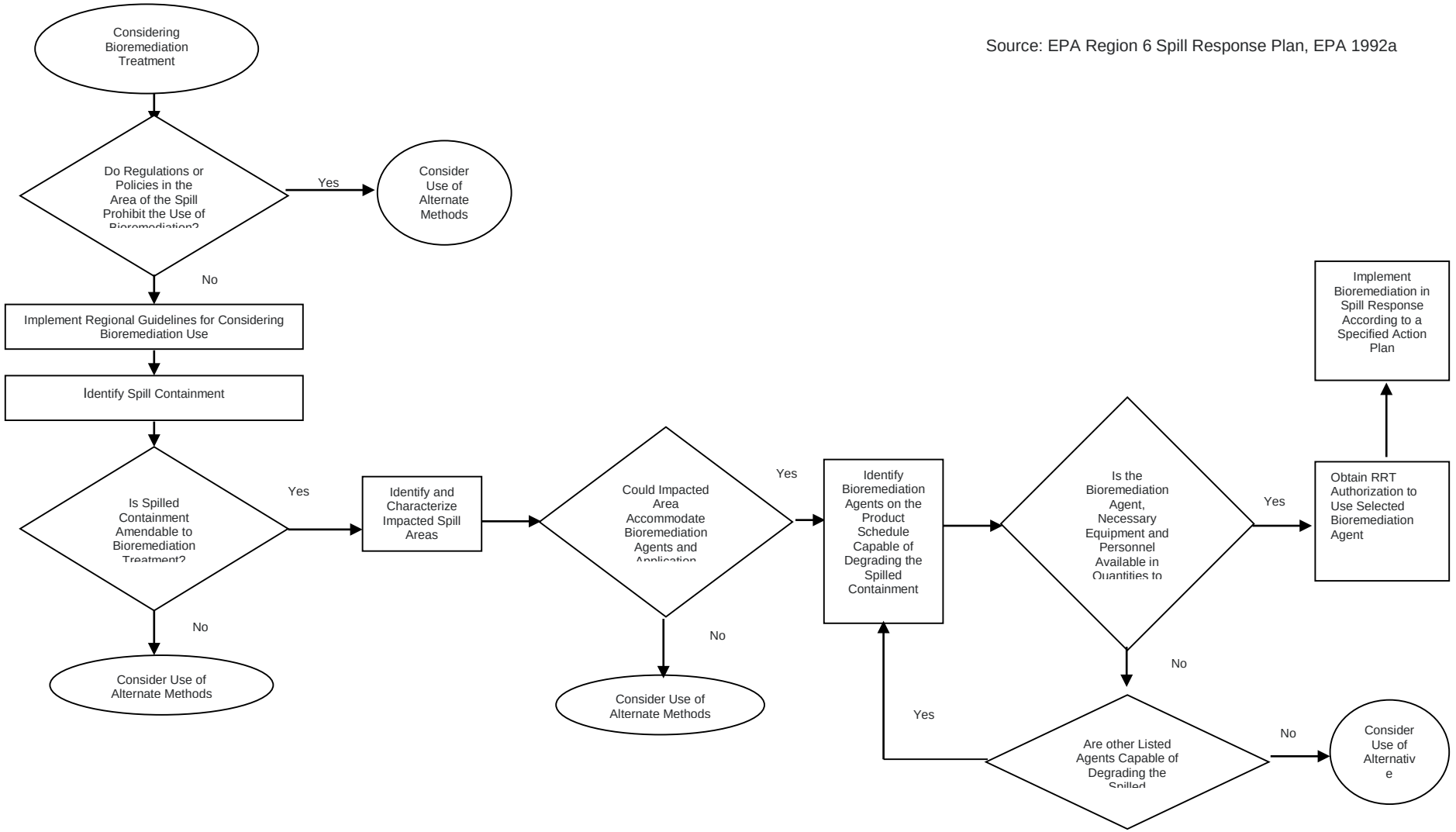
7.3.5 Bioremediation

Bioremediation is the process of stimulating the growth and activity of microorganisms, such as bacteria and fungi, which naturally feed on hydrocarbons. Bioremediation is conducted as a means of accelerating the natural biodegradation rates of stranded or floating oil. Biodegradation is a natural process by which the above microorganism, in the presence of nutrients an oxygen, chemically breakdown hydrocarbons and other substances and produce by-products including carbon dioxide, water, biomass, and partially oxidized products.

Biodegradation, together with physical processes such as evaporation and dispersion, are the primary natural mechanisms for the removal of hydrocarbons (oil spills) from the environment. This process generally occurs at a very low rate but can often be enhanced by the application of nutrients, such as nitrogen, phosphorus, and potassium.

Bioremediation may be a viable response option and should be considered for use where standard recovery or cleanup techniques are not practical or will result in additional environmental impact. **Figure 7.3** provides a federal decision guide for bioremediation consideration. A Bioremediation Checklist is provided in **Section 5.4**.

Figure 7.3. Decision Guide for the Federal Bioremediation Approval Process



Source: EPA Region 6 Spill Response Plan, EPA 1992a

7.4 Decontamination

One or more decontamination areas would be set up during response operations. These areas are to be used only for decontamination at the work site; they are not to be used as a substitute for personal hygiene at home.

Decontamination areas are designed to protect the worker's health and to prevent the spread of contamination into "clean" areas. In the field, it is not possible for a worker to remove all contaminated clothes each time they take a break from work. It is essential, however, that a worker clean hands and face to avoid ingesting oil or spreading oil to otherwise protected body parts. In the field, a worker will be provided with

- Soap, water, paper towels, waterless hand cleaner, and/or other materials for washing their hands and face,
- An impermeable surface to sit on,
- Refuse containers, and
- An eyewash station.

Particular attention should be paid to personal hygiene prior to eating, drinking, or smoking.

At the end of a daily shift, the worker will be required to go through full decontamination. Normally, the worker will report to a "dirty" zone where they will remove all soiled protective clothing. The worker should do this carefully to avoid contaminating clean clothing. Next, the worker will move to the "transition" zone where they will remove their work clothes and clean themselves to remove all traces of oil. Finally, the worker will proceed to the "clean" zone to put on clean clothing and leave for home. If work clothes are contaminated, they should be left at the site for cleaning. If they cannot be properly cleaned; they will be disposed of. Therefore, it is important that the worker bring an extra set of clean work clothes to the site. The worker should not wear clothes that will be missed if they cannot be cleaned.

Decontamination facilities should be positioned prior to employee/contractor entrance to areas where potential for exposure to contamination exists. A separate emergency decontamination area should be established to allow for decontamination of personnel requiring lifesaving medical attention. The appropriate material safety data sheets should be stored in this area at all times to aid health professionals treating the injured parties.

Decontamination facilities should be designed to prevent further contamination of the environment and should have a temporary storage area for items that will be reused in the contaminated area.

7.5 Oil Handling, Storage, and Disposal

Strict rules designed to ensure safe and secure handling of waste materials govern the Company's waste disposal activities. To ensure proper disposal of recovered oil and oiled debris, the following guidelines should be followed.

- In the event of a spill at the Facility, CRC will respond within 2 hours to begin on-water recovery operations.
- It is recognized that both shoreside and on-water storage capability is necessary. Immediate on-water storage will include a 10,000-barrel Tidewater barge adjacent to the Facility. Several 100-barrel SWBs and 8,000 gallons of bladder storage from CRC. MSRC can provide over 40,000 barrels of floating storage. For shoreside storage, the terminal capacities will vary and dedicated CRC member storage will be used as available.

The Facility/Company will use only licensed transporters and approved (or permitted) treatment and disposal facilities for waste handling and disposition, unless otherwise directed by Ecology.

Permanent disposal of oil recovered and oily waste generated during response and cleanup operations will be conducted in accordance to guidelines provided in the Northwest ACP, Washington State Disposal Guidance, Section 9620.

Incident specific disposal plans will be developed in accordance with the Northwest ACP, Washington State Disposal Guidance, Section 9620 and follow the "Sample Disposal Plan" format provided in **Section 5.6**.

The Disposal/Waste Management Specialist will coordinate activities and obtain necessary permits to ensure proper disposal or recycling of recovered product and debris. Key issues to be addressed during a spill to ensure proper handling and effective disposal of recovered product and debris are included as checklist items in the Disposal/Waste Management Specialist checklist.

Recovered oil and oily wastes will be accounted for within the first 24 hours of the spill. Management and quantification will be accomplished by adhering to the Recovered Oil and Water Management Plan found in **Section 5.7** and the Recovered Oil Quantification Plan in **Section 5.8**.

Upon request, waste recovery and disposal records will be made available to Ecology.

A spill from the Facility could involve crude oil. For a spill on land, it is anticipated that crude oil would be recoverable. Recovered crude oil would either be returned to tanks at the Facility or stored in bulk tank trucks, railcars, or vessels until the crude oil can be recycled. Waste materials associated with a spill on land will include contaminated absorbent materials, PPE, and soil.

For a spill on water, it is anticipated that crude oil and significant amounts of contaminated water will be recovered.

The largest crude oil tank at the terminal may contain up to 360,000 barrels of product. For planning purposes, it will be assumed that 100 percent of this tank spills into the Columbia River.

For planning purposes, it will further be assumed that 10 percent, or approximately 36,000 barrels of crude, is actually recovered along with an additional 78,000 barrels of contaminated water. Ten percent recovery was chosen based on typical spill recovery data. The remaining crude oil will evaporate or disperse into the river.

The amount of contaminated sorbents and personal protective equipment that will be generated is unknown, but will be significant. For planning purposes, an estimated 1,000 cubic yards of contaminated solid debris may be generated. Contamination of shoreline materials will also occur, but it is likely that these materials will be treated or cleaned in place.

7.5.1 Model Disposal Plan

The Northwest ACP establishes oily waste disposal guidelines. The Company will work closely with Ecology to develop a plan for the disposal of oily waste. Recovered oil and oily debris will be recycled and reused to the extent feasible to reduce the amount of oily waste that must be incinerated or taken to landfill.

A "Model Disposal Plan for Oil Spills in Washington State" was included in the Northwest ACP. That model has been modified and adopted by the Company. The waste disposal plan is included in **Section 5.6**. This model plan can be used to speed the waste disposal approval procedure during a spill response.

7.5.2 Recovered Oil and Water Storage

CRC has a limited amount of storage available for their initial oil spill response. Additional temporary storage capacity of approximately 150,000 barrels has been identified by CRC for its member companies. **Appendix B** contains a summary of CRC's storage resources.

The Facility/Company will seek to supplement storage capacity (if necessary) with available oil barges, tank trucks, railcars, and tankage from the Facility. Oil barges are frequently the most readily available

asset for storage of recovered liquids. NRCES has access to five 10,000- to 12,000-barrel oil barges routinely in service on the Columbia River. Facility/Company will seek these and any other barges that may be available at the time of the spill to contain recovered liquids. Recovered oil and water will be trucked to the Facility or the liquid oil recycling facilities identified in the Northwest ACP for separation and recycling. Excluding the largest tank volume, the Facility has a storage capacity of 1,850,000 barrels.

7.5.3 Contaminated Solids Storage Area

Tesoro has a truck turnaround area that could be used as a short-term contaminated solids storage area. This land is cleared and level. A series of temporary solid waste holding sites could be constructed by laying 4- to 6-inch-thick sand pads, 10 feet wide and 100 feet long, and surrounding them with 2-foot-high berms. Two layers of seamless visqueen, each a minimum of 6 mils thick could be placed on top of the sand pads and covered with an additional layer of 4 to 6 inches of sand to protect the visqueen from damage. Each of these units could contain 300 to 500 cubic yards of oily debris. Once a pad was filled with oily debris it could be covered with another layer of visqueen to keep rain from flooding the storage area.

Facility/Company will seek approval for the construction of these temporary oily debris storage sites from Ecology, the EPA, and the Port, as required.

7.5.4 Temporary Storage and Ultimate Disposal of Contaminated Debris

Contaminated debris will consist primarily of oiled absorbents and used PPE. It will be segregated into oily and non-oily debris, then placed into plastic bags for storage. Once the bags are filled, they will be transported by truck to the Facility or other approved location for temporary storage.

The oily solids will be sampled and tested to determine if they are hazardous as determined by provisions of WAC 173-303-070 and the EPA Toxicity Characteristic Leaching Procedure. They will then be disposed of within 90 days as permissible by state and federal regulations. If testing indicates the material is not a hazardous waste, it may be disposed of under the Solid Waste Management Act, RCW 70.95. If the waste is designated as a hazardous waste, it must be disposed of under the provisions of the Hazardous Waste Management Act, RCW 70.015.

7.5.5 Decanting

Separation or "decanting" of water from recovered oil and return of excess water into the response area allows for maximum use of limited storage capacity, thereby increasing recovery operations. Decanting is currently recognized as a necessary and routine part of response operations and is appropriately addressed in ACPs (see National Contingency Plan Revisions, 59 F.R. 47401, 15 September 1994).

Criteria

During spill response operations, mechanical recovery of oil is often restricted by a number of factors, including the recovery system's oil/water recovery rate, the type of recovery system employed and the amount of tank space available to hold recovered oil/water mixtures. In addition, the longer oil remains on or in the water, the more it emulsifies. Emulsifications may contain as much as 70 percent water and 30 percent oil, thus consuming significant storage space. Decanting is the process of draining off recovered water from portable tanks, internal tanks, collection wells or other storage containers to increase the available storage capacity of recovered oil. When decanting is conducted properly, most of the petroleum can be removed from the water.

Decanting should be considered and authorized as appropriate by the federal OSC and/or state OSC in cases where the discharged water will be less harmful to the environment than allowing the oil to remain on the water and be subject to spreading and weathering.

During a response, it will likely be necessary to request authority to decant from the federal and/or state OSC so that response operations do not cease or become impaired. An Oil Spill Decanting Authorization Form is provided in **Section 5.7**. Expeditious review and approval, as appropriate, of such requests is necessary to ensure a rapid and efficient recovery operation.

The FOSC and SOSCs will consider each request for decanting on a case-by-case basis. Prior to approving decanting, the OSCs should evaluate the potential effects of weather, including the wind and wave conditions, the quantity and type of oil spilled as well as available storage capacity. The OSCs should also take into account that recovery operations enhanced by decanting will reduce the quantity of pollutants in a more timely and effective manner.

The following criteria should be considered by the FOSC and/or SOSC in determining whether to approve decanting, unless circumstances dictate otherwise.

- All decanting should be done in a designated “Response Area” within a collection area, vessel collection well, recovery belt, weir area, or directly in front of a recovery system.
- Vessels employing sweep booms with recovery pumps in the apex of the boom should decant forward of the recovery pump.
- All vessels, motor vehicles, and other equipment not equipped with an oil/water separator should allow retention time for oil held in internal or portable tanks before decanting commences.
- When deemed necessary by the FOSC and/or SOSC or the response contractor, a containment boom will be deployed around the collection area to minimize loss of decanted oil or entrainment.
- Visual monitoring of the decanting area will be maintained so that discharge of oil in the decanted water is detected promptly.
- Decanting in areas where vacuum trucks, portable tanks or other collection systems used for shore cleanup will be subject to the same rules as vessels.

The Company will seek approval from the FOSC and/or SOSC prior to decanting by presenting the Unified Command with a brief description of the area for which decanting approval is sought, the decanting process proposed, the prevailing conditions (wind, weather, etc.) and protective measures proposed. The FOSC and/or SOSC will review such requests promptly and render a decision as quickly as possible. FOSC authorization is required in all cases and SOSC authorization is also required for decanting in state waters. **Section 5.7** provides guidance on developing a decanting plan.

7.6 Public Affairs

Properly handling media relations is an important facet of Company operation at all times. During normal operations, this function will be handled by the Supervisor of Contingency Planning or designee. During emergency situations, media relations become more complex and a number of other personnel become involved. The Company will use the Washington Joint Information Center Manual as a guideline to media relations.

7.7 Drill and Equipment Verification Program

The Facility participates in the National Preparedness for Response Exercise Program (NPREP) in order to satisfy the exercise requirements of the EPA and USCG (see Appendix A). Additionally, the Facility is committed to Ecology’s drill program as outlined in WAC 173-182-700 & 710. The Company is committed to provide Ecology an opportunity to help design and evaluate all tabletop and deployment drills for which drill credit is desired. This commitment will follow the scheduling guidelines referenced in **Figure A.2**. The Facility meets all applicable drill components established in the Spill Drill Evaluation Checklist in the Ecology’s Publication 12-08-002/March 2012. If plan deficiencies are identified in the Ecology written evaluation, the Company may be required to make specific amendments to the plan, or conduct additional trainings to address the deficiencies. During each triennial cycle, all components of the Plan

must be exercised at least once. The 15 core components listed in **Figure A.1** are the types of components that must be exercised.

7.8 Shoreline Cleanup

The Facility has contracted with MSRC for any necessary shoreline cleanup operations (see **Appendix B** for contract confirmation and contact information). Global Environmental will also support shoreline cleanup operations, as needed.

7.9 Groundwater Spills

The Facility has a contractual relationship with Pacific Groundwater Group (PGG) for management of spill response involving releases to groundwater. PGG is also the Company's contractor for ongoing soil and groundwater remediation projects.

7.10 Compliance with Planning Standards

Planning standard spreadsheets for the Facility are included as **Figure 7.4**.

Figure 7.4. DRAFT Ecology Planning Standard Calculations

[Placeholder for new Ecology spreadsheet]

8. Demobilization/Post-Incident Review

This section provides checklists and guidelines for demobilization and post-incident reviews.

8.1 Equipment Demobilization

Facility can reduce response costs considerably by developing demobilization plans. Therefore, emphasis must be placed on establishing efficient demobilization procedures. A demobilization checklist and plan is contained in **Figure 8.1**.

Figure 8.1. Demobilization Plan

Incident Name: _____ **Plan Location:** _____

Effective Date of Plan: _____ **Effective Time Period of Plan:** _____

Spill Location: _____ **Plan Prepared By:** _____

Demobilization Procedures

- Operations Section will determine which resources are ready for release from a specific collection site. The Planning Section will provide guidance on release priorities and demobilization recommendations. Information maintained by the Planning Section will be used to assist in the prioritization.
- Each collection site will require a decontamination area. Decontaminated equipment will be returned to appropriate staging area for release or redeployment. Transports for equipment will be required if remote from staging area.
- The Planning Section will document all demobilization and decontamination activities.
- Equipment designated for reassignment will be mobilized to the appropriate staging area.
- The Operations Section Chief will maintain a log documenting that proper decontamination procedures were performed for each piece of equipment.
- The Operations Section Chief will ensure that redeployed personnel receive proper rest prior to return to duty. The Planning Section Chief will monitor personnel redeployment activities to ensure number of hours worked is within acceptable guidelines.
- The Operations Section Chief must approve demobilization plans prior to decontamination, release, or redeployment of any resources.

8.2 Post Incident Debriefing and Critique

Facility will schedule a post spill review session within two weeks of completing the response to an oil spill. Representatives of the USCG, EPA, Ecology, and other agencies who participated in the response will be invited to attend. Representatives of any spill response contractors that worked on the spill, such as responders from NRCES, MSRC, and Global Environmental, will also be invited. The purpose of this meeting is to review the response and identify ways to improve Facility's spill prevention policies, spill response plans, and this OSCP.

It is anticipated that topics to be discussed will include

- Cause of the spill and prevention measures that could be used to prevent the reoccurrence of a similar spill.
- Discussion of post-incident critique (**Section 8.3**).
- Recommendations for modifications to the Facility OSCP.

A Post Incident Critique (PIC) is designed to evaluate Company emergency response actions, not the cause of the incident. A Post Incident Critique form is provided in **Figure 8.2.** A post-spill review is also designed to identify potential deficiencies in the plan and determine the changes required to correct the deficiencies. The post-spill review is also intended to identify which response procedures, equipment, and techniques were effective and which were not and the reason(s) why. Response plans can then be revised to eliminate or modify those response procedures that are less effective and emphasize those that are highly effective. This process should also be used to evaluate exercises.

8.3 Post Spill Critique Outline

The following items should be examined by a team composed of outside people knowledgeable in oil spill response and key members of the response teams. These questions are intended as guidelines only; many other questions are likely to be appropriate at each stage of a critique.

Detection

- Was the spill detected promptly?
- How was it detected? By whom?
- Could it have been detected earlier? How?
- Are any instruments or procedures available to consider which might aid in spill detection?

Notification

- Were proper procedures followed in notifying government agencies?
- Were notifications prompt?
- Was management notified promptly?
- Was management response appropriate?
- Was the Company notified properly? If so, why, how, and who? If not, why not?

Assessment/Evaluation

- Was the magnitude of the problem assessed correctly at the start?
- What means were used for this assessment?
- Are any guides or aids needed to assist spill evaluation?
- What sources of wind and water currents information were available?
- Is our information adequate?
- Was this information useful (and used) for spill trajectory forecasts?
- Were such forecasts realistic?
- Was adequate information available on oil properties?
- Was additional information needed on changes of oil properties with time, i.e., as a result of weathering and other processes?

Mobilization

- What steps were taken to mobilize oil spill countermeasures?
- What resources were used?
- Was mobilization prompt?
- Could it have been speeded up or should it have been?
- What about mobilization of manpower resources?
- Was the local oil spill cooperative used appropriately?
- How could this be improved?
- Was it appropriate to mobilize Company resources and was this promptly initiated?
- What other corporate resources are available and have they been identified and used adequately?

Response – Strategy

- Is there an adequate spill response plan for the location?
- Is it flexible enough to cope with unexpected spill events?
- Does the plan include clear understanding of local environmental sensitivities?

- What was the initial strategy for response to this spill?
- Is this strategy defined in the spill plan?
- How did the strategy evolve and change during this spill and how were these changes implemented?
- What caused such changes?
- Are there improvements needed? More training?

Response – Resources Used

- What resources were mobilized?
- How were they mobilized?
- How did resource utilization change with time? Why?
- Were resources used effectively?
  - Contractors
  - Government Agencies
  - Company resources
  - Cooperatives
  - Volunteers
  - Consultants
  - Other (e.g., bird rescue centers)
- What changes would have been useful?
- Do we have adequate knowledge of resource availability?

Response – Effectiveness

- Was containment effective and prompt?
- How could it have been improved?
- Should the location or the local cooperative have additional resources for containment?
- Was recovery effective and prompt?
- How could it have been improved?
- Should the location or the local cooperative have additional resources for recovery of spilled oil?

Command Structure

- Who was initially in charge of spill response?
- What sort of organization was initially set up?
- How did this change with time? Why?
- What changes would have been useful?
- Was there adequate surveillance?
- Should there be any changes?
- Were communications adequate?
- What improvements are needed? Hardware, procedures, etc.
- Was support from financial services adequate? Prompt?
- Should there be any changes?
- Is more planning needed?
- Should financial procedures be developed to handle such incidents?

Measurement

- Was there adequate measurement or estimation of the volume of oil spilled?
- Was there adequate measurement or estimation of the volume of oil recovered?
- Should better measurement procedures be developed for either phase of operations?
- If so, what would be appropriate and acceptable?

Government Relations

- What are the roles and effects of the various government agencies that were involved?
- Was there a single focal point among the government agencies for contact?
- Should there have been better focus of communications to the agencies?

- Were government agencies adequately informed at all stages?
- Were too many agencies involved?
- Are any changes needed in procedures to manage government relations?
- Examples of affected U.S. agencies (there may be others):
  - U.S. Coast Guard
  - U.S. Environmental Protection Agency
  - National Oceanographic Atmospheric Administration
  - Department of Fish and Wildlife
  - State Parks
  - Harbors and Marinas
  - States
  - Cities
  - Counties
- Was there an adequate agreement with the government agencies on criteria for cleanup?
- How was this agreement developed?
- Were we too agreeable with the agencies in accepting their requests for specific action items (e.g., degree of cleanup)?
- Should there be advance planning of criteria for cleanup, aimed at specific local environmentally sensitive areas? (Such criteria should probably also be designed for different types of oils).

Public Relations

- How were relations with the media handled?
- What problems were encountered?
- Are improvements needed?
- How could public outcry have been reduced? Was it serious?
- Would it be useful to undertake a public information effort to “educate” reporters about oil and its effects if spilled?

These areas should be investigated shortly after the incident to assure that actions taken are fresh in peoples’ minds.

Figure 8.2. Post Incident Critique (PIC) Form

The purpose of the PIC is to review overall incident response not a fault finding session.

General Information:

Date: (Incident)
Location:
Type of Incident: (fire, rescue, medical, hazmat)
Cause of Incident: (mechanical, electrical, human)

Incident Command System (personnel who filled the following functions)**:**

Incident Commander:
Safety Officer:
Team Captain(s):
Mutual Aid/Outside Agencies:

Incident Command ('Command'):

Did 'Command' announce over the radio "Who was in charge." (YES/NO)
If no, explain.
Did 'Command' announce Command Post location? (YES/NO)
If no, explain.

Figure 8.2. Post Incident Critique (PIC) Form (continued)

Location of Incident Command Post: (include scene map or drawing)
Did 'Command' and other officers don command vests? (YES/NO)
If no, explain.
Action Items:
Recommended Corrective Action:

Evacuation:

What areas were evacuated?
Were buses used: (YES/NO)
Were all personnel accounted for: (YES/NO)
If yes, How?
If no, explain.
Action Items:
Recommended Corrective Action:

Figure 8.2. Post Incident Critique (PIC) Form (continued)

Response Activation:

How was the system activated: (radio emergency channel, radio emergency button, phone, other)
Who was the reporting party?
Who performed initial dispatch?
Action Items:
Recommended Corrective Action:

Safety:

Were PPE requirements clearly identified: (YES/NO)
If yes, How?
If no, explain.
If PPE was required and not used, Why not?
Was HOT, WARM, COLD Zones marked by flagging and/or landmarks: (YES/NO)
If yes, How?
If no, explain.
Was area monitoring performed: (YES/NO)
If yes, what kind?
If no, explain.
Action Items:
Recommended Corrective Actions:

Figure 8.2. Post Incident Critique (PIC) Form (continued)

Initial Response:

How was the initial incident handled by incipient responders? (incipient firefighting, fixed systems, hazard control, first aid)
Action Items:
Recommended Corrective Actions:

Communications:

What radio channels were used?
Were radio communications clear and concise: (YES/NO)
If yes, How?
If no, explain.
Did communications follow a clear command path: (YES/NO)
If yes, How?
If no, explain.
Action Items:
Recommended Corrective Action:

Equipment:

List equipment used: (company, contractor, etc.)
Was there enough equipment: (YES/NO)

Figure 8.2. Post Incident Critique (PIC) Form (continued)

If yes, How?
If no, explain.
Did the equipment work correctly: (YES/NO)
If yes, How?
If no, explain.
Did equipment operators use equipment correctly: (YES/NO)
If yes, How?
If no, explain.
Action Items:
Recommended Corrective Action:
Injuries:
Did incident cause any injuries: (YES/NO) # of injured:
Who provided initial care?
Were paramedics (911) activated: (YES/NO)
Were injured transported: (YES/NO)
Where were injured transported:
Action Items:
Recommended Corrective Action:

Figure 8.2. Post Incident Critique (PIC) Form (continued)

Outside Agencies:

What agencies were activated and why:
Action Items:
Recommended Corrective Action:

Post Incident:

What areas of response need corrective action?

Individuals who performed beyond the call of duty:

Figure 8.2. Post Incident Critique (PIC) Form (continued)

PIC Attendees:

1.	6.
2.	7.
3.	8.
4.	9.
5.	10.

This critique is to be completed within two weeks of the incident and submitted to the _____ _____.

The PIC was held on the _____ day of _____ in 20 ____. The PIC was completed by _____.

8.4 Final Spill Cleanup Report

A final, comprehensive report for internal use should be prepared by the Incident Commander or his designee after completion of spill cleanup activities. The report should be written in narrative form and should include information listed below, as appropriate.

1. Time, location, and date of discharge.
2. Type of material discharged.
3. Quantity discharged (indicate volume, color, length and width of slick, and rate of release if continuous).
4. Source of spill (tank, flowline, etc.) in which the oil was originally contained, and discharge path.
5. Detailed description of what caused the discharge and actions taken to control or stop the discharge.
6. Description of damage to the environment.
7. Steps taken to clean up the spilled oil, and dates and times steps were taken.
8. The equipment used to remove the spilled oil, dates, and number of hours the equipment was used.
9. The number of persons employed in the removal of oil from each location, including their identity, employer, and the number of hours worked at that location.
10. Actions by the Company or contractors to mitigate damage to the environment.
11. Measures taken by the Company or contractors to prevent future spills.
12. The federal and state agencies to which the Company or contractors reported the discharge. Show the agency, its location, the date and time of notification, and the official contacted.
13. Description of the effectiveness of equipment and cleanup techniques and recommendations for improvement.
14. The names, addresses, and titles of people who played a major response role.
15. A section identifying problems and deficiencies noted during the response. A follow-up section should include recommendations for more effective and efficient response procedures.
16. All other relative information.
17. A final signature as follows:

The above information is true to the best of my knowledge and belief.

Name:

Title:

Signature:

Date:

Vancouver Energy
Operations Facility Oil Spill Contingency Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix A
Training and Exercises

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APPENDIX A
TRAINING AND EXERCISES

A.1 EXERCISE REQUIREMENTS AND SCHEDULES

The Vancouver Energy (Facility) and Tesoro participate in the National Preparedness for Response Exercise Program (PREP) in order to satisfy the exercise requirements of the EPA and USCG. Additionally, the Facility and Tesoro are committed to Ecology's drill program, as outlined in WAC 173-180-700 & 710. The facility meets all applicable drill components established in the Spill Drill Evaluation Checklist in Ecology's Publication #98–251/June 1998. During each triennial cycle, all components of the Plan must be exercised at least once. The 15 core components listed in **FIGURE A.1** are the types of components that must be exercised.

Response exercise will be designed to:

1. Provide an opportunity for SMT personnel to practice responding to a spill.
2. Test FRP for shortcomings or errors.
3. Improve Company personnel's spill response expertise in specified ICS positions.
4. Comply with PREP guidelines.

Facility/Tesoro supplies the IRT and SMT with initial 8-hour spill response training and annual refresher training, including review of ICS/US, ICS Forms, with emphasis placed on the greatest exposure for a given group.

Training is accomplished through video, written and oral presentation as well as hands on. Annual refresher training is intended to be approximately 8 hours.

Training in the NIMS ICS used by Facility/Tesoro is given to all team members during an initial training session designed to cover ICS positions and ICS Forms.

Review of the NWACP and Area GRP location and use are included in annual ICS refresher training.

Individuals with no previous experience with the SMT will receive 8 hours of ICS training prior to being assigned to a position. Newly assigned individuals will normally have a coach working with them.

SMT positions are assigned and will only be filled by the experienced individuals. It's recognized that IC and Section Persons assigned into these roles will receive 8 hours initial ICS training and 8-hours refresher training, and will be expected to complete an additional 16 hours of position-specific training prior to being permanently assigned. Additional training may include off-site workshops, actual drill or spill exposure, job-related experience, or other relevant training specific to the position.

The Supervisor of Contingency Planning is responsible for scheduling, maintaining records, implementing and evaluating this drill program, and ensuring that post-drill evaluation improvements are implemented. Descriptions of these exercises are listed in **FIGURE A.2**.

Figure A.1 – Prep Response Plan Core Components

Core Components	Description
1. Notifications	Test the notifications procedures identified in the Area Contingency Plan and the associated Responsible Party Response Plan.
2. Staff Mobilization	Demonstrate the ability to assemble the spill response organization identified in the Area Contingency Plan and the associated Responsible Party Response Plan.
3. Ability to Operate Within the Response Management System Described in the Plan: Unified Command Response Management System	 Demonstrate the ability of the spill response organization to work within a unified command. Demonstrate the ability of the response organization to operate within the framework of the response management system identified in their respective plans.
4. Discharge Control	Demonstrate the ability of the spill response organization to control and stop the discharge at the source.
5. Assessment	Demonstrate the ability of the response organization to provide initial assessment of the discharge and provide continuing assessments of the effectiveness of the tactical operations.
6. Containment	Demonstrate the ability of the spill response organization to contain the discharge at the source or in various locations for recovery operations.
7. Recovery	Demonstrate the ability of the spill response organization to recover the discharged product.
8. Protection	Demonstrate the ability of the spill response team organization to protect the environmentally and economically sensitive areas identified in the Area Contingency Plan and the respective industry response plan.
9. Disposal	Demonstrate the ability of the spill response organization to dispose of the recovered material and contaminated debris.
10. Communications	Demonstrate the ability to establish an effective communications system for the spill response organization.
11. Transportation	Demonstrate the ability to establish multi-mode transportation both for execution of the discharge and support functions.
12. Personnel Support	Demonstrate the ability to provide the necessary support of all personnel associated with response.
13. Equipment Maintenance and Support	Demonstrate the ability to maintain and support all equipment associated with the response.
14. Procurement	Demonstrate the ability to establish an effective procurement system.
15. Documentation	Demonstrate the ability of the spill response organization to document all operational and support aspects of the response and provide detailed records of decisions and actions taken.

Figure A.2 – Exercise Requirements

Exercise Type	Exercise Characteristics
Facility/QI Notification	• Conducted quarterly • Facility initiates mock spill notification to QI • Terminal Manager documents time/date of notification, name and phone number of individual contacted • Document in accordance with form in **FIGURE A.3**
Equipment Deployment	• Conducted semiannually • Response contractors listed in FRP must participate in annual deployment exercise • Document in accordance with form in **FIGURE A.3**
SMT Tabletop	• Conducted annually • Tests SMT's response activities/responsibilities • Documents plan's effectiveness • Must exercise worst case discharge scenario once every three years • Must test all plan components at least once every three years • Document in accordance with form in **FIGURE A.3**
Unannounced	• Company will either participate in unannounced tabletop exercise or Facility equipment deployment exercise on an annual basis, if selected • Company may take credit for participation in government initiated unannounced drill in lieu of drill required by PREP guidelines • Plan holders who have participated in a PREP government-initiated unannounced exercise will not be required to participate in another one for a least 36 months from the date of the exercise. • If equipment is deployed during this exercise, it may be counted as one of the "semi-annual" deployment drills.
Area	• Company will participate in a minimum of one area exercise per six-year period
Other Exercise Considerations	
Drill Program Evaluation Procedures	• Company conducts post-exercise meetings to discuss positive items, areas for improvement and to develop action item checklist to be implemented later
Records of Drills	• Company will maintain exercise records for five years following completion of each exercise • Records will be made available to WDOE, EPA, USCG and other applicable agencies upon request • Company will verify appropriate records are kept for each spill response contractor listed in Plan as required by PREP guidelines (annual equipment deployment drill, triennial unannounced drill, etc.)

Figure A.3 – Preparedness for Readiness Exercise Form

PREPAREDNESS FOR READINESS EXERCISE PROGRAM

VANCOUVER ENERGY/TESORO EXERCISE DOCUMENTATION FORM

TESORO

Vessel/Facility Name: **Exercise Year:**

First Quarter: Qualified Individual Notification Exercise

☐ Announced ☐ Unannounced
A. Name of Qualified Individual: _____ Title: _____
B. Is Qualified Individual identified in Contingency Plan? ☐ Yes ☐ No
C. Notification method: ☐ Telephone ☐ Pager ☐ In Person ☐ Radio ☐ Other
D. Did notification procedure follow C-Plan? ☐ Yes ☐ No
E. Comments: _____
F. Self-Certification: Name: _____ Title: _____

Second Quarter: Qualified Individual Notification Exercise

☐ Announced ☐ Unannounced
A. Name of Qualified Individual: _____ Title: _____
B. Is Qualified Individual identified in Contingency Plan? ☐ Yes ☐ No
C. Notification method: ☐ Telephone ☐ Pager ☐ In Person ☐ Radio ☐ Other
D. Did notification procedure follow C-Plan? ☐ Yes ☐ No
E. Comments: _____
F. Self-Certification: Name: _____ Title: _____

Third QuarterQualified Individual Notification Exercise

☐ Announced ☐ Unannounced
A. Name of Qualified Individual: _____ Title: _____
B. Is Qualified Individual identified in Contingency Plan? ☐ Yes ☐ No
C. Notification method: ☐ Telephone ☐ Pager ☐ In Person ☐ Radio ☐ Other
D. Did notification procedure follow C-Plan? ☐ Yes ☐ No
E. Comments: _____
F. Self-Certification: Name: _____ Title: _____

Fourth Quarter: Qualified Individual Notification Exercise

☐ Announced ☐ Unannounced
A. Name of Qualified Individual: _____ Title: _____
B. Is Qualified Individual identified in Contingency Plan? ☐ Yes ☐ No
C. Notification method: ☐ Telephone ☐ Pager ☐ In Person ☐ Radio ☐ Other
D. Did notification procedure follow C-Plan? ☐ Yes ☐ No
E. Comments: _____
F. Self-Certification: Name: _____ Title: _____

Figure A.3 – Preparedness for Readiness Exercise Form (Continued)

Date: ☐ Announced ☐ Unannounced

First: Emergency Procedures Exercise

A. Emergency Procedures Tested: _____

B. Drill Location on site: _____

C. List Personnel Participating: _____

_____

D. Describe objectives and how they were exercised: _____

_____

_____

E. Descriptions of lessons learned: _____

_____

_____

_____

F. Self-Certification: **Name:** _____ **Title:** _____

*** Note: Emergency Procedure Exercises are optional for facilities**

Second: Emergency Procedures Exercise

Date: _____ ☐ **Announced** ☐ **Unannounced**

A. Emergency Procedures Tested: _____

B. Drill Location on site: _____

C. List Personnel Participating: _____

_____

D. Describe objectives and how they were exercised: _____

_____

_____

E. Descriptions of lessons learned: _____

_____

_____

F. Self-Certification: **Name:** _____ **Title:** _____

*** Note: Emergency Procedure Exercises are optional for facilities**

Figure A.3 – Preparedness for Readiness Exercise Form (Continued)

First: Equipment Deployment Exercise

Date:_____ ☐ **Announced** ☐ **Unannounced**

A. Equipment Ownership: **Facility** ☐ **OSRO** ☐ **Both** ☐

B. Provide attachment listing Equipment and Personnel

C. Was equipment deployed in its inteded operating environment? **Yes** ☐ **No** ☐

D. Describe objectives and how they were exercised: _____

E. Descriptions of lessons learned: _____

F. Is Spill Response Equipment in a Preventative Maintenance Program? **Yes** ☐ **No** ☐

G. Self-Certification: **Name:** _____ **Title:** _____

Second: Equipment Deployment Exercise

Date:_____ ☐ **Announced** ☐ **Unannounced**

A. Equipment Ownership: **Facility** ☐ **OSRO** ☐ **Both** ☐

B. Provide attachment listing Equipment and Personnel

C. Was equipment deployed in its inteded operating environment? **Yes** ☐ **No** ☐

D. Describe objectives and how they were exercised: _____

E. Descriptions of lessons learned: _____

F. Is Spill Response Equipment in a Preventative Maintenance Program? **Yes** ☐ **No** ☐

G. Self-Certification: **Name:** _____ **Title:** _____

Figure A.3 – Preparedness for Readiness Exercise Form (Continued)

Spill Management Team Tabletop Exercise

RESPONSE CATEGORY

- ☐ Announced
- ☐ Unannounced
- ☐ Average Most Probable Discharge
- ☐ Maximum Most Probable Discharge
- ☐ Worst Case Discharge
- ☐ Simulated ☐ Real _____bbls

PREP CORE REQUIREMENTS COMPLETED THIS CALENDAR YEAR

- ☐ Notifications
- ☐ Assessment
- ☐ Protection of Sensitive Areas
- ☐ Staff Mobilization
- ☐ Containment
- ☐ Personnel Support
- ☐ Response Management System
- ☐ Recovery
- ☐ Equipment Maintenance
- ☐ Unified Command
- ☐ Disposal
- ☐ Procurement
- ☐ SMT Operations
- ☐ Communications
- ☐ Documentation
- ☐ Discharge Control
- ☐ Transportation

Figure A.3 – Preparedness for Readiness Exercise Form (Continued)

EXERCISE OBJECTIVES

LESSONS LEARNED

APPROVED BY:

RESPONSIBLE PARTY	**DATE**
FEDERAL ON-SCENE COORDINATOR	**DATE**
STATE ON-SCENE COORDINATOR	**DATE**
LOCAL ON-SCENE COORDINATOR	**DATE**

LIST OF ATTACHMENTS:

- ☐ **Incident or Scenario & Objective of Exercise/Incident**
- ☐ **ICS 201 Initial Incident Briefing**
- ☐ **List of Equipment Operational Problems**
- ☐ _____
- ☐ **Incident Action Plan (IAP)**
- ☐ **Critique/Lessons Learned**
- ☐ **ICS 211P (OS) Check-in List**
- ☐ _____

Attachments on file with Supervisor Contingency Planning and Emergency Response

A.2. TRAINING PROGRAM

The Facility Manager and Facility Supervisor are trained to the following level:

1. 40 hour HAZWOPER;
2. 8 hour ICS;
3. 16 hour Specialized ICS;
4. 8 hour oil spill response;
5. 40 hour Coastal Oil Spill Control Course at Texas A&M.

The Supervisor, Contingency Planning is designated as the Training Supervisor. The Training Supervisor prepares and conducts a spill prevention training session in conjunction with safety meetings. **FIGURE A.4** lists training requirements for spill responders. **FIGURE A.8** is a form for documenting a safety meeting.

At a minimum, all Facility Operators will receive training adequate to satisfy HAZWOPER level 3 (24-hour) requirements.

The Facility will comply with the requirements of WAC 173-180(C), Ecology's Facility Personnel Oil-Handling Training and Certification Program and WAC 296-62-3112. Tesoro's Training manual and documentation were approved by the Department of Ecology on June 15, 1995 and recertified in June 2000.

The objectives of the training program are to prevent oil spills caused by human error, promote job competency and environmental awareness, and certify the competency of all terminal personnel. The training program is on file at the Facility. The training program elements include:

1. a training topic core program,
2. a trainer qualification section,
3. a competency-based training program,
4. a training and certification program, and
5. a training manual and materials section. Recertification of the training program is required every 3 years.

Daily, weekly, monthly and annual inspection and maintenance routines and examples of record keeping and inspection forms for the Facility are presented in **Appendix G**.

Figure A.4 – Training Elements

Training Type	Training Characteristics
Training in Use of Oil Spill Plan	• All terminal personnel will be trained to properly report/monitor spills • Plan will be reviewed annually with all employees and contract personnel • The Personnel Response Training Log is provided in **FIGURE A.6**.
OSHA Training Requirements	• All Company responders designated in Plan must have 24 hours of initial spill response training – Laborers having potential for minimal exposure must have 24 hours of initial oil spill response instruction and 8 hours of actual field experience – Spill responders having potential exposure to hazardous substances at levels exceeding permissible exposure limits must have 40 hours of initial training offsite and 24 hours of actual field experience – On-site management/supervisors required to receive same training as equipment operators/general laborers plus 8 hours of specialized hazardous waste management training – Managers/employees require 8 hours of annual refresher training
Spill Management Team Personnel Training	• See recommended PREP Training Matrix (**FIGURE A.5**)
Training for Casual Laborers or Volunteers	• Company will not use casual laborers/volunteers for operations requiring HAZWOPER training
Wildlife	• Only trained personnel approved by USFWS and appropriate state agency will be used to treat oiled wildlife
Training Documentation and Record Maintenance	• Training activity records will be retained five years for all personnel following completion of training • Company will retain training records indefinitely for individuals assigned specific duties in Plan • Training records will be retained at the Terminal. Training Supervisor will document all applicable training. **FIGURE A.9** is a training activity report to be used to document training completed at the Facility.

Figure A.5 – Training Program Matrix
(Based upon the Training Reference for Oil Spill Response-USCG, RSPA, EPA, MMS, 1994)

TRAINING ELEMENT	QUALIFIED INDIVIDUAL (QI)	SPILL MANAGEMENT TEAM (SMT)	FACILITY RESPONDERS
Captain of the Port (COTP) Zones or Environmental Protection Agency (EPA) regions in which the facility is located.	X	X	X
Notification procedures and requirements for facility owners or operators; internal response organizations; federal and state agencies; and contracted oil spill removal organizations (OSRO's) and the information required for those organizations.	X	X	X
Communication system used for the notifications.	X	X	X
Information on the products, stored, used, or transferred, by the facility, including familiarity with the material safety data sheets, special handling procedures, health and safety hazards, spill and firefighting procedures.	X	X	X
Procedures the facility personnel may use to mitigate or prevent any discharge or a substantial threat of a discharge of oil resulting from facility operational activities associated with internal or external cargo transfers, storage, or use.	X		
Facility personnel responsibilities and procedures for use of facility equipment which may be available to mitigate or prevent an oil discharge.	X	X	X
Operational capabilities of the contracted OSRO's to respond to the following: ☐ Average most probable discharge (small discharge); ☐ Maximum most probable discharge (medium discharge); and ☐ Worst-case discharge.	X	X	X
Responsibilities and authority of the Qualified Individual as described in the facility response plan and company response organization.	X	X	X

Figure A.5 – Training Program Matrix (Continued)
(Based on the Training Reference for Oil Spill Response - USCG, RSPA, EPA, MMS, 1994)

TRAINING ELEMENT	QUALIFIED INDIVIDUAL (QI)	SPILL MANAGEMENT TEAM (SMT)	FACILITY RESPONDERS
The organizational structure that will be used to manage the response actions including: □ Command and control; □ Public information; □ Safety; □ Liaison with government agencies; □ Spill response operations; □ Planning; □ Logistics support; and □ Finance.	X	X	X
The responsibilities and duties of each oil spill management team within the organizational structure.	X	X	
The drill and exercise program to meet federal and state regulations as required under OPA.	X	X	X
The role of the Qualified Individual in the post discharge review of the plan to evaluate and validate its effectiveness.	X		
The Area Contingency Plan (ACP) for the area in which the facility is located.	X	X	X
The National Contingency Plan (NCP).	X	X	X
Roles and responsibilities of federal and state agencies in pollution response.	X	X	X
Available response resources identified in response plan.	X	X	
Contracting and ordering procedures to acquire oil spill removal organization resources identified in the response plan.	X	X	
OSHA requirements for worker health and safety (29 CFR 1910.120).	x	x	x
Incident Command System/Unified Command System.	x	x	

□ Applicable to designated job responsibilities.

Figure A.5 – Training Program Matrix (Continued)
(Based upon the Training Reference for Oil Spill Response - USCG, RSPA, EPA, MMS, 1994)

TRAINING ELEMENT	QUALIFIED INDIVIDUAL (QI)	SPILL MANAGEMENT TEAM (SMT)	FACILITY RESPONDERS
Public Affairs.	X	X	
Crisis management.	X	X	
Procedures for obtaining approval for dispersant use or in-situ burning of the spill.	X		
Oil spill trajectory analyses.	X		
Sensitive biological areas.	X	X	
This training procedure as described in the response plan for members of the spill management team		X	
Procedures for the post discharge review of the plan to evaluate and validate its effectiveness. **FIGURE A.7** is a form to document a discharge prevention meeting.		X	
Basic information on spill operations and oil spill clean-up technology including: ☐ Oil containment; ☐ Oil recovery methods and devices; ☐ Equipment limitations and uses; ☐ Shoreline clean-up and protection; ☐ Spill trajectory analysis; ☐ Use of dispersants, in-situ burning, bioremediation; and ☐ Waste storage and disposal considerations.		X	
Hazard recognition and evaluation.		X	
Site safety and security procedures,		X	
Personnel management, as applicable to designated job responsibilities.		X	
Procedures for directing the deployment and use of spill response equipment, as applicable to designated job responsibilities.			

Figure A.5 – Training Program Matrix (Continued)
(Based upon the Training Reference for Oil Spill Response - USCG, RSPA, EPA, MMS, 1994)

TRAINING ELEMENT	QUALIFIED INDIVIDUAL (QI)	SPILL MANAGEMENT TEAM (SMT)	FACILITY RESPONDERS
Specific procedures to shut down affected operations.			x
Procedures to follow in the event of discharge, potential discharge, or emergency involving the following equipment or scenarios: ☐ Tank overfill; ☐ Tank rupture; ☐ Piping or pipeline rupture; ☐ Piping or pipeline leak, both under pressure or not under pressure, if applicable; ☐ Explosion or fire; ☐ Equipment failure; and ☐ Failure of secondary containment system.			x
Name of the Qualified Individual and how to contact him or her.			x

Figure A.6 – Personnel Response Activities Training Log

NAME	RESPONSE TRAINING/DATE AND NUMBER OF HOURS	PREVENTION TRAINING/DATE AND NUMBER OF HOURS

Figure A.7 – Discharge Prevention Meeting Log

Date: _____

Subject / Issue Identified: _____

_____

_____

Required Action Item Identified:

1. _____
2. _____
3. _____
4. _____

Date of Implementation of Action Items:

WO # Issued

1. _____ _____
2. _____ _____
3. _____ _____
4. _____ _____

Meeting Attendee Name/Dept:

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Figure A.7 – Discharge Prevention Meeting Log (Continued)

Meeting Attendee Name/Dept:

Figure A.8 – Vancouver Energy Safety Meeting Minutes

Subsidiary _____ Meeting Date ____/____/____

Address/Location _____ Time Meeting Opened _____ A.M. P.M.

Personnel Present _____ Time Meeting Closed _____ A.M. P.M.

_____ Next Meeting Date ____/____/____

ORDER OF BUSINESS: (1) Introduce visitors and/or new personnel: (2) Review recent safety activities: (3) Discuss accident reports, inspection reports, etc.: (4) Review overall activities, recommendations, and facility conditions.

MINUTES

The undersigned does/do certify that the date above accurately presents the attendees and proceedings of the safety meeting covered by these minutes.

Supervisor _____ Date _____

Figure A.9 – Vancouver Energy Spill Prevention and Response Training Activity Report

DATE OF TRAINING: _____

LOCATION: _____

INSTRUCTOR/COMPANY: _____

COURSE/TOPICS/HOURS: _____

SOURCE/TYPE OF TRAINING MATERIALS _____

NAME OF PARTICIPANTS

LAST NAME	FIRST NAME	SIGNATURE

This form shall be completed for all spill prevention and response related training except for monthly safety/prevention meetings, which are documented on a separate form.

OPA 90 "PREP" training shall be recorded on this form and on the documentation form provided by the Coast Guard.

To comply with State requirements, annual training will include a practice exercise on spill prevention during abnormal operations.

This form shall be maintained at the Terminal for a period of five years.

Tesoro Savage Vancouver Energy Distribution Terminal
5501 NW Lower River Road
Vancouver, Washington 98660

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Appendix B
Vancouver Energy Contractor Response Equipment

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APPENDIX B
VANCOUVER ENERGY CONTRACTOR RESPONSE EQUIPMENT

B.1 COOPERATIVES AND CONTRACTORS

Spill response contractors and their equipment are available to support the Facility's response team, as needed. Primary Response Contractors (PRCs) are private companies or cooperatives that are in partnership with plan holders to act as required response support teams. The PRCs have equipment and crews that are trained and equipped to mitigate leaks and spills when they occur. PRCs that will support the Facility's response team are listed in **Figure B.1**. Proof of a contractual relationship is provided in **Figure B.2.** Maps that show the types and locations of equipment available are provided in **Figure B.3.**

B.1.1 Clean Rivers Cooperative

The Facility and Tesoro are members of the Clean Rivers Cooperative, Inc. (CRC). As a member of CRC, Vancouver Energy/Tesoro may also have access to equipment and personnel resources from NRC.

- CRC is classified as a "W3" OSRO by USCG. The response organization for Clean Rivers and their relationship with the Company and with subcontractors, NRCES, described in **Section 7.1.4**.

- Ecology has approved CRC as a Primary Response Contractor (PRC). CRC's response time to the Facility is 1 hour. CRC's Equipment Map can be found in **Figure B.3**.

  CRC's contact information is as follows:
  Clean Rivers Cooperative, Inc.
  Address: 9420 NW St. Helens Rd.
  Portland, Oregon 97231
  24-hour hotline: (503) 220-2040
  Office: (503) 735-1687

- CRC is classified by the USCG as a category W3 OSRO for the inland/nearshore operating area in the Columbia River Captain of the Port (COTP). An OSRO Classification process was developed by the USCG to evaluate an OSRO's potential to respond to and recover oil spills. Plan holders who arrange for USCG classified OSRO services do not have to list their response resources in their plans.

B.1.2 Other Oil Spill Response Organizations

- Facility and Tesoro are also members of Marine Spill Response Corporation (MSRC). A letter confirming this membership and a copy of the MSRC contract with Tesoro can be found in **Figure B.2**.

- The Company has also obtained permission from Global Diving & Salvage Inc., a PRC in the State of Washington, to list its response resources for the Washington facilities. **Figure B.1** summarizes contractor contact information. **Figure B.2** contains evidence of contracts **Figure B.3** contains response contractor equipment maps.

B.2 NON-DEDICATED VESSELS

- Through contractual agreement with CRC, non-dedicated work boats and operators will be available to deploy geographic response plans, enhance skimming, provide platforms as vessel of opportunity skimming systems, logistical support, or other uses during a spill. Such resources could arrive on scene beginning at 48 hours.

- In addition to CRC, MSRC may also provide non-dedicated vessels to support spill response.

Figure B.1 – Facility Response Action Contractors

CONTRACTOR AND POINT OF CONTACT	ADDRESS	PHONE/FAX NUMBERS	CONTRACTOR CERTIFICATION	CONTRACT IN PLACE WITH FACILITY?	RESPONSE TIME
Clean Rivers Cooperative Inc. Ernie Quesada	200 SW Market Street, Suite 190 Portland, OR 97201	(503) 220-2040 (24 hr.) (503) 295-3660 (fax)	• USCG classification W3, River/Canal, Inland and Oceans • State of Washington approved primary response contractor	YES	2 hours
Marine Spill Response Corporation	455 Spring Park Place Suite 200 Herndon, VA 20170	(703) 326-5600 (Office) (703) 326-5660 (Fax) (800) 645-7745 (24 hr.) (425) 252-1300 (Everett)	• USCG classification W3, River/Canal, Inland and Oceans • State of Washington approved primary response contractor	YES	2 hours
Global Diving & Salvage, Inc.	3840 W Marginal Way SW Seattle, WA 98106	(206) 623-0621 (Office) (206) 932-9036 (Fax)	• TBD	TBD	TBD

FIGURE B.2 – EVIDENCE OF CONTRACTS

EVIDENCE OF CONTRACTS
MARINE SPILL RESPONSE CORPORATION CLEAN RIVERS COOPERATIVE INC. - Pending

Judith A. Roos
Vice President
Marketing, Customer Services & Corporate Relations
(703) 326-5617

April 30, 2015

Mr. Eric Haugstad
Tesoro Corporation Inc.
5501 NW Lower River Road
Vancouver, WA 98660

Re: Letter of Intent

Dear Mr. Haugstad:

This letter certifies that Tesoro Corporation has entered into an Agreement with the Marine Spill Response Corporation (MSRC). Pursuant to this Agreement the Tesoro Vancouver Energy facility and its accompanying facilities are (1) entitled by contract to MSRC response services, and (2) have the right to cite the capability of MSRC in its Facility Response Plan, in accordance with the terms and conditions of the Standard Form MSRC Service Agreement.

The enclosed Execution Instrument to the MSRC Service Agreement dated February 18, 2013 between Tesoro Corporation and MSRC is proof that such a contract exists. In addition, MSRC's contract is an evergreen contract and continues automatically until such time that Tesoro Corporation ceases to be a member of the Marine Preservation Association (MPA).

Please let me know if I may provide further assistance to you in the future.

Sincerely,

Judith A. Roos

Enclosure

220 Spring Street | Suite 500 | Herndon, VA 20170 | Telephone 703.326.5600 | Fax 703.326.5660

MARINE SPILL RESPONSE CORPORATION
SERVICE AGREEMENT

EXECUTION INSTRUMENT

The MSRC SERVICE AGREEEMENT attached hereto (together with this execution instrument, the "Agreement"), a standard form of agreement amended and restated as of September 27, 1996, as amended, is hereby entered into by and between

Tesoro Corporation
[Name of COMPANY]

a Delaware Corporation
[Type of entity and place of organization]

with its principal offices located at 19100 Ridgewood Parkway, San Antonio, TX 78259 (the "COMPANY"), and MARINE SPILL RESPONSE CORPORATION, a nonprofit corporation organized under the laws of Tennessee ("MSRC"), and shall be identified as

SERVICE AGREEMENT No. 6MPA 346 [This is to be provided by MSRC.]

IN WITNESS WHEREOF, the parties hereto each have caused this Agreement to be duly executed and effective as of Feb. 18, 2013

Tesoro Corporaiton [COMPANY]

By: _____ [signature]

Daniel R. Romasko [print name]

Title: Executive Vice President, Operations

Address: 19100 Ridgewood Parkway
San Antonio, TX 78259

Telephone: 210/626-6881 Fax: 210/626-4051

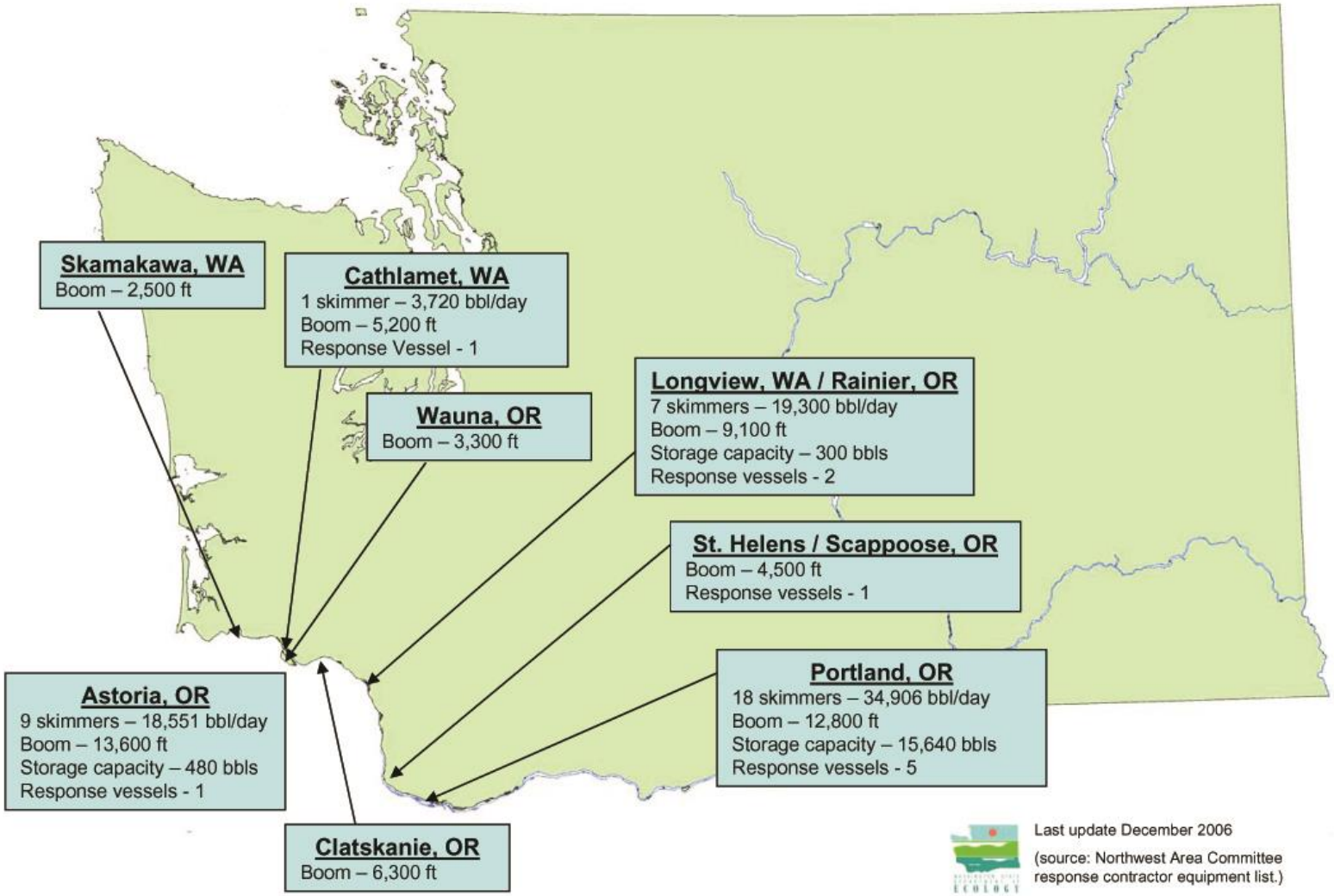
MARINE SPILL RESPONSE CORPORATION:

By: _____
Judith A. Roos
Vice President
Marketing, Customer Services & Corporate Relations
220 Spring Street, Suite 500
Herndon, VA 20170
(703) 326-5617; Fax: (703) 326-5660

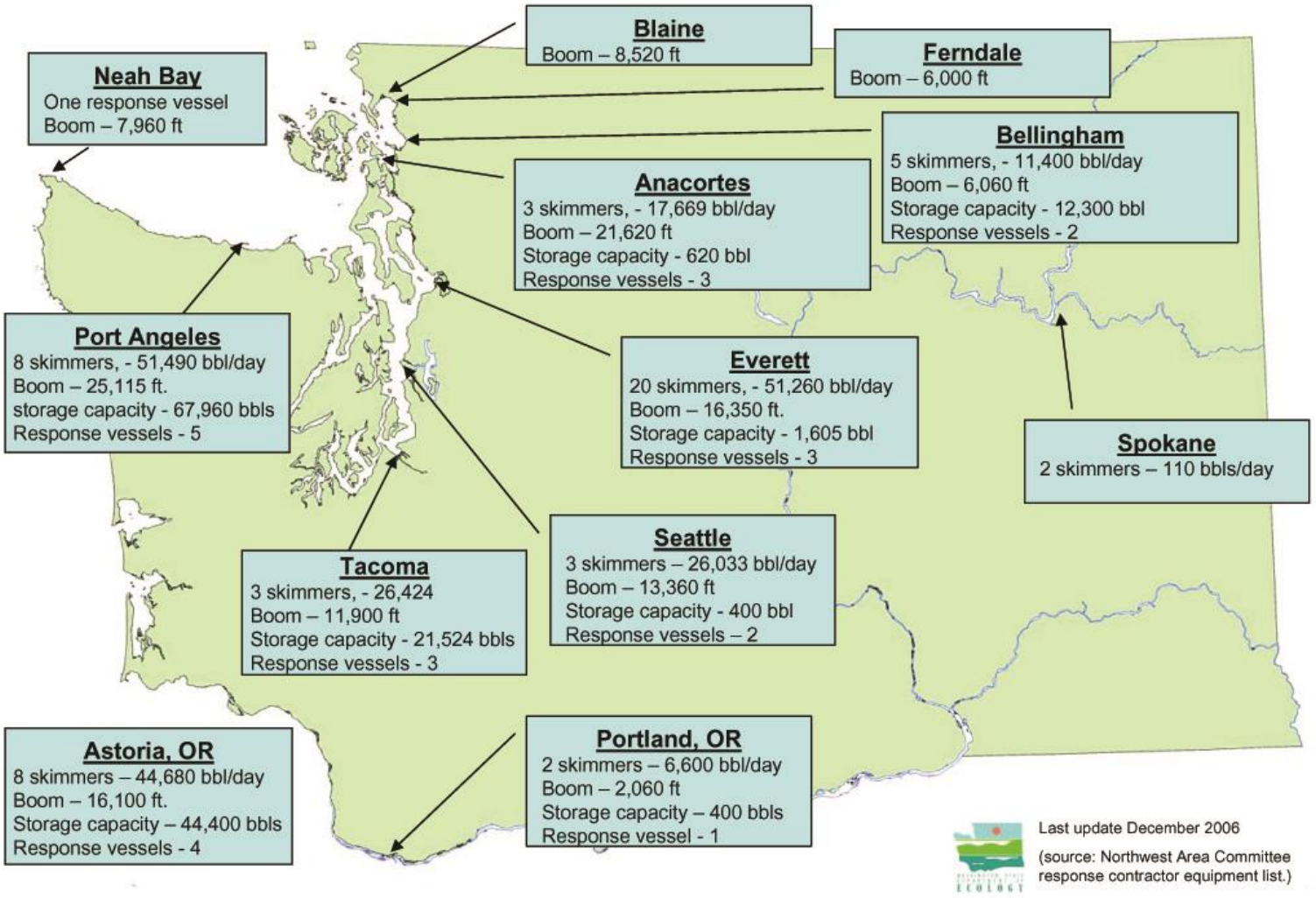
Figure B.3 Equipment Maps

EQUIPMENT MAPS
CLEAN RIVERS COOPERATIVE INC. MARINE SPILL RESPONSE CORPORATION NATIONAL RESPONSE CORPORATION (Equipment available through Clean Rivers' Contract with NRC)

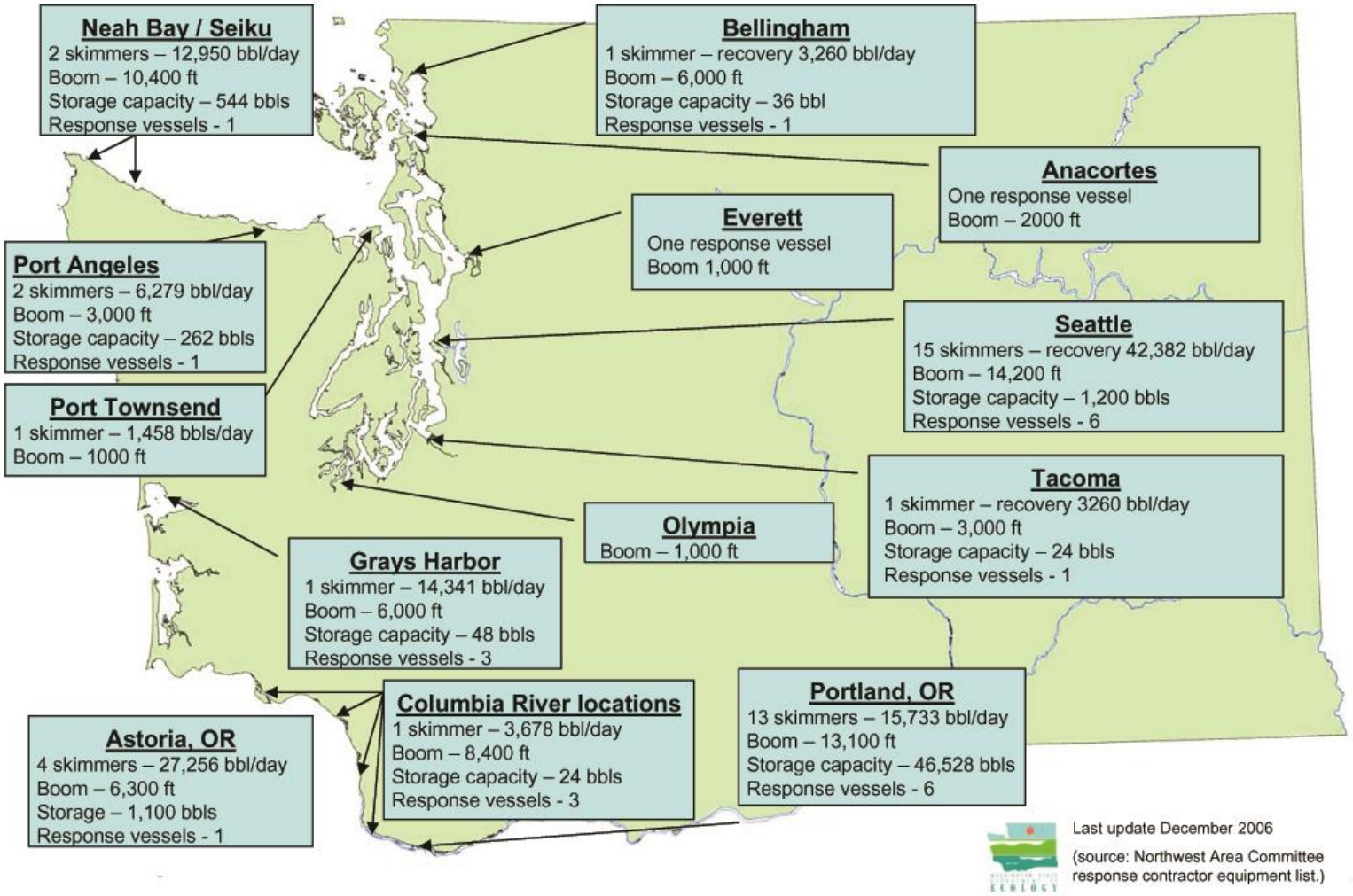
Clean Rivers Cooperative



Marine Spill Response Corporation



National Response Corporation



Vancouver Energy
Operations Facility Oil Spill Contingency Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix C
Vancouver Energy Facility Operations

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APPENDIX C
VANCOUVER ENERGY FACILITY OPERATIONS

C.1 OVERVIEW

The Facility in the Port of Vancouver USA, Washington, is located in different "areas" of the Port. **Figure C-1** presents a Facility Site Plan. The site address is 5501 NW Lower River Road, Vancouver, Washington 98660. The marine dock is located at Terminal 4, on the north side of the Columbia River, at River Mile 103.5, approximately 2.5 miles downriver of the Interstate 5 bridge. The facility is located at latitude 45° 39' 6" N and longitude 122° 43' 52" W.

C.2 DESIGN AND OPERATIONS

C.2.1 General Operations Description

The Facility receives crude oil by rail, stores it on site, and loads it on vessels for shipment. Unit trains arrive at the Facility and are stationed on the Facility rail loops. The trains are "indexed" through the unloading area (Area 200), where the crude oil is gravity-drained into the transfer pipeline system (Area 500). The crude oil is pumped through the transfer pipelines to the crude oil storage tanks (Area 300) where it is held until the marine vessel loading operation. Marine vessels arrive and moor at the dock (Area 400) where they are preboomed. Crude oil is pumped from the storage tanks to the loading area, and loaded to the marine vessels.

Physical properties of these products are provided in **Figure C.2**. Material Safety Data Sheets (MSDSs) are on file in the Facility office.

C.2.2 Physical Description

The Facility occupies approximately 47.4 acres located in different areas within the Port. The terrain is mostly flat, but drops off toward the south. Facility drainage outside of the various containment areas flows to existing surface water conveyance and treatment systems prior to the eventual release of water to the Columbia River. All of the downstream outfalls are permitted and regulated by the Washington Department of Ecology. There are three separate conveyance systems in which surface discharges are released from the Facility to eventual aquatic discharges.

Terminal 5 stormwater system

Terminal 4 stormwater system

Combined Marine Terminal and Subaru lot treatment swales

A portion of the Facility lease boundary is located within areas determined by the Port to be within its general use area, which the Port defines as areas in which it is not feasible that individual tenants collect and treat their own stormwater discharges. Areas in this Facility that fall under that designation are limited to rail improvements located within the master plan rail corridor, transfer pipeline alignment, and non-pollution-generating rail yard area on the north side of the rail unloading building.

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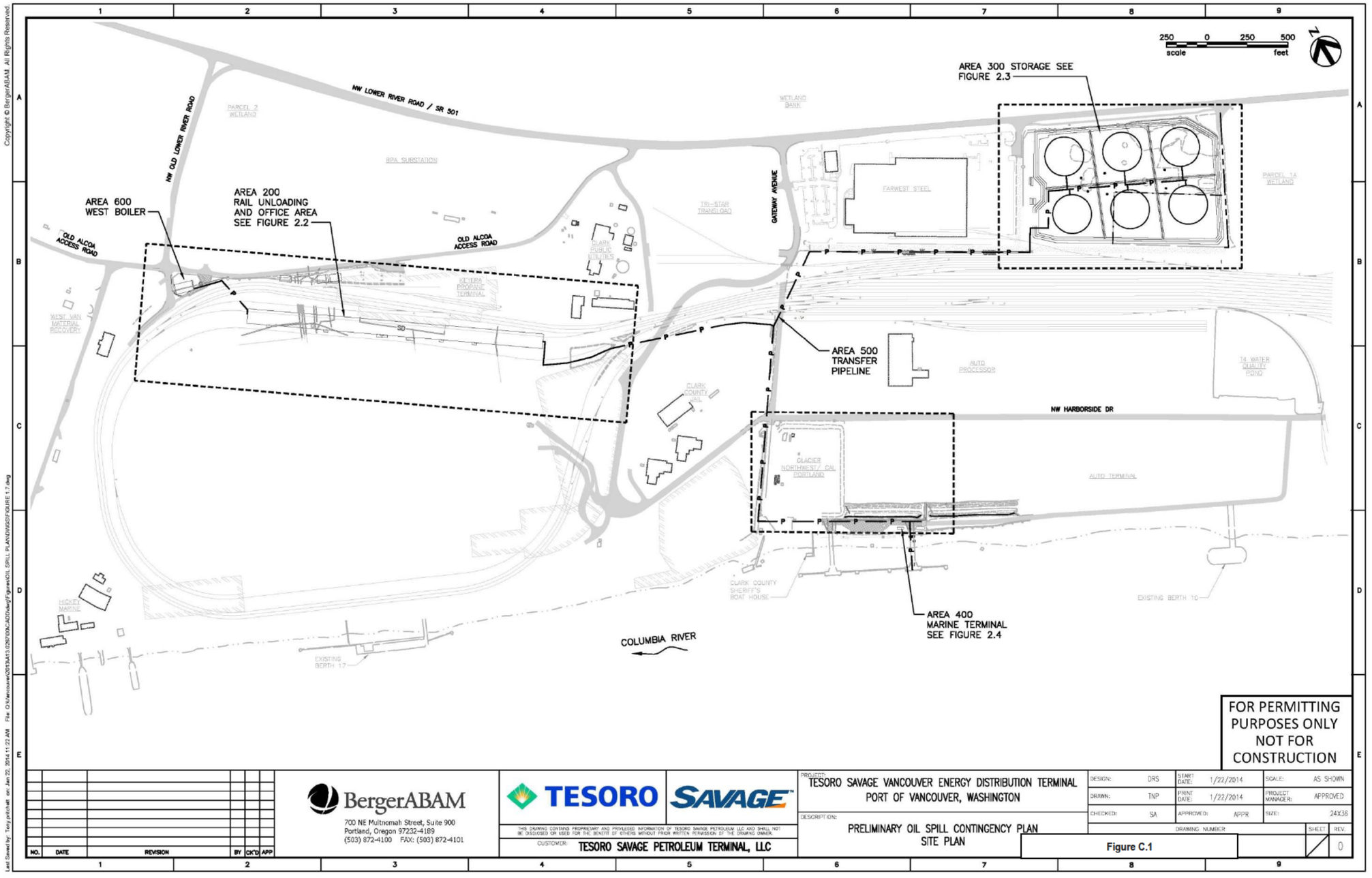
Figure C.1. Facility Site Plan



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The following discussion summarizes the project site areas.

Area 200 – Administrative/Support and Rail Unloading
Area 200 is located at 5501 NW Lower River Road in Vancouver. The following Facility elements are located in Area 200: administrative and support buildings, parking, rail access to the rail unloading facility, and the rail unloading facility. Area 200 is accessible from an unnamed private road owned and maintained by the Port.

Area 300 – Product Storage
Area 300 is located at the Port's Parcel 1A on the south side of NW Lower River Road just east of the existing Farwest Steel facility. The following Facility elements are located in Area 300: product storage tanks and associated secondary containment, the Area 300 Boiler Building, and associated control and ancillary systems. Area 300 is accessible from NW Gateway Avenue and NW Lower River Road via a shared private drive.

Area 400 – Marine Terminal
Area 400 is located at existing Port berths 13 and 14 on the Columbia River south of the current Subaru facility. The following Facility elements are located in Area 400: product conveyance and loading facilities located on the dock, the marine vapor combustion units (MVCUs), emergency containment and response equipment, and control and ancillary facilities associated with vessel loading. This area is accessed from Gateway Avenue and Harborside Drive by a driveway to be constructed with the project.

Area 500 – Transfer Pipelines
Area 500 consists of a non-exclusive easement located within Terminal 5, Parcel 1A, berths 13 and 14, and corridors adjacent to existing private port roads. Area 500 includes the corridors for the approximately 26,400 = 5 miles lineal feet of transfer pipelines that will connect the Unloading (Area 200), Storage (Area 300), and Marine Terminal (Area 400) portions of the project. These transfer pipelines include

(1) A 36-inch marine transfer pipeline that extends approximately 4,600 feet from the product storage tanks to the marine terminal.
(2) Three 24-inch transfer pipelines that extend approximately 4,500 feet from the rail unloading area to the product storage tanks.
(3) A 6- to 12-inch return line/pressure release.

All transfer pipelines are pressure tested annually. Pipelines are tested according to API RP 1110, ASME B31.4 or B31.3 as appropriate. Test dates and results are recorded and maintained at the Facility.

Area 600 – West Boiler
Area 600 is located at the northwest corner of Terminal 5, and is composed of the Area 600 Boiler Building and its associated parking.

Area 600 is accessed from Old Lower River Road and a private road owned and maintained by the Port.

Rail Facilities
The project uses up to three main rail loops (Tracks 4105, 4106, and 4107) at Terminal 5, and associated bad order car and departure tracks.

Hours of Operation
The Facility is planned to operate 24 hours a day, 7 days a week. Marine terminal operations are scheduled on a 24-hour, 7-day-a-week basis, as required by a particular vessel's schedule.

Figure C.2. Properties of Petroleum Products Handled

Product	Boiling Point (°F)	Specific Gravity (H_2O=1)	Density	API	Oil Group	Sulfur Content	Construction Type
Crude Oil	94 to 1330	0.8 to < 1.0	0.8 to < 1.0	10-45	2, 3, 4	Trace to 5%	Welded steel

MSDSs on products listed are located in the Facility office and are available 24 hours per day.

C.2.3 Drip and Discharge Collection

A minimum three-barrel capacity collection pan is located below the transfer header at the hose crane at the marine terminal. The collection pan is covered with openings to allow drips and incidental discharges to drain into the pan. Additional drip pans are located at all fittings, connection points, and at hose ends.

C.2.4 Secondary Containment

All crude oil storage tanks are surrounded by compacted earthen dikes that meet EPA volumetric guidelines. Secondary containment capacity is sufficient to contain 110 percent of largest tank volume plus a 100-year rainfall event and freeboard.

All crude oil storage tanks are equipped with automatic gauging systems and high level alarms. **Figure C.3** provides a summary of tanks at the facility.

C.2.5 Emergency Shutdown System

While unloading rail cars and pumping oil to the Storage Facility, operators can manually stop the process by pressing an emergency shutdown (ESD) push button. When pressed, automated valves will close at each of the rail offload stations, isolating the crude inside the rail cars from the pump header, shut down the rail transfer pumps, and close the 24-inch valves at the beginning of the rail transfer lines, isolating the rail area process from the transfer pipe line.

When an ESD push button has been pressed, the control room will receive an alert stating which stations' push button has been pressed and an alarm will sound throughout the rail unloading area with horns and beacons.

Within the tank storage area the ESD system will be manually activated by pressing an ESD push button. When an ESD is pressed, all automated valves on the storage tanks will close isolating the crude in the tanks, the marine vessel loading pumps will shut down, and the control rooms will receive an alert stating which push button has been pressed and that an ESD occurrence has taken place.

While loading a Marine Vessel at the berth, operators may manually stop the process by pressing one of the ESD push buttons on the dock. When pressed, the Marine Vessel loading pumps will shut down, the automated valve near the dock will close and an alert will be sent to the control rooms stating which ESD button has been pressed.

If a facility-wide emergency is necessary, there will be a facility wide button to press at each of the control rooms. When a facility-wide ESD is necessary, all operations will be stopped as outlined above for all areas of the facility.

C.2.6 Monitoring Devices

Monitoring devices as described in 33 CFR 154.525 are not required at the Facility dock or terminal.

§ 154.525 Monitoring devices.
The COTP may require the facility to install monitoring devices if the installation of monitoring devices at the facility would significantly limit the size of a discharge of oil or hazardous material and either:

(a) The environmental sensitivity of the area requires added protection;

(b) The products transferred at the facility pose a significant threat to the environment; or

(c) The size or complexity of the transfer operation poses a significant potential for a discharge of oil or hazardous material.

[CGD 75–124, 45 FR 7172, Jan. 31, 1980, as amended by CGD 86–034, 55 FR 36253, Sept. 4, 1990]

C.2.7 Relief Valve Setting

For transferring product from the rail unloading area (Area 200) to the storage area (Area 300), a predetermined PLC set point from a pressure transmitter signal will automatically power off the facility pump at approximately 100 psi. The pressure transmitter is located on the 10-inch pump discharge pipeline at the pump basin. In addition to the pump shutdown, the system has a pressure relief valve downstream of each pump that will recirculate the crude in the event that the pump discharge piping is blocked and the pressure transmitter fails. This pressure relief valve is set at approximately 110 psi. The system also has thermal pressure relief valves relieving thermal expansion in blocked portions of the piping between the rail unloading area (Area 200) and the storage area (Area 300). These valves are set at varying pressures depending on their location in the piping system. For transferring product from the storage area (Area 300) to the marine terminal area (Area 400), a predetermined PLC set point from a pressure transmitter signal will automatically power off the facility pump at approximately 100 psi. The pressure transmitter is located on the 36-inch pump discharge pipeline at the pump basin. In addition to the pump shutdown, the system has a pressure relief valve on the pump discharge header that will recirculate the crude in the event that the pump discharge piping is blocked and the pressure transmitter fails. This pressure relief valve is set at approximately 110 psi. The system also has thermal pressure relief valves relieving thermal expansion in blocked portions of the piping between the storage area (Area 300) and the marine terminal are (Area 300). These valves are set at varying pressures depending on their location in the piping system.

Figure C.3. Oil Storage Tank Information

Tank	Product	Volume (bbl)	Built	API 653 Inspection	Major Type of Failure/Cause	Cathodic Protection
0300-TK-001	Non-heated Crude Oil	380,000	TBD	Upon Construction Completion	Leak/Rupture	Yes
0300-TK-002	Non-heated Crude Oil	380,000	TBD	Upon Construction Completion	Leak/Rupture	Yes
0300-TK-003	Non-heated Crude Oil	380,000	TBD	Upon Construction Completion	Leak/Rupture	Yes
0300-TK-004	Non-heated Crude Oil	380,000	TBD	Upon Construction Completion	Leak/Rupture	Yes
0300-TK-005	Heated Crude Oil	380,000	TBD	Upon Construction Completion	Leak/Rupture	Yes
0300-TK-006	Heated Crude Oil	380,000	TBD	Upon Construction Completion	Leak/Rupture	Yes

Total Terminal Storage Shell Capacity = 2,280,000 bbl (six tanks at shell capacity of 380,000 bbl each)
Total Terminal Storage Capacity = 2,160,000 bbl (fill capacity of the six tanks is 360,000 bbl each)
Total Secondary Containment Volume = 606,020 bbl. (157% of largest tank volume)

C.3 Transfer Procedures

There are loading arms located at the marine terminal. Transfers are from manifold to vessel via hose connections using the crane and loading arms.

Product can be transferred at the terminal by two different methods:

1. Railcar (receive only).
2. Vessel (dispense only).

Product receiving and completion of product pumping procedures are described for each of these methods below.

C.3.1 Vessel Transfers

Upon confirmation of product delivery/receipt involving either barge or ship, the following procedures are followed.

1. Notify the Port of the scheduled transfer in advance. Verify availability of dock space.
2. Notify USCG and state of Washington via the Ecology website:

   Name of ship/barge company
   Barge number or ship name
   Product type and volume
   Date of transfer
   Estimated start and finish times

This information is then logged in the terminal log book, along with the initials of the employees making the call, initials of person receiving the call, and the date and time this information was transmitted.

3. Physical inventory is then collected on the receiving or dispensing tank involved. Hand gauging will occur. Beginning meter readings are taken, as well as temperature of the product and the level of condensate water on the bottom of the tank. This information is recorded in the terminal log book. Hourly gauges are logged as in a pipeline receipt.
4. The Tesoro employee on dock duty will be responsible for:
   a. Preparing and checking the transfer site.
      (1) The dock and surrounding area are inspected for oil slicks, debris, and proper condition of the dolphins.
      (2) The pipeline, valves and hose are inspected. Any oil slicks, damage, leaks, etc. must be reported to the Terminal Manager.
      (3) The valve in the shoreline (which is located at the northeast corner of the building just north of the dock) is then opened. The by-pass valves to the shoreline valve are closed.
   b. Inspecting the vessel for proper alignment with the hose header, holding a face-to-face Pre-Transfer Conference with the Vessel Person in Charge, following directions outlined on the Declaration of Inspection1, signing the Declaration of Inspection and checking for hazardous conditions that might exist.
   c. Ensuring that when the hose is passed to the vessel that the end of the hose is capped.

[1] An explanation of Declaration of Inspection Procedures and a blank Declaration of Inspection Form are contained in Appendix F.

d. Begin transfer by opening valves to start the flow to the vessel. Starting with low flow and checking for proper connections, valve alignments and leaks. After a thorough system check, slowly bringing the flow rate to a normal operating rate.

e. During the transfer operation the operator will monitor the transfer operation continuously. Checking transfer pressure and adjusting as necessary. Checking valves, fittings and connections for leaks and checking the water surface for signs of oil in the water.

f. Transfer operation will be stopped should any of the following occur:
   (1) Oil is spilled outside of the containment onto the ground or into the water.
   (2) Communications or power is lost.
   (3) Lighting becomes inadequate.
   (4) Weather turn bad (such as during an electrical storm).

g. Upon completion of product transfer, the terminal dock operator assists vessel personnel in draining the hose, disconnecting the hose and capping the end of the hose prior to the hose being passed over water for storage.

h. h. The terminal dock operator closes all valves and secures the main valves with a chain and lock.

5. The plant operator, upon completion of the transfer, will ensure hand gauging is conducted on the receiving/shipping tank. A bill of lading (BOL) is then prepared.
6. Rack delivery tickets from all previous transactions are kept isolated. Product dispensed through the rack while the dock transfer is occurring is noted.
7. For dispensing product, it is necessary to open the proper valves in the pumping station manifold. The valve to the cargo pump and the valve into the shoreline are opened.
8. All tanks on the vessel (whether it is being loaded or unloaded) are to be gauged to determine the amount of product capacity.

C.3.2 Railcar Transfers

The facility receives railcars on three rail loops located at Terminal 5. Up to three unit trains of 100 to 120 cars each can be simultaneously accommodated on the rail loops at full operation of the Rail Unloading Area. Unit trains are indexed 30 cars at a time through the unloading building. There is one unloading header at each railcar position. Rail cars are gravity drained. Each railcar position is protected by a spill containment system.

During railcar unloading, the following procedures are followed:

1. The railroad will provide at least one-day notice of a railcar delivery. The railroad will spot the railcar, block its wheels and set the brakes.
2. At least one terminal operator is required to monitor railcar-unloading operations.
3. Operators wear protective clothing, including hard hats, goggles, rubber gloves and appropriate outerwear.
4. Before unloading, the grounding cable to the railcar is connected.
5. The contents of the railcar are verified by reviewing the bill of lading.
6. The railcar, transfer equipment and surrounding area is inspected to assure that everything is in normal operating conditions.
7. Bolts on the railcar dome covers are slowly loosened to relieve possible pressure build-up.
8. Each product compartment is inspected for debris or foreign matter.
9. Volume is verified by BOL. The tank that is to receive the product is also gauged.

10. The product is sampled. The product is then verified by visual inspection and testing for specific gravity.
11. The railcar's bottom outlet cap is removed and the terminal's transfer hose camlock is connected to the railcar fitting.
12. The railcar valve and the pipeline valve are then opened, followed by the railcar manifold. The transfer pump is then activated.
13. Upon completion of transfer, the pump is turned off, valves are turned off, the hose is removed, the railcar dome hatch is re-bolted, and the railcar bottom outlet cap is closed and tightened.
14. The amount of product on the bill of lading from the railcar is verified against the inventory change in the receiving tank.
15. Finally, the railroad is notified that the railcar unloading has been completed.

C.4 EMERGENCY SHUT DOWN PROCEDURES

The Facility uses the international recognized signals for emergencies. If an emergency occurs on the marine terminal, the ship will be notified by portable radio or voice.

IN ALL EMERGENCY SITUATIONS, SHUTDOWN ALL PRODUCT TRANSFERS IMMEDIATELY AND SECURE VALVES

If any abnormal situation is detected during a product transfer, stop all activities. Shut the associated pump down immediately. Close all valves on the railcar, pump, pipeline, or tank. Transfer operations are not resumed until the system has been inspected and repaired, and the Facility Manager has deemed the system fit for continued operations.

If leakage or uncontrolled discharge is detected, the transfer is immediately terminated or not initiated. A safety perimeter is established. When the Facility Manager has deemed conditions are safe, necessary and practical remediation actions are initiated. The first available qualified individual, the emergency response contractor, and appropriate agencies and organizations as described in **Section 2** and **Section 3** are alerted. If necessary, the Tesoro response away-team is alerted.

Product transfer will not resume until the oil is cleaned up, removed from the deck of the vessel and/or from the surface of the water (if possible) and damage is repaired and no further danger exists.

Emergency shutdown systems are described in **Appendix C.2.5**.

Figure C.4. Facility Drainage and General Sewer Plan

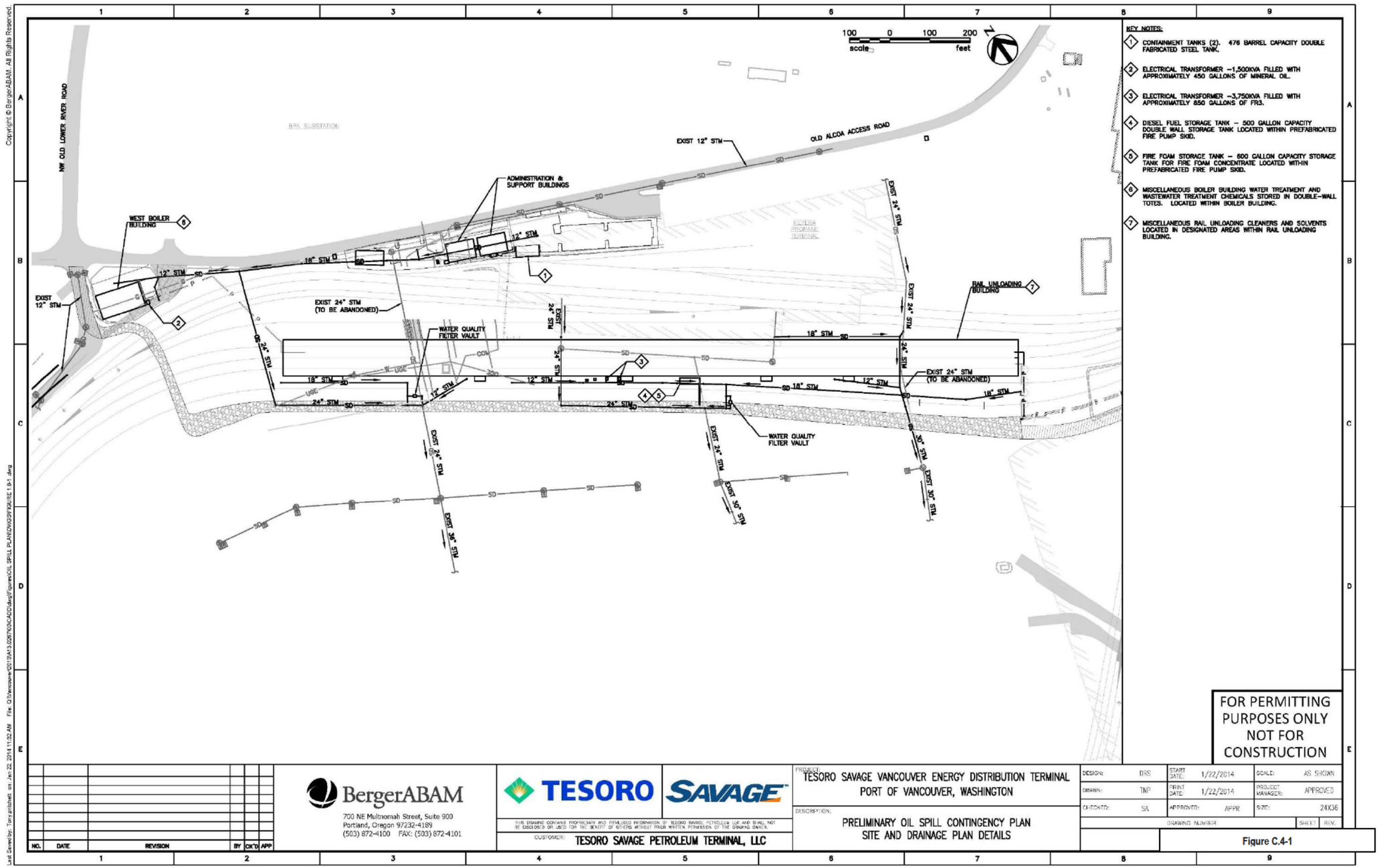

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Figure C.4. Facility Drainage and General Sewer Plan (continued)

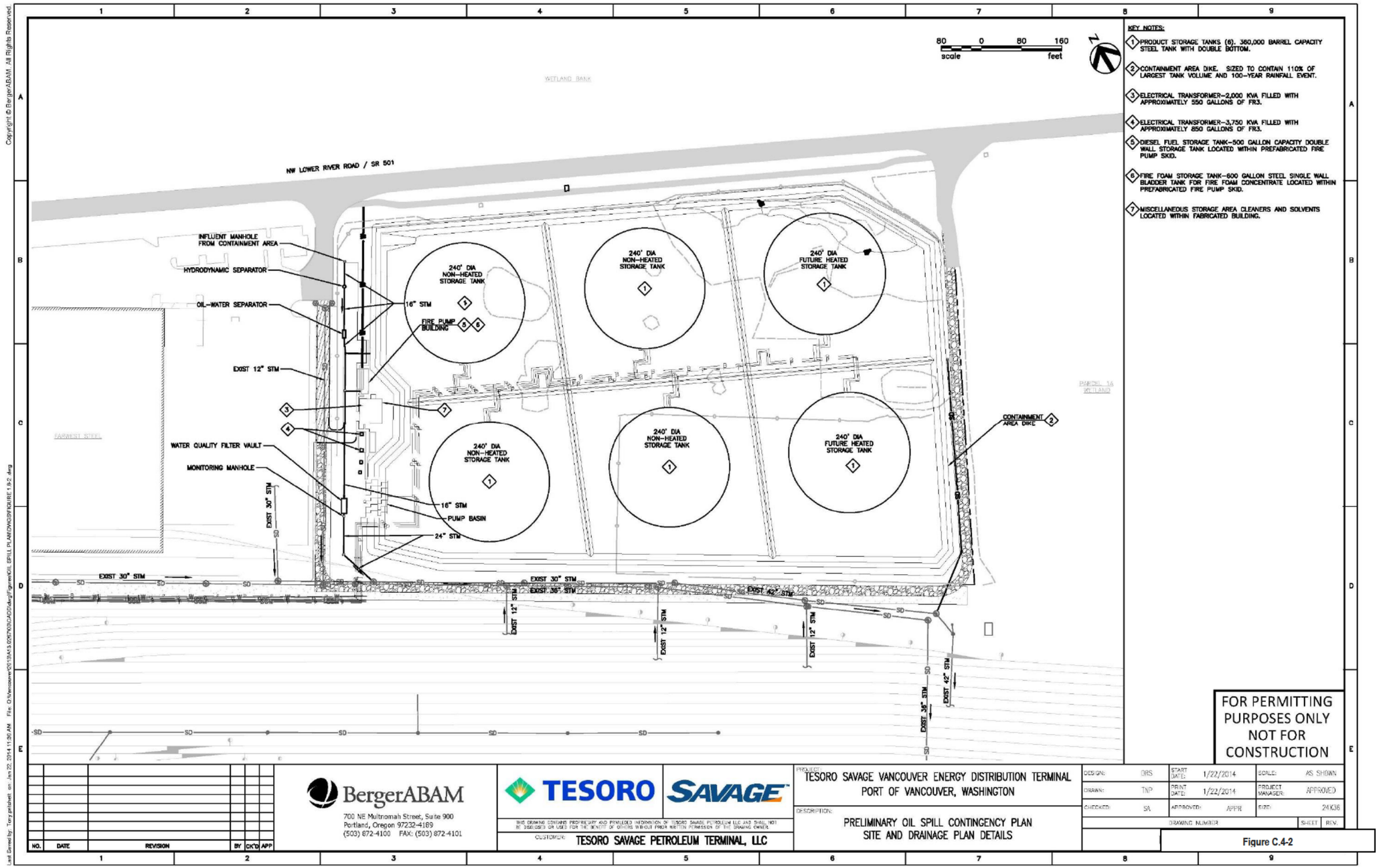

Figure C.4-2

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Figure C.4. Facility Drainage and General Sewer Plan (continued)

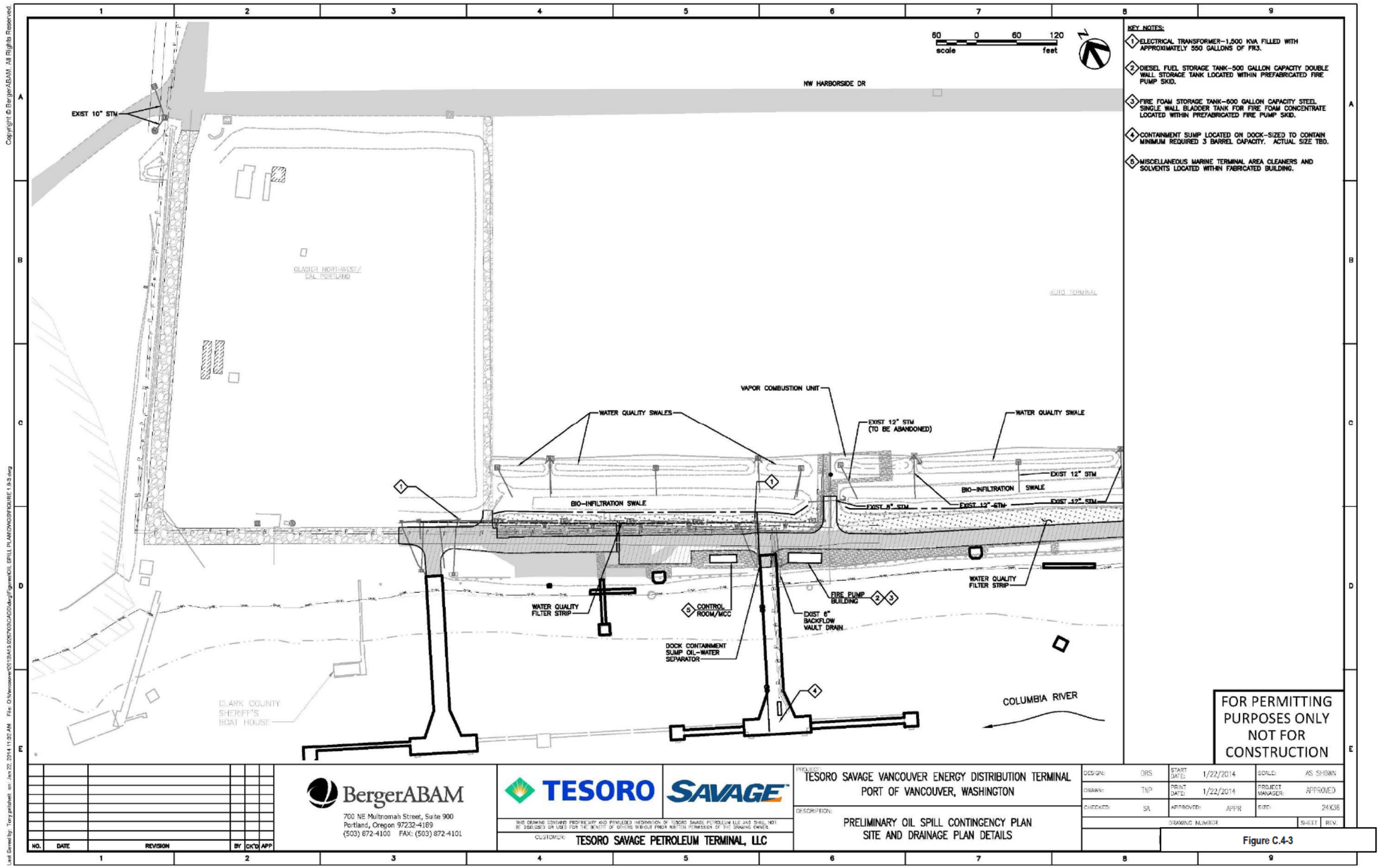

Figure C.4-3

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Vancouver Energy
Operations Facility Oil Spill Contingency Plan
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix D
Hazard Evaluation/Risk Analysis

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APPENDIX D
HAZARD EVALUATION/RISK ANALYSIS

D.1 INTRODUCTION

An evaluation of the major components of the oil transfer and storage system at the terminal has been completed for the purpose of identifying the potential risk of oil spills associated with each component. The analysis is focused on identifying the components or areas that pose the greatest overall risk of spills.

The spill prevention measures for any components/areas identified as having a significant spill risk were then evaluated to ensure that the best achievable technologies are in place based on industry standards. In the unlikely event that additional protection measures should be taken, recommendations will be made for additional measures.

D.2 FACILITY OIL SPILL RISK ANALYSIS

D.2.1 Scope

The oil spill risk analysis identifies potential oil spill risks and evaluates the frequency and severity of such risks. For the purposes of the risk analysis, the storage and transfer facilities are grouped into the following areas.

Area 200	Rail transfer facilities
Area 300	Storage tanks and their containment
Area 400	Marine transfer facilities
Area 500	Transfer pipeline leak outside of secondary containment

All of these facilities are operated in an integrated fashion by the Certificate Holder. Therefore, any risks that transcend the artificial boundaries established by the above grouping were an integral part of the analysis.

The risk analysis was primarily intended to identify hazards that could lead to oil spills that could reach the waters of the State. Small spills on land that cannot impact the waters of the State were not to be analyzed in detail.

The preceding sections of this plan discuss the measures taken to prevent oil spills from the facility. In many cases, these measures are not repeated in this section.

D.2.2 Method

Hazard identification was done using the checklists in Ecology's Facility Risk Analysis Guidelines as the starting point. The checklists were made site-specific by adding items that have resulted in past spills at other facilities, items that are discussed in the prevention plan, and other items that could present potential oil spill risks.

From the oil spill hazards identified by the checklist review, oil spill scenarios that could conceivably lead to oil reaching the river were developed. The frequency and severity of these spill scenarios were identified qualitatively. This identification was based primarily on the operating history of the facility and a detailed knowledge of the operating procedures, inspection program and results, and maintenance schedules of the oil storage and transfer facilities. A "Frequency-Severity Matrix" similar to the one shown in Ecology's guidelines was used to identify the risk category into which each scenario fell.

D.2.3 Analysis of Past Spills

The Facility is not yet constructed and therefore there are no past spills to evaluate.

D.2.4 Risk Estimation and Scenario Development

Risks from the hazards identified in completing the checklists were addressed by developing spill scenarios that contained one or more of the identified hazards. Low probability spills with high potential severities also were addressed.

Scenarios were not developed for every possible combination of events or hazards. The following guidelines were used in developing the scenarios:

Cover the range of hazards identified, even the ones viewed as unlikely.

For a group of related scenarios, use the one representing the worst combination of frequency and severity, yet still plausible.

As determined using the Hazard Identification Checklist (**Figure D.1**) and this risk analysis, a risk of a significant discharge exists in the terminal tank yard, at the truck and rail transfer areas, from pipelines, and at the marine header/dock.

The possibility of a catastrophic discharge impacting state or navigable waters is extremely low due to the location of the terminal and strict adherence to established operating and maintenance procedures. The terminal is located approximately 1,800 feet inland from the Columbia River. There is limited direct drainage from the terminal to the river, and several roads and naturally occurring impoundments are located between the terminal and river which should provide containment and collection sites.

The single marine transfer pipeline that extends from the Storage Area to the Marine Terminal is equipped with three valves that are closed and locked when transfers are not in progress. The total volume of the pipeline from the Storage Area to the Marine Terminal is approximately 5,505 barrels. The total volume of the pipeline from the Rail Unloading Area to the Marine Terminal is approximately 3,802 barrels. The volume between the dock header valve and first inline valve is approximately 314 barrels. All marine transfers are continuously monitored by trained and qualified personnel. A Tesoro Operator is positioned on the dock and maintains radio contact with the vessel and the Storage Area. Marine transfers can be terminated within 60 seconds of notice, and valves closed immediately thereafter.

Figure D.1. Hazard Identification Checklist

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:	Spill Potential Ratings: **High (H) Medium (M) Low (L)**

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
A. MARINE LOADING/UNLOADING AREA					
Fire Related Spill Hazards					
1. Is the fire extinguishing system adequate?	X				
2. Are sufficient fire extinguishers nearby?	X				
3. Are block valves, check valves, pumps, filters, etc... made of steel?	X				
4. Are pipe supports fire proofed?		X		Pipeline supports are constructed of steel and concrete	
5. Have flammable material ignition sources been eliminated?	X				
6. Does all electrical equipment meet explosion proof requirements?		X		Where required by NEC, API, and NFPA electrical equipment is explosion proof	

Figure D.1. Hazard Identification Checklist (continued)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:

Spill Potential Ratings:
High (H) Medium (M) Low (L)

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
Material Handling Related Spill Hazards					
7. Are remotely operated controls installed for emergency shutdown?	X				
8. Are barricades and/or shields installed to protect equipment?	X				
9. Are unloading lines equipped with check values allowing one way flow?	X				
10. Are hoses in good repair and pressure tested on a regular basis?	X				
11. Is the over-pressure prevention system adequate?	X				
12. Are there spill collection facilities?	X				

Figure D.1. Hazard Identification Checklist (continued)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:

Spill Potential Ratings:
High (H) Medium (M) Low (L)

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
13. Is oil spill containment equipment on hand and adequate?	X				
14. Is there an oil spill response plan?	X				
15. Are vessel overfill devices and/or procedures adequate?	X				
B. DOCK TRANSFER PIPELINES					
Material Handling Related Spill Hazards					
1. Is the corrosion protection and inspection program adequate?	X				
2. Are external coatings used and in good condition?	X				
3. Is right-of-way clear and patrolled on a regular basis? Is it effective?	X X				
4. Are pipelines protected from impact damage (Barricades/depth of cover)?		X	L	Pipelines where adjacent to traffic have barricades. DOT standards have been used to determine barricade placement based on road configuration and permitted vehicle speeds.	
5. Are surge and fatigue loadings acceptable?	X				

Figure D.1. Hazard Identification Checklist (continued)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:

Spill Potential Ratings:
High (H) Medium (M) Low (L)

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
6. Is there an effective leak detection system?	X				
7. Are pipelines susceptible to soil movement? (Landslides, washouts, etc.)	X			Pipelines are designed for soil movements resulting from static settlement and liquefaction.	
8. Have lines been hydrostatically tested? What level and frequency?	X			Dock lines are hydrostatically tested prior to start-up and annually thereafter in accordance with USCG requirements 33 CFR 154 and WAC 173-180-420.	
C. BULK STORAGE TANK FARM					
Fire Related Spill Hazards					
1. Is fire protection adequate? Does system meet industry codes and A.P.I. standards?	X				
2. Is there adequate fire water?	X				
3. Are tank valves made of steel?	X				
4. Are pipe supports fire proofed?		X		Pipeline supports are constructed of steel and concrete	
5. Are firewalls (dykes) in place and sized to meet industry standards?	X				

Figure D.1. Hazard Identification Checklist (continued)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:

Spill Potential Ratings:
High (H) Medium (M) Low (L)

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
6. Do oil lines inside fire walls have welded joints?	X				
Material Handling Related Spill Hazards					
7. Do tanks have high level alarms?	X				
8. Is there an automatic shutdown system on high level?	X				
9. Are there ground level or remote fill level gauges?	X				
10. Do pipelines penetrate dykes and fire walls?		X		Pipelines do not penetrate dikes or fire walls.	
Containment/Control Related Spill Hazard					
11. Is tank farm lot impervious to oil spill penetration?	X				
12. Is there a spill collection system inside tank lot?	X				
13. Are containment dykes sized to meet codes?	X				

Figure D.1. Hazard Identification Checklist (continued)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:

Spill Potential Ratings:
High (H) Medium (M) Low (L)

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
D. PUMP STATION					
Fire Related Spill Hazards					
1. Are pumps, valves and other vessels fire rated?	X				
2. Is fire protection system adequate?	X				
3. Are all ignition sources eliminated?	X				
Material Handling Related Spill Hazards					
4. Is over-pressure system adequate?	X				
5. Is there an emergency shutdown system?	X				
6. Is there a spill collection system (pump slab, dykes, collection drains, sump tank, etc..)?	X				
E. TRUCK/RAIL LOADING/UNLOADING					
Fire Related Spill Hazards					
1. Is fire protection adequate?	X				
2. Is there adequate fire water? Does it meet codes and industry standards?	X				

Figure D.1. Hazard Identification Checklist (continued)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:

Spill Potential Ratings:
High (H) Medium (M) Low (L)

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
3. Are block valves fire rated?	X				
4. Does electrical equipment meet explosion proof requirements?	X				
Material Handling Related Spill Hazards					
5. Is system manual or automatic?				BOTH	
6. Do trucks/rail cars have overfill protection?				Not Applicable	
7. Is there an emergency shutdown system?	X				
8. Are there pressure relief devices on system?	X				
9. Are block valves secure and safe from the public?	X				
10. Are public access areas fenced and lighted?	X				
Containment/Control Related					
11. Is there a spill collection system around loading/unloading areas?	X				

Figure D.1. Hazard Identification Checklist (continued)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:

Spill Potential Ratings:
High (H) Medium (M) Low (L)

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
F. PROCEDURES					
1. Does facility have an up-to-date operating procedures manual?	X				
2. Does facility have an oil spill response plan and procedures?	X				
3. Is there a system to ensure compliance with applicable codes?	X				
4. Is there a quality management system in place to ensure compliance with above procedures and programs?	X				
5. Is there a program for monitoring/controlling third party activities?	X				
G. GENERAL					
1. Is there a fitness for purpose testing program in place for critical oil movement lines (hydrostatic pressure testing, internal inspection, external inspection, coating inspection, etc.)?	X				
2. Have natural hazards been investigated and monitored (landslides, slope instability, bed scouring on flowing water, soil subsidence, etc.)?	X				

Figure D.1. Hazard Identification Checklist (continued)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

OIL SPILL PREVENTION PLAN
FACILITY OIL SPILL RISK ANALYSIS
HAZARD IDENTIFICATION CHECK LIST

FACILITY: Vancouver Energy DATE:

Spill Potential Ratings:
High (H) Medium (M) Low (L)

"No" answers with high to medium spill potential require further investigation. Formal risk analysis methods should be considered for situations with high to medium spill potential.

	YES	NO	SPILL POTENTIAL	COMMENTS	RESPONSE
3. Are leak detection surveys conducted and records maintained for two years min? Is a material balance maintained for the facility?	X X				
4. Are changes to equipment critical set points controlled adequately?	X				
5. Are pipeline crossings by third parties controlled? Are crossing agreements in use?	X				
6. Is there a training program for employees on safe operation and maintenance of all oil movement systems?	X				

D.3 HAZARD EVALUATION AND IDENTIFICATION

A completed Ecology's Hazard Identification Check List is provided in **Figure D.1**. None of the "no" answers on the checklist contribute to high or medium spill risk, therefore the following qualitative discharge risk analysis is provided:

D.3.1 Storage Tank Leak or Failure

All storage tanks are constructed to API 650 and Uniform Fire Code specifications. The tank yard and surrounding area is cathodically protected. The entire area is visually inspected daily. Future tank inspections will be made in compliance with API 653 guidelines.

The maximum quantity of crude oil which could be discharged is based on the capacity of the largest single tank which is 360,000 barrels. The rate of flow would be variable depending on the size and location of the leak or failure. The total quantity of crude oil which could be discharged would not exceed 360,000 barrels.

Spilled crude oil would be contained in the tank yard impoundment area. The impoundment area is fully diked and provides storage volume in excess of the capacity of the largest tank.

D.3.2 Tank Overflow

During crude oil receipt there is potential for tank overflow due to operator error or equipment failure. Tanks are equipped with high level audible alarms which are set at approximately 95 percent of capacity. A redundant high level emergency shutdown level alarm is additionally included. Due to the large storage capacity, tanks are seldom "topped-off," and normally are filled to only 70 percent of capacity.

During all bulk transfers to or from the crude oil storage tanks operators are on duty. Continuous communication is maintained between the receiving and delivering operator. At a minimum at least one operator will be monitoring operations at the storage area and another operator at either the rail unloading operation when loading the tanks, or at the dock when unloading the tanks.

The total quantity of crude oil that could be discharged is proportional to the length of time the tank is overflowing. It is estimated that 250 barrels could be discharged based on transfer monitoring procedures, delivery rates, and shutdown procedures.

Spilled crude oil would be contained in the storage area impoundment area.

D.3.3 Rail Unloading Rack

At the rail unloading area there is potential for discharge due to operator error or equipment failure. The area is attended during all transfers activities. The rack is equipped with automatic and manual shutdown capability. Emergency shutdown switches are located every 6 unloading stations.

Each rail unloading station is capable of unloading 8.33 barrels per minute of crude. The maximum capacity of all 90 unloading stations is 750 barrels per minute.

The total quantity of crude oil that could be discharged is variable. The worst case discharge is based on the capacity of an entire rail car which is approximately 700 barrels.

Spilled crude oil would flow into the containment collection system which consists of continuous drip pans and collection piping that flows into surge tanks and pumped into aboveground containment tanks that have a minimum capacity of 770 barrels.

D.3.4 Marine Transfer Pipeline

A 36-inch transfer pipeline extends approximately 4,600 feet from the storage area marine terminal. A spill could result from a pipeline fracture or leak. The pipeline is constructed of welded

steel and cathodically protected. Where underground the pipeline includes secondary containment consisting of either double walled pipe or located within casings. It is hydrostatically pressured tested annually in accordance with API standards. The pipeline is equipped with three isolation valves which are closed and locked when transfers are not in progress.

Maximum rate of flow is 36,000 barrels per hour.

Total volume that could be discharged would be variable depending upon the location and nature of the leak or fracture. The volume between the dock valves and first inline valve is approximately 314 barrels. The total capacity of the pipeline is approximately 5,505 barrels.

Direction of flow from a pipeline discharge would be dependent upon the location of the failure. The pipeline alignment is sloped to direct spills and drainage to storm drain inlets designed to separate and retain oil.

D.3.5 Rail Unloading Transfer Pipeline

Three 24-inch transfer pipelines extend approximately 4,500 feet from the rail unloading area to the storage area. A spill could result from a pipeline fracture or leak. The pipeline is constructed of welded steel and cathodically protected. Where underground the pipeline includes secondary containment consisting of either double walled pipe or located within casings. It is hydrostatically pressured tested annually in accordance with API standards. The pipelines is equipped with three isolation valves each which are closed and locked when transfers are not in progress.

Maximum rate of flow is 11,000 barrels per hour.

Total volume that could be discharged would be variable depending upon the location and nature of the leak or fracture. The total capacity of each pipeline is approximately 2,458 barrels.

Direction of flow from a pipeline discharge would be dependent upon the location of the failure. The pipeline alignment is sloped to direct spills and drainage to storm drain inlets designed to separate and retain oil.

D.3.6 Marine Terminal

A discharge may result from operator error and/or hose or piping failure during marine transfers. All marine transfer personnel are trained and qualified to USCG standards. All transfer equipment is visually inspected, a pre-transfer conference is conducted, and a Declaration of Inspection is completed prior to transfer.

Marine transfer equipment is maintained to USCG requirements (33 CFR Part 154, 155, 156). During marine transfer, a Tesoro Terminal Operator is stationed adjacent to the transfer hose header. He maintains radio communication with the vessel and terminal.

It is estimated that less than 100 barrels could be discharged at the dock based upon operating procedures and the close proximity of shutdown valves.

Drip pans are positioned beneath the header and hose connections to contain leaks and drips. In the event of a spill to water, the movement of crude oil which enters the Columbia River would be determined by the prevailing currents and weather. Containment boom and sorbents, which are maintained at the head of the dock would be deployed within one hour.

Figure D.2. Facility Spill History

Date:	
Release Description/Cause/Location:	
Material:	
Quantity (spilled/recovered) in barrels:	
Amount Reaching Navigable Water:	
Effectiveness and Capacity of Secondary Containment:	
Clean-up actions taken:	
Steps taken to reduce possibility or reoccurrence:	
Total oil storage capacity of tank(s) or impoundment(s) from which material discharged:	
Enforcement actions:	
Effectiveness of monitoring equipment (describe):	
Spill detection:	

NOTE: The facility has had no spills or releases to date.

D.4 POTENTIAL ROUTES OF DISCHARGE

A spill from the Facility will probably originate in one of three areas. Each has been discussed above.

Rail Unloading Area Spill

Terrain directly adjacent to the Rail Unloading Area is flat and generally slopes to the south. Spilled oil within the rail unloading structure would be captured by the containment system and remain on-site.

Storage Area Spill

Terrain directly adjacent to the Storage Area is flat and generally slopes to the south. Spilled oil within the Storage Area would be retained within the perimeter secondary containment dike.

Transfer Pipeline Spill

A total of 9,100 feet of transfer pipeline alignment exists on site connecting the rail unloading area, storage area, and marine terminal. A rupture of this pipeline where buried would be contained within the casing annular space and receiving vaults at either end. Monitoring is provided to detect any leaks in the below ground portions of the pipeline. A rupture of the pipeline where the pipeline runs above ground would be detected by calibrated flow meters and observations by on-site personnel. A sudden drop of pressure or discrepancy between flow meter data will cause a shutdown of pumping operations and valves will close within 30 seconds. The pipeline alignment is sloped to direct spills and drainage to storm drain inlets designed to separate and retain oil. Oil traps are installed on all drainage inlets and supplemented by downstream water quality vaults that also contain oil/water separating baffles.

Marine Terminal Spill

Crude oil storage tanks at the Facility are connected to the marine terminal by the 36-inch pipeline. In accordance with EPA and USCG contingency planning requirements, a worst-case scenario must be considered for response planning purposes. While highly unlikely, the required worst-case scenario to consider is the loss of the full contents of the largest tank into the Columbia River. Once oil is in the river, it would be transported downstream at a speed that, on a seasonable basis, varies between 1 and 6 knots. For planning purposes, it will be assumed that the average speed of oil moving downstream on the Columbia River is 2 knots.

D.5 PLANNING DISTANCE CALCULATIONS

The planning distance method for tidally-influenced navigable waters is based on worst case discharges of persistent and non-persistent oils.

Planning distance calculations are based on the following factors and guidelines in accordance with 40 CFR 112, Attachment C-III, 4.2:

Persistent oils

Planning distance is 5 miles from the facility down current during ebb tide and to the point of maximum tidal influence or 5 miles, whichever is less, during flood tide.

Tesoro will plan to respond to a spill for distance from 5 miles upstream and downstream to the mouth to the Columbia River.

D.6 DISCHARGE SCENARIOS

The equipment and manpower to respond to a spill are available from several sources and are listed with the equipment and contractors in **Section 7** and **Appendix B**.

D.6.1 Average Most Probable Discharge/Major Inland Discharge

Incident

At Time 0 the Facility is transferring crude oil across the dock to a vessel. The crude oil pumping rate is 36,000 barrels per hour. The Tesoro Operator at the dock observes a leak develop at the flange which connects the transfer hose to the dock. The flange separates and oil is pumped into the water. The Terminal Operator, who is standing by in the control room of the Marine Terminal shuts down the transfer pumps and secures all transfer valves. The Vessel Operator closes the valves on the vessel to minimize continued crude oil loss. The Terminal Operator's estimates based on shutdown time and transfer rates that approximately 100 barrels of crude oil were spilled. For the purpose of a small/average scenario, it is assumed that some of the oil was caught in the catch basin on the dock, but 50 barrels (2,100 gallons) flowed into the Columbia River. For the purpose of a medium (major) spill scenario, it is assumed that 100 barrels (4,200 gallons) flowed into the Columbia River.

Conditions

Weather: Light rain, temperature 57 degrees, winds from the north at 10 knots.

Water: Maximum daily current of 2.0 knots with favorable wave conditions for skimming.

Forecast: Cloudy, high temperature of 59 degrees, continued winds from the north at 10 to 15 knots with persistent light rain throughout the day.

Immediate Response

A response to an average/small spill would be much the same as to a medium spill.

The Operator at the Facility Marine Terminal and the Vessel Operator immediately stopped the flow of crude oil from the vessel by shutting down the pump and closing the transfer valves. The Terminal Operator radios the other Facility Operator and Terminal Manager and notifies them of the problem, provides spill assessment information, and requests an on-water response. Initial site characterization will take place to ensure appropriate PPE is used by initial responders either from the vessel or dock crew. The Vessel Operator is directed to spread absorbent pads on areas of the spill on the dock or barge which are not covered by a containment basin to minimize the spill volume which will flow into the Columbia River. Once that task is done, the Vessel Operator is instructed to remain clear of the area and to monitor the vessel to ensure safety of the vessel.

The Facility Manager directs Facility personnel to secure the transfer valves in the tank storage area, and then to drive to the dock to prepare the Facility boat and boom for launching. The Facility Terminal Manager becomes the Facility Incident Commander. He uses the checklist provided in SECTION 2 and FIGURE 3.4 of this plan and notifies the National Response Center, Washington Emergency Management Division, Oregon Emergency Response System, USCG, MSRC, CRCI, and the Vancouver Police and Fire departments at 911. Notification takes approximately 30 minutes.

The Facility and Tesoro operators are familiar with the properties of crude oil and recognize that it presents little danger of fire and a low health risk for clean-up workers or the community. Both Facility/Tesoro operators meet at the Facility boat house within 15 minutes, don appropriate personal protective equipment and use the boat to initiate deployment of 1,000 feet of boom to begin to contain any crude oil which may still be dripping from the dock. At Time = 1 hour, the leading edge of the spill has moved approximately 2 miles downstream.

The Vessel Operator has the free oil on the dock covered with absorbent pads. The used absorbent will be placed in plastic garbage bags and then into 55 gallon drums.

Containment and Cleanup

At Time = .30 hours CRCI arrives on scene. CRCI's focus will be on recovery and shoreline cleanup operations. Additional contractor personnel arrive with two response vessels, 2 Douglas Skimpack 4200 (Derated Capacity of 275 bbls/day each), 2 - 2" portable pumps, an additional 2,000 feet of boom, and 2-2500-gallon storage bladders.

Small boats with Viscous Sweep are deployed by CRCI along the shoreline. Men with small skimmers and booms also are placed along the shoreline in preparation for oil recovery. Vacuum trucks are ordered by CRCI and will arrive on scene within 30 minutes after notification to begin shoreline recovery operations. NRCES resources are used for additional boom, sorbents, drums, and manpower. Equipment will arrive based on the schedules provided in **Section** 7.

Additional Viscous Sweep is deployed to sweep oil from the surface of the water are removed and placed in drums. Sweeping the spill with Viscous Sweep, skimming operations, and adjustments to the containment boom continue until the oil is contained and recovered or evaporated. Spent sorbents, and viscous sweep are disposed of by CRCI after appropriate testing and the recovered oil/water mixture from skimmer and vacuum trucks is returned to the terminal for storage.

Wildlife Protection

The small spill size, volatility of the crude oil, and immediate response prevented wildlife from being impact by the spill. Some shoreline clean-up may be required. Permits will be sought as necessary.

Command and Control

The Facility Terminal Manager is the Incident Commander and uses CRCI to manage clean-up operations. Planning, Logistics, and Financial Units are not independently activated. Additional Tesoro resources are not required. Tesoro, USCG and Ecology are on-site and set up a Unified Command with all Sections. The Vancouver Police and Fire departments are released from the spill after their initial response to the scene due to the low danger of fire or explosion.

Post Spill Review and Reporting

The Incident Commander convenes a meeting the next day between the Clean Rivers Co-op Manager, USCG Representative, and Ecology Representative to review the cause of the spill and the response. A report is drafted and submitted to the Ecology and USCG.

D.6.2 Worst-Case Discharge

Incident

At midnight on a Friday night before a three-day weekend, an earthquake strikes Vancouver causing TK-001 to spill 360,000 barrels of crude oil, into the Columbia River.

This is a highly unlikely set of circumstances, but there is no other route in which 100 percent of the Worst-Case Discharge (WCD) from the Facility will discharge into the Columbia River. Methods to stop the tank from draining will not be used in this scenario, even though numerous options are available to stop the loss of crude oil from this tank if the event were real.

Conditions

Weather: The sky is overcast, the temperature is 60 degrees F, and the winds variable at 10 miles per hour.

Water: The average current is 2 knots with wave conditions not favorable for skimming.

Forecast: Cloudy with showers. Continued variable winds.

Response

This spill is not discovered for 2 hours until an evening fisherman smells crude oil and sees it floating down the river. He immediately notifies the Vancouver Police Department. The Police Department notifies the Vancouver Fire Department. They discover the source of the crude oil, take immediate action to initiate an area evacuation, and immediately notify the Tesoro Terminal Manager.

The Tesoro Terminal Manager is alerted by the Vancouver Police Department at Time = 3 hours. Once he understands the circumstances, he calls the terminal operators and requests them to go to the terminal to attempt to stop the oil flow. He also makes immediate notification to CRCI and MSRC requesting standby assistance in deploying oil spill equipment downstream of the dock for protection of sensitive areas.

He then notifies the agencies, and responders listed in Incident Commander checklist (**Figure 2.1**) .He makes a call to the Facility Qualified Individual requesting activation of the West Coast Away Team. Notification takes approximately 30 minutes.

At Time = 4 hours the Facility Manager arrives at the Facility. The Chief of the Vancouver Fire Department indicates he will be the Incident Commander who is in control of all emergency actions to protect life and property. The Federal On-Scene Coordinator, State On-Scene Coordinator, and Facility Incident Commander will not be allowed to respond as long as there is danger of fire. The USCG is asked to close the river to all traffic and emergency actions are taken

by the police and fire departments to continue to evacuate a corridor on and near the river as the crude oil drifts downstream.

The Unified Command will be allowed to set protective boom sufficiently ahead of the crude oil to attempt to divert it away from sensitive areas. They will not be allowed to attend the boom beginning 4 hours ahead of when the crude oil is expected to reach the boom site. Facility authorizes CRCI to use the equipment and people listed in **Section 7**, and **Appendix B** of this plan. Boom will be set to protect the sensitive areas identified in **Section 6** of this plan unless the Natural Resource Damage Assessment Team proposes alternative strategies.

The Facility Manager working with CRCI personnel prepare a health and safety plan following the format provided in **Section 5**. A Material Safety Data Sheet for crude oil is available at the Facility office.

CRCI has identified 46 potential boom sites, which will require a total of 57,800 feet of boom. A summary of these sites is included in **Section 6**. Assuming a team of four men using two boats can set 1,000 feet of boom an hour, it can be calculated that it would take 60 team-hours to boom all of the sites. Facility requests that CRCI supply six booming teams using a total of twenty-four 40-hour HAZWOPER-trained responders and 12 small boats. Their goal is to boom all sensitive areas that have not already been impacted. Booming is initiated at Time = 5 hours near the confluence of the Lewis and Columbia Rivers (River Mile 86). The booming teams, under the direction of the CRCI Operations Chief, work their way downstream remaining a minimum of 4 hours ahead of the oil.

The entire team (some will arrive within a couple of hours) will arrive on scene at Time = 8 hours. CRCI is asked to establish a command post at their Portland office or nearer location sufficient to house the West Coast Regional Response Team and additional personnel.

Initial site safety is completed before it is determined that the crude oil spill cleanup can begin.

The Tesoro Supervisor of Contingency Planning has access to NOAA's "ADIOS" computer model that is used to calculate evaporation and dispersion rates of oils spills. Several runs are made with this program at Time + 5 hours based on the following assumptions:

A continuous spill of 360,000 barrels of crude oil over 24 hours (15,000 bbls/hr)

Average current is 2 knots

Wind speed is 10 knots

Water temperature is 60 degrees F

The ADIOS Model will predict the percent evaporation and emulsification of the crude oil. Based on this data responders will determine when it is safe to approach the spill to begin skimming oil. This assumption will be tested using flammable gas and benzene meters when actually approaching the crude oil.

CRCI and MSRC will be directed by Tesoro to transport equipment and personnel by truck to St. Helens, Oregon where it should be safe to begin recovery operations. A convenient recovery site will be selected near the boat ramp at St Helens, preferably upstream of the island located at River Mile 86. The ADIOS Model will provide an estimate of volume of oil and oily water that will be available for recovery. Initially skimmed oil will be contained in tankage available from CRCI and co-op members (**Appendix B**). Tesoro Marine Department will charter in any additional on-water tankage. Tesoro would arrange to have up to 20,000 barrels of combined storage available to designated staging and/or deployment areas.

An overflight is made at Time = 6 hours (at first light) to determine the extent of the crude oil distribution. Booming operations will be directed based on frequent aerial observations.

The booming and skimming operations are successful and the weathered crude oil is recovered as it approaches St. Helens. Shoreline impacts have traveled approximately 30 miles downstream from the facility. Recovered oil is recycled for fuel, as described in **Section 7** of this plan. Oil does not escape downstream.

A shoreline damage assessment is made after Tank TK-001 is empty at Time = 24 hours. Injured wildlife are recovered and treated under the direction of the National Marine Fisheries Service and the Washington Department of Wildlife. Permission for access and permits are obtained and the shoreline is cleaned as appropriate.

Treatment will probably include oily debris collection and cold water flushing. Oily debris will be returned to the Facility as discussed in **Section 7** for temporary storage, testing, recycling, and disposal.

A post-spill meeting is held with Savage, Tesoro, CRCI, USCG, EPA, Ecology, and other interested agencies and response contractors. A final report is written by the Certificate Holder and submitted to the agencies.

D.7 RESPONSE PLANNING STANDARD CALCULATIONS

D.7.1 Washington Department of Ecology Worst-Case Discharge

Ecology requires that the facility plan for the WCD, which is defined as the capacity of the largest above ground storage tank, complicated by adverse weather. Tank 0300-TK-001 may store up to 360,000 barrels of crude oil. Ecology regulations require that it must be assumed that 100 percent of this volume reaches the Columbia River.

The largest vessel for the Tesoro Vancouver Terminal is 900 feet long. Therefore, the terminal must have capability to initiate the deployment of four times the largest vessel (4x900=3,600 feet) or 2,000 feet of boom, whichever is less, within 3 hours. Tesoro has access to 7,000 feet of boom and a boat stored at the vessel dock, which can be deployed by the three Terminal Operators within the mandated time frame.

Ecology planning milestones include

2 hours 1,000 feet of boom

3 hours 2,000 feet of boom

6 hours 6,000 feet of additional boom
12,000 bbls/day derated recovery capacity
1 x Effective daily recovery capacity (12,000 barrels storage)

12-hours 20,000 feet of additional boom
36,000 bbls/day derated recovery capacity
1.5 x Effective daily recovery capacity (54,000 barrels storage)

24-hours 20,000 feet of additional boom
48,000 bbls/day derated recovery capacity
2 x Effective daily recovery capacity (96,000 barrels storage)

48-hours Additional boom as necessary
60,000 bbls/day derated recovery capacity
Additional storage as necessary

D.7.2 USCG Planning Standards

When calculating the WCD for the portion of a facility under USCG jurisdiction (i.e., from the dock to the first valves inside secondary containment), the facility must assume that all dock pipelines that could be in service simultaneously are in service and are pumping at their maximum rates.

They must also assume that all lines, in service or not, are severed at the same time and that once the pipelines are shut down and isolated, the entire contents of each line drains out into the water.

The scenario that would result in the largest WCD volume involves vessel loading of crude oil from the Facility Marine Terminal. In this case the assumptions are as follows.

Maximum Pumping rate = 36,000 barrels per hour
Draindown volume = 314 barrels
5 minutes for detection, transfer shutdown, and onshore valve closure

Therefore the **WCD** is:

36,000 bph x 1hr/60min x 5min + 314 bbls line vol. **= 3314 bbls**

The **WCD inland on-water planning volume** (Group 1 through 4 oil) is:

3,314 bbls x 1.0 (emulsification) x 0.2 (removal) = **663 bbls**

Planning volume calculations are provided in Figure D.3.

Figure D.3. USCG Planning Volume Calculations

Calculation		Groups 2 – 4 Oil (Persistent)
Areas Impacted: Nearshore and Inland		
Pipeline Contents:		Crude Oil (Group II, III, & IV)
Total Pumping Rate: (bbl/hr)		36,000
Total Pumping Loss: (L = Pumping rate x 5 min.) (bbl/hr)		3000
Total Static Pipe Volume: (V = Pipe volume between dock and 1st non-MTR valve) (bbl)		314
Adjustment Factor: (AF)		1.0
Worst Case Discharge: (WCD = V x AF + L) (bbl)		3314
Average Most Probable: (AMP = Lesser of 1% WCD or 50 bbl) (bbl)		50
Maximum Most Probable Discharge: (MMP = Lesser of 10% WCD or 1,200 bbl) (bbl)		331 bbls
On-Water Recovery Factor (OWRF)		0.2
On-Shore Recovery Volume (OSRF)		0.1
Emulsification Factor (EF)		1.0
On-Water Clean-Up Planning Volume (OWRV = WCD x OWRF x EF) (bbl/day)		663
Shoreline Clean-Up Planning Volume (OSRV = WCD x OSRF x EF) (bbl/day)		331
On-Water Recovery Capacity (OWRC = OSRV x Resource Mobilization Factor) (bbl/day)	Tier 1	235 x 0.15 = 35
	Tier 2	235 x 0.25 = 59
	Tier 3	235 x 0.40 = 94
On-water Recovery Response Caps (OWRRC) (bbl/day)	Tier 1	10,000
	Tier 2	20,000
	Tier 3	40,000
Amount needed to be identified, but not contracted for (OWRC – OWRRC) (bbl/day)	Tier 1	< 0
	Tier 2	< 0
	Tier 3	< 0

D.7.3 EPA Planning Standards

The EPA worst-case discharge standard is 100% of the volume of the largest tank at the facility. The EPA planning standard for Tank TK-001 is 360,000 bbls of crude oil, which is Persistent Oil. [1] Based on OPA 90 criteria, response equipment must be available assuming the following:

80 percent of the worst case volume naturally disperses

20 percent of the worst case volume remains floating

10 percent of the worst case volume impacts the shoreline

Based on these assumptions, the following volumes are used to calculate the initial planning standards:

On-water recovery (360,000 bbls) (0.20) = 72,000 bbls

Shoreline recovery (360,000 bbls) (0.10) = 36,000 bbls.

The initial EPA planning standards for this terminal can then be modified by using the following EPA calculation factors:

Emulsification Factor: 1.0

Tier 1 Factor: 0.15 (Response resources to arrive in 12 hrs.)

Tier 2 Factor: 0.25 (Response resources to arrive in 36 hrs.)

Tier 3 Factor: 0.40 (Response resources to arrive in 60 hrs.)

Using these factors the final calculations to determine oil recovery rates become:

Tier 1: (72,000) (1.0) (0.15) = 10,800 bbls/day

Tier 2: (72,000) (1.0) (0.25) = 18,000 bbls/day

Tier 3: (72,000) (1.0) (0.40) = 289,800 bbls/day

Shoreline: (36,000) (1.0) = 36,000 bbls/day.

D.8 OFF-SITE CONSEQUENCES/RESOURCES AT RISK

D.8.1 Oil Movement

Oil moves across the surface of the water as a result of wind and current; therefore, it is important to have knowledge of tides, currents, prevailing winds, and other factors, which will permit the prediction of how and where a slick will move.

D.8.2 Site Conditions

The Facility and Dock are situated in the Port of Vancouver.

The Marine Terminal is located adjacent to the Columbia River.

The lower Columbia River currents will be a determining factor in oil movement.

The area surrounding the facility is highly industrial and densely populated. A plot plan of the facility is shown in **Figure 1.5**. Response maps which cover the area may be found in the Northwest ACP.

[1] The shell capacity of approximately 380,000 barrels each; however, the maximum amount of product stored in each tank will be approximately 360,000 barrels, to take into account the presence of the internal floating roof and the additional headspace required to allow product movement in the event of seismic conditions.

D.8.3 Climatic Conditions

The prevailing climatic conditions at the time of a spill can influence a variety of response factors and should be quantified to the extent practical and as soon as possible following the discovery of a spill. In general the climatic conditions in the Vancouver area include:

Typically mild temperatures and prevailing summer northwesterly winds and winter southwesterly winds.

Seasonal rains occur during the fall and winter months (October – March), with the summer months being considerably drier.

Local wind speed and direction information can generally be obtained by calling the National Weather Service (**Figure 3.3**) or by using a wind sock or portable anemometer.

If access to these sources is not available, grass or fine sediments can be thrown into the air to estimate wind direction, but wind speed estimates are typically very qualitative.

The key climatic conditions and the response factors that may be affected are:

Wind speed and direction – Evacuation, vapor plume dispersions, worker safety, techniques effectiveness, aircraft safety, and others.

Visibility – Spill surveillance, worker safety, site security, and aircraft safety.

Temperature – Spill volatility, worker productivity and safety, equipment effectiveness, and others.

Visibility is determined by visual estimates concerning both the horizontal and vertical distances within which objects are clearly visible. The vertical visibility, or ceiling, is typically limited by low cloud cover or overcast conditions, but can also be dramatically reduced by heavy fog. Lateral visibility is influenced by fog or heavy rain. In general, normal aircraft operations are restricted to ceilings greater than 500 feet and horizontal visibility in excess of 0.5 mile.

Temperature can be determined using an outdoor thermometer or by calling the weather service or airport. The phone number for the National Weather Service is provided in **Figure 3.3**. Only temperatures below freezing or above 80 to 90 degrees are of concern to oil spill response operations. Temperatures above or below that range can adversely affect productivity and the health and safety of response personnel.

Both the Lower Columbia and Willamette Rivers are tidally influenced. The rise and fall of these tides can create a tidal current, which can create a reversal in the downstream current during low river flow conditions.

A detailed discussion of Lower Columbia River hydrography is provided in **Section 6**.

D.8.4 Geographic Boundaries

The location where oil may be expected to impact during the first day of a spill from the Facility are developed based on:

Past experience with oil spills in the Lower Columbia River.

An average flow rate of 2 knots.

D.8.5 Trajectory Analysis

Oil slicks move as a result of wind and water currents. For the terminal, river flow, tidal currents, and winds are all contributing factors, with river current or flow rate as the predominant factor.

Assumptions

1. Oil moves with the wind at approximately 3 to 4 percent of the wind velocity.
2. When wind velocity is low or wind is absent, oil will tend to move in the same direction as the current at about the same velocity.
3. When the wind is present, oil movement is affected by both water and wind currents.
4. When the wind direction is opposite to the current, the wind may reduce or possibly reverse the oil slick velocity at the surface.

Due to the complex currents of the Lower Columbia River and the many variables involved, it is difficult to accurately predict direction and speed of an oil slick before a spill occurs. This plan addresses response to spills within these geographic boundaries. Booming strategies have been developed for different wind and/or tidal current directions (**Section 6**). These booming strategies identify priorities and lengths of boom required. Additional boom is available if needed.

Although a computer model may be used to estimate oil spill movements, aerial surveillance provides the most effective means of determining spill size, location, and movement.

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Vancouver Energy
Operations Facility Oil Spill Contingency Plan
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix E
Cross Reference/OPA 90 Requirements

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APPENDIX E
CROSS REFERENCE/OPA 90 REQUIREMENTS

Figure E.1. Cross Reference to Ecology Plan Requirements (per WAC Cross Reference — 173-182 WAC)

This table to be updated after all information has been added to the document and a full cross reference can be completed.

Item	Section/Figure
SECTION A – General Planning, Information, and Timing	
Plan Maintenance and Reporting Obligations (WAC 173-182-140, 142, 145, 150)	
Plan maintenance and update procedures: 173-182-140. Annual review – review the entire plan for accuracy and either: (1) Update and distribute amended pages to ecology, or (2) Send letter confirming existing plan is accurate 173-182-142. Notify Ecology of significant changes 173-182-145. Plan implementation procedures 173-182-150. Post spill review and documentation: Conduct post spill review procedures to confirm effectiveness of plan and make plan improvements	Section 1.3 Section 1.3 Section 1.1 & 1.3 Section 8.0
SECTION B – Contingency Plan Format and Content	
Contingency Plan Format Requirements (WAC 173-182-210)	
(1). Formatted for maximum usefulness during a spill (includes job aids, diagrams, checklists)	Addressed
(2). Formatted with tabbed chapters, sections and annexes/appendices. Includes detailed TOC based on chapter, section, annex and titles, tables and figures.	Addressed
(3). Format allows replacement of revised pages.	Addressed
Binding Agreement Statement (WAC 173-182-220)	
Signed by plan holder, and owner or operator or designee with authority to bind the owners and operators of the facilities or vessels covered by the plan. Name, address, phone number, email and website of submitting party. Verification of commitment to immediate response to spills. Commit to having an Incident Commander in the state within 6 hours after notification of a spill. Commit to implementation and use of plan during a spill and substantial threat of a spill, and to training of personnel to implement plan. Verify authority and capability of plan holder to make necessary and appropriate expenditures to implement plan provisions. Commit to working in unified command within the incident command system to ensure that all personnel and equipment resources necessary to the response will be called out to clean up the spill safely and to the maximum extent practicable.	Preface
Contingency Plan Content (WAC 173-182-230)	
(2). Plan refers to and is consistent with the NWACP.	Addressed
(3)(a). States federal and state requirements intended to be met by plan.	Section 1.2
(3)(b). Plan states size of worst-case spill. (i). For transmission pipelines – more than one worst case spill volume for different line sections may be submitted. (ii). For vessel umbrella plans that enroll both tank vessels and nontank covered vessels and that rely on supplemental resources for approval, the worst case discharge volume and product type for both tank and nontank covered vessels for each port covered by the contingency plan for each port of operation may be submitted to ecology (if operations of enrolled vessels differ by port). (iii). For multiple facilities using a single plan, separate worst case spill volumes are required for each facility.	Section 1.1
(3)(c). Revision Log to record revisions and updates (identify section amended, date of amendment, verification that ecology notified, authorized person making change). A description of the amendment and its purpose shall also be included in the log sheet, or filed as an amendment letter to be inserted in the plan immediately after the log sheet.	Page vi
(3)(d).Cross reference table reflecting locations in the plan of each component required.	Figure E.1

Item	Section/Figure
(3)(e). Name, phone number, address, 24 hour contact number of PRC.	Appendix B
(i). Contract or letter summarizing terms of contract signed by the PRC.	Figure B.2
(ii). If contract not submitted make available for inspection upon request.	N/A
(iii). Copy of mutual aid agreements and description of terms of that document.	Appendix B
(iv). Specify in writing if plan holder relies on a PRC or other contractor to staff ICS positions for spill management team.	N/A
(v). If the entire contract for additional spill management team support is not included in the plan, that document shall be made available for inspection if requested.	N/A
(3)(f). Procedures to track and account for the entire volume of oil recovered and oily wastes generated and disposed of during spills. The responsible party must provide these records to Ecology upon request.	Sections 5.7 & 5.9
(4). Facility plan content:	
(a). Facility name, location, address	Figure 1.4
(b). Starting date of operations.	Figure 1.4
(c). Description of operations covered by plan.	
(i). List oil handling operations that occur at the facility	Figure 1.4
(ii). Inventory all tanks and list the tank capacity	Figure 1.3
(iii). All oil(s) or product(s) handled by name and include: density, gravity, API, oil group number, and sulfur content (sweet/sour).	Figures 1.5, 1.6, & 1.7
(iv). Written description and map indicating site topography, stormwater and other drainage systems, mooring areas, pipelines, tanks, and other oil processing, storage, and transfer sites and operations. (CB, need figure with topo)	Section 1.5
(v). Describe geographic area that could be impacted from a spill at the location based on a 48-hour worst-case spill trajectory analysis.	
(5) For vessel plans	N/A
(6). Plans covering multiple vessels with different owners shall also include:	N/A
(7). Umbrella plans shall list the name of the entities that provide supplemental equipment.	Appendix B
(8). Plan provides concise procedures to establish a process to manage oil spill liability claims of damages to persons or property, public or private, for which a responsible party may be liable.	Section 5.2
Requirements for vessel umbrella plans maintaining additional agreements for supplemental resources (WAC 173-182-232)	N/A
Field Document (WAC 173-182-240)	
(1). Field document listing time critical information for the initial emergency phase of the spill and a substantial threat of a spill. The owner or operator of the covered vessel or facility shall make the field document available to personnel who participate in oil handling operations and shall keep the field document n key locations at facilities, docks, on vessels and in the plan. The locations where field documents are kept must be listed in the plan, provided that plan holders covering multiple persons shall not be subject to enforcement if the owner or operator of an enrolled vessel fails to keep the field documents in the location specified in the plan. Plans covering multiple persons shall include procedures to ensure each vessel covered by the plan is provided the field document prior to entering Washington waters. This can include by electronic means.	Sections 1 to 3
(2). At a minimum, the field document shall contain:	
(a). A list of the procedures to detect, assess and document the presence and size of a spill.	Section 2
(b). Spill notification procedures and a call out list that meets the requirements in WAC 173-182-260 and 173-182-262 or 173-182-264 as applicable; and	Section 3
(c). A checklist that identifies significant steps used to respond to a spill, listed in a logical progression of response activities.	Figure 2.3
Additional requirements for vessel plan holders with access to the emergency response system at Neah Bay (WAC 173-182-242)	N/A
Initial Response Actions (WAC 173-182-250)	
(1). Initial Spill Action Forms shall be included in the plan and used to document their initial spill actions.	Figure 5.1
(2). Describe equipment to be used to conduct initial spill assessment - including equipment effective in darkness and low visibility (e.g., visual methods, tracking buoys, trajectory modeling, aerial overflights, thermal and infrared)	Section 2.4
(3). Safety Assessment (including initial air monitoring) for all types of spills, including spills to groundwater	Section 5

Item	Section/Figure
(4). Procedures to confirm the occurrence and estimate the quantity and nature of the spill, including updated reports if the initially reported quantity or the area extent of the contamination changes significantly.	Section 2.5
Notification and call-out procedures (WAC 173-182-260)	
(1). Procedures to immediately notify appropriate parties • Identify central reporting office or individuals responsible for implementing the notification procedure	Section 3
(2). List name and phone numbers of required notifications to government agencies, response contractors, spill management team members (internal call down information need not be included but should be available for review)	
(3). Identify clear order of priority for immediate notification.	
Vessel notification requirements for a discharge or substantial threat of a discharge (WAC 173-182-262)	N/A
Notification requirements for facility spills to ground or containment that threaten waters of the state (WAC 173-182-264) (1). Facility plans shall contain procedures for notifications for spills to ground and to permeable secondary containment that threaten to impact waters of the state. (2). Plan holders must also include procedures in their plan to address spills of an unknown volume.	Figure 3.4 Section 6.8
Maintenance records for response equipment (WAC 173-182-270)	
(1). Response equipment maintained in a state of readiness and in accordance with manufacturer specifications	Section 7 & Appendix G
(2). Schedules, methods, and procedures for equipment maintenance. (maintenance records for at least 5 years available upon request)	
Spill Management Teams (WAC 173-182-280)	
(1). Personnel available to manage oil spill (including contract personnel) (a). An organizational diagram depicting the chain of command for the spill management team for a worst case spill. (b). For the purpose of ensuring depth of the spill management team, an organization list of one primary and one alternate person to lead each ICS spill management position down to the section chief and command staff level as depicted in the NWACP standard ICS organizational chart (made available to ecology upon request). If a response contractor is used to fill positions, they must agree in writing to staff the positions. The capacity and depth of spill management teams will be evaluated in drills and spills. (c). A job description for each spill management position (if consistent with NWACP may reference) (d). A detailed description of the planning process which will be used to manage a spill (if consistent with NWACP may reference)	Figure 4.2 Figure 4.3 Figure 4.2 Figure 4.4 Section 4
(2). Type and frequency of training for each position. Training program to include at a minimum ICS, NWACP policies, use and location of GRPs, contents of plan, worker health and safety. Training program also to include participation in announced and unannounced exercises, and participation should approximate the actual roles and responsibilities of the individual specified in the plan. New employees shall complete the training program prior to being assigned job responsibilities which require participation in emergency response situations.	Section 4.7
(3). The plan shall identify a primary and alternate incident commander's representative that can form unified command at the initial command post, and if located out-of-state, a primary and alternate incident commander that could arrive at the initial command post within six hours. The plan shall include estimated time frames for arrival of the remainder of the spill management team to the spill site, or at the incident command post as appropriate.	Figure 4.2
(4). The plan shall list a process for orderly transitions of initial response staff to incoming local, regional or away team personnel, including transitions between shift changes.	Section 4.3
(5). Covered vessel umbrella plans	N/A
SECTION C – Planning Standards	
Planning Standards (WAC 173-182-310) (1). Ecology shall apply planning standard when determining ability of plan holder to meet regulations (to be verified at drills/spills). In an actual spill event, initial deployment shall be guided by safety considerations. RP must address entire volume of actual spill regardless of planning standards. (2). Planning standards do not constitute cleanup standards.	

Item	Section/Figure
Planning standards for nondedicated work boats and operators (WAC 173-182-315) Non-dedicated work boats and operators available to deploy GRPs. Enhance skimming, provide platforms as vessel of opportunity skimming systems, logistical support, or other uses during spill. Support worst case spill response with workboats and operators that could have arrived on scene beginning at 48 hours.	Appendix B.2
Covered vessel planning standards for vessels of opportunity (WAC 173-182-317)	N/A
Planning standards for aerial surveillance (WAC 173-182-320) Provide aerial oil tracking resources capable of being on-scene within 6 hours of spill awareness. Resources must be capable of supporting oil spill removal operations for three 10-hr operational periods during the initial 72 hours of the discharge.	Section 2.4.1
Covered vessel planning standards for aerial surveillance (WAC 173-182-321)	N/A
Planning standards for Group 5 Oils (WAC 173-182-324)	N/A
Planning standards for dispersants (WAC 173-182-325)	Section 5.3 & 7.3.1
Planning standards for in situ burning (WAC 173-182-330)	Section 5.5 & 7.3.2
Planning standards for storage (WAC 173-182-335) (1). Identify both on-water devices and shoreside interim storage locations. (a). For marine waters – shoreside storage to meet 50% of storage requirements WDOE if plan holder demonstrates that recovered oil can be transported to the shoreside storage. (b). For freshwater – shoreside storage to meet 65% of storage requirements if plan holder demonstrates that recovered oil can be transported to the shoreside storage. (2). For covered vessel plan holders, at least twenty-five percent of the total worst case discharge volume at twenty-four hours, from the planning standard tables below, must be dedicated to on-water storage.	Section 5.7 & 7.3.3
Determining effectiveness of recovery systems (WAC 173-182-345) Plan holders and PRC's that own equipment must provide information to WDOE to determine the effectiveness of the recovery systems and how equipment meets planning standards. Determining efficiency of recovery systems in various operating environments and product types: (1). For skimmers: Transport and deployment, list boom and workboats associated with each water based skimming system, identify pumps and pumping capacity to be used to transfer product to storage devices. (2). For oil recovery systems relying on vessel of opportunity or non-dedicated transport asset, include how asset would be located and secured. Include mobilization time needed to ensure assets are available, as well as time needed to set up oil recovery system, and personnel.	Section 7
Determining effective daily recovery capacity (WAC 173-182-348) Plan holders and PRCs that own recovery equipment shall request EDRC (or alternative EDRC) using procedures and criteria in WAC 173-182-348 and 33 CFR 155, Appendix B, Section 6, Determining Effective Daily Recovery Capacity for Oil Recovery Devices.	
Covered vessel plan holders technical manuals (WAC 173-182-349)	N/A
Documenting compliance with the planning standards (WAC 173-182-350)	
(1). Provide spreadsheet on resources intended to meet planning standards. Account for boom, recovery systems, storage, and personnel by type, quantity, home base and provider.	Section 7 & Appendix D
(3). Include time for notification and mobilization of equipment and personnel (notification + mobilization + travel time = time to spill site). For dedicated resources owned by plan holder use mobilization planning factor = 30min. For all other dedicated response equipment use mobilization planning factor = 1 hour. Nondedicated resources: mobilization planning factor = 3 hours.	Figure 7.2
(4). Equipment travel speeds computed using 35 mph for land and 5 kts for water.	TBD
(5). Provide documentation (e.g. actual performance during spills or unannounced drills) to request approval for alternative notification, mobilization and travel times. nclude date and time of performance or test, weather/sea state conditions and transportation information.	TBD
Transfer sites for covered vessels at locations where transfers occur (WAC 173-182-355)	N/A
Transmission pipelines and pipeline tank farms (WAC 173-182-365)	N/A

Item	Section/Figure
Vancouver Planning Standard (WAC 173-182-420) See WAC 173-182-420 for boom assessment, minimum oil recovery rate, and storage planning standards for covered vessel and facility plan holders that transit or operate on the Columbia River between statute mile 99 and 107.	Section 7.1.8
Washington Coast Planning Standard (WAC 173-182-450) Capable of sustaining a worst case spill response and shall develop an addendum specific to Washington's coast, including: (1). Capability, if applicable, for is situ burning, dispersant use, and mechanical recovery (2). Surveillance equipment (including fixed wing helicopters and low visibility equipment) to provide for aerial assessment of spill within 6 hours of spill awareness (3). Time frames and mechanisms to cascade in equipment and other resources for up to 72 hours (4). 10,000 feet of boom appropriate for shoreline protection, containment and/or ten thousand feet of open water boom for enhanced skimming, containment or other use to arrive within twelve hours (5). 20,000 feet of boom appropriate for containment, protection or recovery to arrive within twenty four hours	Section 2.4.1 & 7.1.8
SECTION D – Response and Protection Strategies for Sensitive Areas	
Requirements for response and protections strategies (WAC 173-182-510)	
(1). Methods to track and contain spilled oil and enhance recovery and removal operations described in the plan	Section 2.4
(2). Describe how environmental protection will be achieved: (a). Protection of sensitive shoreline and island habitat by diverting or blocking oil movement (b). Description of sensitive areas and strategies to protect resources (including info on natural resources, coastal and aquatic habitat types and sensitivity by season, breeding sites, presence of state or federally endangered or threatened species, commercial and recreational species, geographic features, isolation areas beach types, geological characteristics (c). Identify public resources (public beaches, water intakes, drinking water supplies, marinas) (d). Identify shellfish resources and methods to protect (e). Identify significant economic resources to be protected in area covered by plan (f). For facilities with potential to impact "sole source" aquifer/public drinking water supply identify type of substrate and geologic extent of sensitive sites	Section 6 & Appendix F
(3). Refer to NWACP for GRP's developed to meet requirements. If approved GRPs do not exist in the NWACP, work with ecology to determine alternative sensitive areas to protect.	Section 6.7
(4). Identify potential initial command post locations	Section 4.4
Planning standards for shoreline cleanup (WAC 173-182-520) dentify and ensure availability of response resources necessary to perform shoreline cleanup operations.	Appendix F
Covered vessel planning standards for shoreline cleanup (WAC 173-182-522)	N/A
Planning standards for ground water spills (WAC 173-182-530)	
(1). Describe methods used to immediately assess ground water spills.	Section 6.8.4
(2). Contact information for resources typically used to investigate, contain, and remediate/recover spills to ground water.	Section 7.9
Planning standards for wildlife rescue and rehabilitation (WAC 173-182-540) dentify applicable federal, state, and NWACP requirements for wildlife rescue and rehabilitation, and describe equipment, personnel, resource and strategies for compliance with the requirements. Resources are capable of arriving on scene within 24 hours of spill awareness.	Section 6.6

Figure E.2. EPA OPA 90 Cross Reference

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
1.0 Response Plan Cover Sheet (EPA Sec. 2.0)	Figure 1.4
a. General Information (Sec. 2.1)	Figure 1.4
b. Applicability of Substantial Harm Criteria (Sec. 2.2)	Figure 1.4
c. Certification (Sec. 2.3)	Figure 1.4
2.0 Emergency Response Action Plan (ERAP) (Sec. 1.1)	
a. Qualified Individual (QI) Information (Sec. 1.2)	Figure 3.1, Section 4.6
b. Emergency Notification List (Sec. 1.3.1)	Figure 3.1, Figure 3.3, Figure 3.4
c. Spill Response Notification Form (Sec. 1.3.1)	Figure 3.2
d. Response Equipment List and Location (Sec. 1.3.2)	Section 7
e. Response Equipment Testing and Deployment (Sec. 1.3.4)	Section 7
f. Facility Response Team List (Sec. 1.3.4)	Section 4
g. Evacuation Plan (Sec. 1.3.5)	Figures 2.1 - 2.2
h. Immediate Actions (Sec. 1.7.1)	Figure 2.7
i. Facility Diagrams (Sec. 1.9)	Figures 1.6 - 1.7
*The sections above should be extracted from the more detailed corresponding sections of the plan.	
3.0 Facility Information (Sec. 1.2)	Figure 1.4
a. Facility name (Sec. 1.2.1)	Figure 1.4
b. Street address	Figure 1.4
c. City, State, Zip	Figure 1.4
d. County	Figure 1.4
e. Phone number	Figure 1.4
f. Latitude/Longitude (Sec. 1.2.2)	Figure 1.4
g. Wellhead protection area (Sec. 1.2.3)	Figure 1.4
h. Owner/operator (both names included, if different) (Sec. 1.2.4)	Figure 1.4
i. QI Information (Sec. 1.2.5) *(Name, position, street address, phone numbers)*	Figure 1.4

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
j. Description of specific response training experience	Figure 1.4, Section 4.6, Appendix A.2
k. Oil storage start-up date (Sec. 1.2.6)	Figure 1.3
l. Facility operations description (Sec. 1.2.7)	Figure 1.3
m. Standard Industrial Classification code	Figure 1.3
n. Dates and types of substantial expansion (Sec. 1.2.8)	Figure 1.3
4.0 Emergency Response Information (Sec. 1.3)	
Notification (Sec. 1.3.1)	Figure 3.3, Section 3
a. Emergency Notification Phone list	Figure 3.3, Section 3
1. National Response Center phone number	Figure 3.3, Section 3
2. QI (day and evening) phone numbers	Figure 3.3, Section 3
3. Company response team (day and evening) phone numbers	Figure 3.3, Section 3
4. Federal On-Scene Coordinator (OSC) and/or Regional response center (day and evening) phone numbers	Figure 3.3, Section 3
5. Local response team phone numbers (Fire Department/Cooperatives)	Figure 3.3, Section 3
6. Fire marshal (day and evening) phone numbers	Figure 3.3, Section 3
7. SERC (day and evening) phone numbers	Figure 3.3, Section 3
8. State police phone number	Figure 3.3, Section 3
9. LEPC phone number	Figure 3.3, Section 3
10. Wastewater treatment facility (s) name and phone number (recommended)	Figure 3.3, Section 3
11. Local water supply system (day and evening) phone numbers	Figure 3.3, Section 3
12. Weather report phone number	Figure 3.3, Section 3
13. Local TV/radio phone number(s) for evacuation notification	Figure 3.3, Section 3
14. Hospital phone number	Figure 3.3, Section 3
b. Spill Response Notification Form	Figures 3.2 - 3.3

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
5.0 Response Equipment List (Sec. 1.3.2)	
a. Skimmer Pumps	Section 7, Appendix B
1. Operational Status	Section 7, Appendix B
2. Type, Model, and Year	Section 7, Appendix B
3. Number	Section 7, Appendix B
4. Capacity	Section 7, Appendix B
5. Daily Effective Recovery Rate	Section 7, Appendix B
6. Storage Location(s)	Section 7, Appendix B
7. Date Fuel Last Changed	Section 7, Appendix B
b. Boom	Section 7, Appendix B
1. Operational Status	Section 7, Appendix B
2. Type, Model, and Year	Section 7, Appendix B
3. Number	Section 7, Appendix B
4. Size (length)	Section 7, Appendix B
5. Containment Area	Section 7, Appendix B
6. Storage Location	Section 7, Appendix B
c. Chemicals Stored	Section 7, Appendix B
1. Date Authorized	Section 7, Appendix B
d. Dispersant Dispensing Equipment	Section 7, Appendix B
1. Operational Status	Section 7, Appendix B
2. Type and Year	Section 7, Appendix B
3. Capacity	Section 7, Appendix B
4. Storage Location	Section 7, Appendix B
5. Response Time	Section 7, Appendix B
e. Sorbents	Section 7, Appendix B
1. Operational Status	Section 7, Appendix B

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
2. Type and Year Purchased	Section 7, Appendix B
3. Amount	Section 7, Appendix B
4. Absorption Capacity	Section 7, Appendix B
5. Storage Location(s)	Section 7, Appendix B
f. Hand Tools	Section 7, Appendix B
1. Operational Status	Section 7, Appendix B
2. Type and Year	Section 7, Appendix B
3. Quantity	Section 7, Appendix B
4. Storage Location	Section 7, Appendix B
g. Communication Equipment	Section 7, Appendix B
1. Operational Status	Section 7, Appendix B
2. Type and Year	Section 7, Appendix B
3. Quantity	Section 7, Appendix B
4. Storage Location/Number	Section 7, Appendix B
h. Fire Fighting and Personnel Protective Equipment	Section 7, Appendix B
1. Operational Status	Section 7, Appendix B
2. Type and Year	Section 7, Appendix B
3. Quantity	Section 7, Appendix B
4. Storage Location	Section 7, Appendix B
i. Other (e.g. Heavy Equipment, Boats, and Motors)	Section 7, Appendix B
1. Operational Status	Section 7, Appendix B
2. Type and Year	Section 7, Appendix B
3. Quantity	Section 7, Appendix B
4. Storage Location	Section 7, Appendix B
6.0 Response Equipment Testing and Deployment Drill Log (Sec. 1.3.3)	
a. Date of Last Inspection or Equipment Test	Section 7, Appendix B

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
b. Inspection Frequency	Section 7, Appendix B
c. Date of Last Deployment Drill	Section 7, Appendix B
d. Deployment Frequency	Section 7, Appendix B
e. OSRO Certification	Section 7, Appendix B
7.0 Personnel (Sec. 1.3.4)	
a. Emergency Response Personnel Information	Section 4
1. Name	Figures 3.3 & 4.2
2. Phone numbers	Figures 3.3 & 4.2, Section 4
3. Response time	Section 4
4. Responsibility	Figure 4.4
5. Type and date of response training	Appendix A
b. Emergency Response Contractor Information	
1. Name	Appendix B
2. Phone numbers	Appendix B
3. Response time	Appendix B
4. Evidence of contractual agreement	Appendix B
c. Facility Response Team Information	Section 4
1. Job title/position of emergency response personnel	Figure 4.2, Section 4
1.1 Response Time	Figure 4.2, Section 4
1.2 Phone/pager	Figure 4.2, Section 4
2. Name of emergency response contractor (Contractors providing facility response team services may be different than contractors providing oil spill response services)	N/A
2.1. Response time	N/A
2.2 Phone/pager	N/A
8.0 Evacuation Plan (Sec. 1.3.5)	Figures 2.1 – 2.2
a. Facility Evacuation Plan (Sec. 1.3.5.1)	Figure 2.2

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)			LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.			
	1.	Location of stored materials	Figure 2.1
	2.	Hazard imposed by spilled materials	Figure 2.1
	3.	Spill flow direction	Figure 2.1
	4.	Prevailing wind directions and speed	Figure 2.1
	5.	Water currents, tides, or wave conditions (if applicable)	Figure 2.1
	6.	Arrival route of emergency response personnel and response equipment	Figure 2.1
	7.	Evacuation routes	Figures 2.1 – 2.2
	8.	Alternative routes of evacuation	Figures 2.1 – 2.2
	9.	Transportation of injured personnel to nearest emergency medical facility	Figure 2.1
	10.	Location of alarm/notification systems	Figure 2.1
	11.	Centralized check-in area for roll call	Figure 2.1
	12.	Mitigation command center location	Figure 2.1
	13.	Location of shelter at facility	Figures 2.1 – 2.2
	b.	Community Evacuation Plans referenced (Sec. 1.3.5.3)	Figure 2.1
9.0	Description of Qualified Individual ' s Duties (Sec. 1.3.5)		Section 4.6
	a.	Activate internal alarms and hazard communication systems	Section 4.6
	b.	Notify response personnel	Section 4.6
	c.	Identify character, exact source, amount, and extent of the release	Section 4.6
	d.	Notify and provide information to appropriate Federal, State and Local authorities	Section 4.6
	e.	Assess interaction of spilled substance with water and/or other substances stored at facility and notify on-scene response personnel of assessment	Section 4.6
	f.	Assess possible hazards to human health and the environment	Section 4.6
	g.	Assess and implement prompt removal actions	Section 4.6
	h.	Coordinate rescue and response actions	Section 4.6
	i.	Access company funding to initiate cleanup activities	Section 4.6

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
j. Direct cleanup activities	Section 4.6
10.0 Hazard Evaluation (Sec. 1.4)	Appendix D
a. Hazard Identification (Sec. 1.4.1)	Appendix D
1. Tank and Surface Impoundment Forms	Figure C.3
1.1 Tanks	Figure C.3
a. Tanks Number(s)	Figure C.3
b. Substance(s) Stored	Figure C.3
c. Quantity(s) Stored	Figure C.3
d. Tank Type(s)/Year(s)	Figure C.3
e. Maximum Capacity(s)	Figure C.3
f. Failure(s)/Cause(s)	Figure C.3
1.2 Surface Impoundments (SI)	N/A
a. SI Number(s)	N/A
b. Substance(s) Stored	N/A
c. Quantity(s) Stored	N/A
d. Surface Area(s)/Year(s)	N/A
e. Maximum Capacity(s)	N/A
f. Failure(s)/Cause(s)	N/A
2. Labeled schematic drawing	Figures 1.6 & and C.4
3. Description of transfers (loading and unloading) and volume of material	Section C.3, Section D.3
4. Description of daily operations	Figure 1.3, Section C.2, Section D.3
5. Secondary containment volume	Section C.2
6. Normal daily throughput of the facility	Figure 1.4
11.0 Vulnerability Analysis (Sec. 1.4.2) (see Appendix A - Calculation of the Planning Distance)	Section 6.4
a. Analysis of potential effects of an oil spill on vulnerable areas	Section 6.4

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
1. Water Intake	Section 6.4
2. Schools	Section 6.4
3. Medical facilities	Section 6.4
4. Residential areas	Section 6.4
5. Businesses	Section 6.4
6. Wetlands or other sensitive environments	Section 6.4
7. Fish and wildlife	Section 6.4
8. Lake and streams	Section 6.4
9. Endangered flora and fauna	Section 6.4
10. Recreational areas	Section 6.4
11. Transportation routes (air, land, and water)	Section 6.4
12. Utilities	Section 6.4
13. Other applicable areas	Section 6.4
12.0 Analysis of the Potential for an Oil Spill (Sec. 1.4.3)	Appendix D.2
1. Description of likelihood of release occurring	Appendix D.2
a. Oil spill history for the life of the facility	Appendix D.2
b. Horizontal range of potential spill	Appendix D.5
c. Vulnerability to natural disaster	Appendix D.2
d. Tank age	Appendix D.2
e. Other factors (e.g., unstable soils, earthquake zones, Karst topography, etc.)	Appendix D.2
13.0 Facility Reportable Oil Spill History Description (Sec. 1.4.4)	Figure D.2
a. Date of discharge(s)	Figure D.2
b. List of discharge causes	Figure D.2
c. Material(s) discharged	Figure D.2
d. Amount of discharges in gallons	Figure D.2
e. Amount that reached navigable waters (if applicable)	Figure D.2

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
f. Effectiveness and capacity of secondary containment	Figure D.2
g. Clean-up actions taken	Figure D.2
h. Steps taken to reduce possibility of reoccurrence	Figure D.2
i. Total oil storage capacity of tank(s) or impoundment(s) from which material discharged	Figure D.2
j. Enforcement actions	Figure D.2
k. Effectiveness of monitoring equipment	Figure D.2
l. Spill detection	Figure D.2
14.0 Discharge Scenario (Sec. 1.5)	Appendix D.6
Small Discharges (Sec. 1.5.1)	Appendix D.6
a. Description of small discharge scenario addressing facility operations and components (Sec. 1.5.1.1)	Appendix D.6
1. Loading and unloading operations	Appendix D.6
2. Facility maintenance operations	Appendix D.6
3. Facility piping	Appendix D.6
4. Pumping stations and sumps	Appendix D.6
5. Oil storage tanks	Appendix D.6
6. Vehicle refueling operations	Appendix D.6
7. Age and condition of facility and components	Appendix D.6
b. Description of factors affecting response efforts (Sec. 1.5.1.2)	Appendix D.6
1. Size of spill	Appendix D.6
2. Proximity to down gradient water	Appendix D.6
3. Proximity to fish and wildlife and sensitive environments	Appendix D.6
4. Likelihood that discharge will travel offsite	Appendix D.6
5. Location of material spilled (i.e., on concrete pad or soil)	Appendix D.6
6. Material discharged	Appendix D.6
7. Weather or aquatic conditions	Appendix D.6

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
8. Available remediation equipment	Appendix D.6
9. Probability of a chain reaction or failures	Appendix D.6
10. Direction of spill pathway	Appendix D.6
Medium Discharge (Sec. 1.5.1)	Appendix D.6
c. Description of medium discharge scenario addressing facility operations and components (Sec. 1.5.1.1)	Appendix D.6
1. Loading and unloading operations	Appendix D.6
2. Facility maintenance operations	Appendix D.6
3. Facility piping	Appendix D.6
4. Pumping stations and sumps	Appendix D.6
5. Oil storage tanks	Appendix D.6
6. Vehicle refueling operations	Appendix D.6
7. Age and condition of facility and components	Appendix D.6
d. Description of factors affecting response efforts (Sec. 1.5.1.2)	Appendix D.6
1. Size of spill	Appendix D.6
2. Proximity to down gradient water	Appendix D.6
3. Proximity to fish and wildlife and sensitive environments	Appendix D.6
4. Likelihood that discharge will travel offsite	Appendix D.6
5. Likelihood of material spilled (i.e., on concrete pad or soil)	Appendix D.6
6. Material discharge	Appendix D.6
7. Weather or aquatic conditions	Appendix D.6
8. Available remediation equipment	Appendix D.6
9. Probability of a chain reaction or failures	Appendix D.6
10. Direction of spill pathway	Appendix D.6
15.0 Worst Case Discharge (Sec. 1.5.2) (See Appendix A)	Appendix D.6
a. Correct Worst Case Discharge calculation for specific type of facility	Appendix D.6

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
b. Description of worst case discharge scenario	Appendix D.6
1. Loading and unloading operations	Appendix D.6
2. Facility maintenance operations	Appendix D.6
3. Facility piping	Appendix D.6
4. Pumping stations and sumps	Appendix D.6
5. Oil storage tanks	Appendix D.6
6. Vehicle refueling operations	Appendix D.6
7. Age and condition of facility and components	Appendix D.6
c. Description of factors affecting response efforts (Sec. 1.5.1.2)	Appendix D.6
1. Size of spill	Appendix D.6
2. Proximity to down gradient water	Appendix D.6
3. Proximity to fish and wildlife and sensitive environments	Appendix D.6
4. Likelihood that discharge will travel offsite	Appendix D.6
5. Location of material spilled (i.e., on concrete pad or soil)	Appendix D.6
6. Material discharged	Appendix D.6
7. Weather or aquatic conditions	Appendix D.6
8. Available remediation equipment	Appendix D.6
9. Probability of a chain reaction or failures	Appendix D.6
10. Direction of spill pathway	Appendix D.6
16.0 Discharge Detection Systems (Sec. 1.6)	Operations Spill Prevention, Control and Countermeasures Plan
Discharge Detection by Personnel (Sec. 1.6.1)	Appendix C.2, Appendix G
a. Description of procedures and personnel for spill detection	Appendix C.2, Appendix G
b. Description of facility inspections	Appendix G
c. Description of initial response actions	Appendix G
d. Emergency Response Information (referenced)	Appendix G
17.0 Automated Discharge Detection (Sec. 1.5.2)	Operations Spill Prevention, Control and Countermeasures Plan

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
a. Description of automatic spill detection equipment, including overfill alarms and secondary containment sensors	Operations Spill Prevention, Control and Countermeasures Plan
b. Description of alarm verification procedures and subsequent actions	Appendix G
18.0 Plan Implementation (Sec 1.7)	
a. Identification of response resources for small, medium, and worst case spills (Sec. 1.7.1)	Appendix D.6
b. Description of response actions	Appendix D.6
1. Emergency plans for spill response	Throughout Plan
2. Additional response training	Section 7
3. Additional contracted help	Section 7
4. Access to additional response equipment/experts	Section 7
5. Ability to implement plan. Including response training and practice drills.	Section 4.7 & 7
19.0 Disposal Plan (Sec. 1.7.2)	Section 5.7, Section 7.5
a. Description of procedures for recovering, reusing, decontaminating or disposing of materials	Section 5.7, Section 7.5
b. Materials addressed in Disposal Plan (Recovered product, contaminated soil, contaminated equipment and materials, personnel protective equipment, decontamination solutions, absorbents, spent chemicals)	Section 5.7, Section 7.5
c. Plan prepared in accordance with any Federal, State, and/or Local regulations	Section 5.7, Section 7.5
d. Plan addresses permits required to transport or disposal of recovered materials	Section 5.7, Section 7.5
20.0 Containment and Drainage Planning (Sec. 1.7.3)	Appendix C
a. Description of containing/controlling a spill through drainage.	Appendix C
1. Containment volume	Appendix C.2
2. Drainage route from oil storage and transfer areas	Figure 1.7
3. Construction materials in drainage troughs	Appendix C.2
4. Type and number of valves and separators in drainage system	Appendix C.2

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)	LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.	
5. Sump pump capacities	Appendix C.2
6. Containment capacities of weirs and booms and their location	Figure 6.11 & 7.1, Appendix C.2
7. Other clean up materials	Section 7, Appendix C.2
21.0 Self-Inspection, Training, and Meeting Logs (Sec. 1.8)	
Facility Self-Inspection (Sec. 1.8.1)	Appendix G
a. Records of tank inspections contained or cross referenced in plan or maintained electronically	Appendix G
b. Records of secondary containment inspections contained or cross referenced in plan or maintained electronically	Appendix G
c. Equipment Inspection Checklist	Appendix G
d. Response Equipment Checklist (Sec. 1.8.1.2)	Appendix G
1. Inventory (item and quantity)	Appendix G
2. Storage location	Appendix G
3. Accessibility (time to access and respond)	Appendix G
4. Operational status/condition	Appendix G
5. Actual use/testing (last test date and frequency of testing)	Appendix G
6. Shelf life (present age, expected replacement date)	Appendix G
e. Response Equipment Inspection Log	Appendix G
1. Inspection records maintained for 5 years	Appendix G
22.0 Facility Drills/Exercise (Sec. 1.8.2)	Appendix A
a. Description of drill/exercise program based on PREP guidelines or other comparable program	Appendix A
1. QI notification drill	Appendix A
2. Spill management team tabletop exercise	Appendix A
3. Equipment deployment exercise	Appendix A
4. Unannounced exercise	Appendix A
5. Area exercise	Appendix A

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)		LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.		
	b. Description of evaluation procedures for drill program	Appendix A
	c. Qualified Individual Notification Drill Log (Sec. 1.8.2.1) (Date, company, qualified individual, emergency scenario, evaluation)	Appendix A
	d. Spill Management Team Tabletop Drill Log (Sec. 1.8.2.2) (Date, company, qualified individual, emergency scenario, evaluation, changes to be implemented, time table for implementation)	Appendix A
23.0	Response Training (Sec. 1.8.3)	Appendix A
	a. Description of Response Training program (including topics)	Appendix A
	b. Personnel Response Training Logs (Name, response training date/and number of hours; prevention training date/and number of hours)	Appendix A
24.0	Diagrams (Sec. 1.9)	
	Site Plan Diagram	Figure 1.6
	a. Entire facility to scale	Figure 1.6
	b. Above and below-ground storage tanks	Figure 1.6
	c. Contents and capacities of bulk oil storage tanks and drum oil storage areas	Figure 1.6
	d. Process buildings	Figure 1.6
	e. Transfer areas	Figure 1.6
	f. Location and capacity of secondary containment systems	Figure 1.6
	g. Location of hazardous materials	Figure 1.6
	h. Location of communications and emergency response equipment	Figure 1.6
	i. Location of electrical equipment that might contain oil	Figure 1.6
25.0	Site Drainage Plan Diagram	
	a. Major sanitary and storm sewers, manholes, and drains	Figure 1.7
	b. Weirs and shut-off valves	Figure 1.7
	c. Surface water receiving streams	Figure 1.7
	d. Firefighting water sources	Figure 1.7

Figure E.2. EPA OPA 90 Cross Reference (continued)

EPA OPA 90 REQUIREMENTS (40 CFR 112)		LOCATION IN THIS PLAN
Note: Section numbers indicated below correspond to sections in the model response plan in Appendix F of the Facility Response Plan (FRP) rule.		
	e. Other utilities	Figure 1.7
	g. Response equipment transportation routes	Figure 2.2
	h. Direction of spill flow from discharge points	N/A
26.0	Site Evacuation Plan Diagram	Figure 2.2
	a. Evacuation routes	Figure 2.2
	b. Location of regrouping areas	Figure 2.2
27.0	Site Security (Sec. 1.10)	Section 7.2
	a. Description of facility security (Emergency cut-off locations, enclosures, guards and their duties, lighting, valve and pump locks, pipeline connection caps)	Section 7.2
28.0	Acronyms and References	Appendix I

Figure E.3. USCG OPA 90 Cross Reference

USCG OPA 90 REQUIREMENTS (33 CFR 154.1035)	LOCATION IN PLAN
a) *Introduction and Plan Content*	
1. Facility Name and Location address, city, county, state, zip, phone number, fax number.	Fig. 1.4
2. Facility Directions (including but not limited to maps, landmarks and river mile that could aid a responder and reviewer).	Section 1.4; Figure 1.6
3. Name, address and procedures for contacting the facility's owner or operator on a 24 hour basis.	Figure 1.4
4. Table of contents.	Preface
5. Period when submitted plan does not have to conform to the subpart, a cross index, if appropriate.	Appendix E
6. Record of change(s) to record information on plan updates.	Page vi
b) *Emergency Response Action Plan*	
1. Notification procedures • Prioritized list of facility response personnel.	Section 3
• Federal, State, or local agencies, as required.	Section 3, Figure 3.1 & 3.3
• Notification of the National Response Center.	Figure 3.1, 3.3 & 3.4
• Spill response notification forms to Federal, State, local agencies. Form must state that initial notification must not be delayed by collection of data.	Figure 3.2
2. Facility's spill mitigation procedures (i) Describe volume and oil groups that would be involved in the following: • Average, maximum and worse discharge from the MTR facility.	Appendix D
• Where applicable, the worst case discharge from the non-transportation-related facility.	Appendix D.6
(ii) Prioritized list of procedures and facility personnel (identified by job title). Procedures must address actions to be taken in the event of a discharge, potential discharge, or emergency involving the following equipment and scenarios: • Transfer equipment • Tank overfill or failure • Piping rupture, leak both under pressure and not under pressure • Explosion or fire • Equipment failure	Sections 2 & 4; Appendix D
(iii) Listing of equipment and the responsibilities of facility personnel to mitigate an average most probable discharge	Section 7.0
3. Facility's response activities	
(i) Responsibilities of facility personnel to initiate a response and supervise response resources pending arrival of qualified individuals.	Figures 4.3 & 4.4
• Responsibilities and authority of the qualified individual and • Alternate as required in § 154.1026.	Section 4.6

Figure E.3. USCG OPA 90 Cross Reference (continued)

USCG OPA 90 REQUIREMENTS (33 CFR 154.1035)	LOCATION IN PLAN
	Vancouver
(iii) Apply the following organizational structure to manage response actions: • Command and control • Public information • Safety • Liaison with government agencies • Spill operations • Planning • Logistics support • Finance	Figures 4.1 & 4.3
(iv) Identify oil spill removal organizations and the spill management teams to be capable of providing the following response resources: • Equipment & supplies to meet § 154.1045, 154.1047, as appropriate • Trained personnel for response to be on hand for the first 7 days of the response	Section 7.1
• Job descriptions for each spill management team member within the organizational structure in a response action.	Figure 4.4
(v) For mobile facilities in more than one COTP zone, oil spill removal organizations and the spill management teams must be identified from paragraph (3)(iv) and included in each COTP zone.	N/A
4. Sensitive areas	
(i) Identify areas of economic importance and environmental sensitivities as identified in the ACP, which are potentially impacted by a worst case discharge.	Section 6.2 – 6.4
(ii) For a worst case discharge the plan must address the following: • List all sensitive elements identified in ACP that are potentially impacted by a discharge	Section 6.3 – 6.4
• Describe all response actions anticipated to protect sensitive elements • Contain map or chart that depicts each response action anticipated.	Section 6.5 - 6.8, Figures 6.7, 6.10 & 6.11
(iii) Identify appropriate equipment and personnel as described in §154.1028 to protect sensitive elements by one of the following calculations: • Persistent oils and non-petroleum oils discharged into non-tidal waters, the distance from the facility reached in 48 hours at maximum current. (Not applicable)	N/A
• Persistent and non-petroleum oils discharged into tidal waters, 15 miles from the facility down current during ebb tide and to the point of maximum tidal influence or 15 miles, whichever is less, during flood tide.	Section
• Non-persistent oils discharged into non-tidal waters, the distance from the facility reached in 24 hours at maximum current. (Not applicable)	N/A Section 7
• Non-persistent oils discharged into tidal waters, 5 miles from the facility down current during ebb tide and to the point of maximum tidal influence or 5 miles, whichever is less, during flood tide. • Spill trajectory or model may be substituted if acceptable to COTP. • Procedures contained in the Environmental Protection's Agency's regulations on oil pollution prevention may be substituted for non-tidal and tidal waters. • COTP may require additional sensitive elements to be protected depending on trajectory.	Appendix D & Appendix H

Figure E.3. USCG OPA 90 Cross Reference (continued)

USCG OPA 90 REQUIREMENTS (33 CFR 154.1035)	LOCATION IN PLAN
	Vancouver
5. Disposal plan This subsection must describe any actions to be taken or procedures to be used to ensure that all recovered oil and oil contained debris produced as a result of any discharge are disposed according to federal, state, or local requirements.	
c) *Training and Exercises*	
1. Training procedures of the facility owner or operator must meet requirements of §154.1050.	Appendix A
2. Drill procedures of the facility owner or operator must meet requirements of §154.1055.	Appendix A
d) *Plan Review and Update Procedures* Plan review and update procedures of the facility owner or operator must meet requirements of §154.1065 and any post-discharge review of the plan to evaluate and validate its effectiveness.	Page vi and Section 1.3
e) Appendices	
1. Facility-specific information – principal characteristics	
i) Physical description of the facility must include mooring areas, transfer locations, control stations, locations of safety equipment and location and capacities of all piping storage tanks.	Sections C.1 – C.2, Figure C.3
ii) Identify sizes, types and number of vessels the facility can transfer oil to or from simultaneously.	Section C.2, p. C-3
iii) Identify the first valve(s) on piping separating transportation-related and non-transportation-related areas. If piping serves tank vessels from a manifold it is considered the first valve.	Appendix C, Figure 1.7
iv) The oil(s) and hazardous material handled, stored or transported in bulk must be documented and include the following: • Generic/chemical name • Description of appearance and odor • Hazards involved with handling or discharge • Firefighting procedures and extinguishing agents for oil/hazardous materials	Appendix D, Section 7.1
2. List of contacts must include primary and alternate personnel, personnel from paragraph (b) (3) (iv), and Federal, state and local officials.	Figure 3.3
3. Equipment list and records must include the following: • List of equipment and facility personnel required to respond to an average most probable discharge, as defined by §154.1020	Appendix D
• List of equipment belonging to an oil spill removal organization as described in §154.1028; unless the organization has been classified by the Coast Guard to equal or exceed the response capability needed by the facility	Figures 7.1 & 7.3, Appendix B
• When it is necessary for the appendix to contain a listing of response equipment, it shall include the following: skimmers; booms; dispersant application; in-situ burning; bioremediation equipment and supplies, and other equipment used to apply other chemical agents on the NCP Product Schedule; communications, firefighting, and beach cleaning equipment; boats and motors; and heavy equipment	Section 7.1

Figure E.3. USCG OPA 90 Cross Reference (continued)

USCG OPA 90 REQUIREMENTS (33 CFR 154.1035)	LOCATION IN PLAN
	Vancouver
• This list must also include specifications for each piece of equipment as follows: 1) type, make, model, and year of manufacture, 2) for oil recovery devices, the effective daily recovery rate, 3) for containment boom, the overall boom height and type of end connectors, 4) spill scenario in which the equipment will be used, total daily capacity for storage and disposal of recovered daily oil, 6) for communication equipment, the type and amount of equipment intended for use during response activities, 7) location of equipment, and 8) date of last inspection.	Section 7
4. Communications plan must describe the primary and alternate method of communication during discharges, including communications at the facility and at remote locations.	Section 7.1.10
5. Site specific safety and health plan must describe the safety and health plan to be implemented. This appendix may reference another existing plan requiring under 29 CFR 1910.120	Section 2.7
6. List of acronyms and definitions must include all definitions that are critical to understanding the response plan.	Appendix I

Vancouver Energy
Operations Facility Oil Spill Contingency Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix F
Response Techniques and Guidelines

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APPENDIX F
RESPONSE TECHNIQUES AND GUIDELINES

F.1 SHORELINE PROTECTION GUIDANCE

Shoreline protection procedures are conducted to prevent oil impact to shoreline and reduce the impact on wildlife. Mechanical methods, such as use of boom and skimmers are the preferred methods. These methods can be used to control or contain floating oil slicks on the water away from marshes. Sorbents are effective on mudflats when placed on the shoreline before oil contacts the shore. A description of shoreline types is presented in **Figure F.1**. Specific shoreline protection and cleanup measures, for areas possibly impacted by a potential spill from the Facility, are discussed in this subsection. Additional information may be obtained from the *Northwest Area Contingency Plan*. The Vancouver Energy recognizes CRCI as their primary response contractor and will defer to their expertise in assessment, clean-up methodology, and provision of trained personnel.

F.2 SHORELINE AND TERRESTRIAL CLEANUP

F.2.1 General

In the event that terrestrial areas do become oiled, cleanup operations should be undertaken to minimize the environmental effects of the oil**.** Before terrestrial and shoreline cleanup plans are implemented they require Unified Command approval. Assessment teams comprised of personnel from the appropriate agencies, Company personnel, and consultants can be utilized to determine the most appropriate cleanup method.

In most instances, cleanup efforts are not subject to the same time constraints as containment, recovery, and protection operations. As a result, better planning and greater attention to detail are possible. The exception is where there is a high probability of stranded oil becoming mobilized again and migrating to previously unaffected areas. In this case, implement cleanup operations as soon as possible. If time does permit, consider the following items in detail.

- Documentation of the location, degree, and/or extent of oil conditions
- Evaluation of all environmental, cultural, economic, and political factors
- Selection of optional cleanup technique
- Mitigation of physical/environmental damage associated with cleanup operations
- Cost-effectiveness
- Net environmental benefit assessment

The shoreline or terrestrial oil conditions can range from those which require immediate and thorough cleanup to lightly oiled areas where no cleanup may be the most environmentally sound option. Factors that influence technique selection and whether or not cleanup will be required include:

- Oil type and amount
- Sensitivity
- Substrate or shoreline type
- Intrusive nature of the candidate techniques
- Shoreline accessibility
- Exposure

Therefore, before initiating cleanup activities, an assessment of the net environmental benefits of a proposed cleanup operation should be performed for all affected shorelines.

F.2.2 Cleanup Technique Selection

Shoreline

In the event the techniques recommended above do not apply to a particular spill situation at the Facility, other techniques should be considered for implementation. The other techniques that may be applicable are generally dependent on the following.

- Oil type
- Oiling conditions/degree of impact
- Environmental, safety, and political considerations
- Unusual circumstances the may be present at the time of the spill

Therefore, the following guidelines can be used to identify the most appropriate cleanup technique(s) for that situation.

The selection of an appropriate shoreline cleanup technique is primarily dependent on the following factors:

- **Substrate type** – Finer grained sediments typically require different techniques than coarse grained sediments and sediment type can affect trafficability (i.e., ability to traverse the area without losing traction) for heavy equipment.
- **Oil conditions** – Heavier oil conditions and larger areas may require more intrusive or mechanical methods, whereas lighter conditions may not require any form of cleanup.
- **Slope** – Heavy equipment use may not be appropriate on steeper or unstable banks.
- **Shoreline sensitivity** – Intrusive techniques may create a greater impact than the oil itself.
- **Penetration depth** – Significant penetration can reduce the effectiveness of several techniques.

FIGURE F.2 includes a shoreline cleanup technique selection guide.

These figures should only be used as a guide to identify the most appropriate techniques based on a limited number of factors and not a definitive list of techniques that can be used for selected situations.

A number of other factors can influence technique selection and result in techniques other than those identified in the figures as the most appropriate for a given situation. Final selection of cleanup techniques should be conducted in consultation with the state and federal OSCs, the appropriate natural resource trustees, if applicable, and the particular landowner(s) or manager(s) prior to implementation.

Figure F.1. Description of Shoreline Types

TYPES	ESI #	DESCRIPTION	PREDICTED OIL IMPACT	RECOMMENDED CLEANUP ACTIVITY
Exposed Rocky Cliffs	1A	• The intertidal zone is steep (greater than a 30° slope), with very little width. • Sediment accumulations are uncommon and usually ephemeral, since waves remove the debris that has slumped from the eroding cliffs. • They are often found interspersed with other shoreline types. • There is a strong vertical zonation of intertidal biological communities.	• Oil is held offshore by waves reflecting off the steep cliff. • Any oil that is deposited is rapidly removed from exposed faces. • The most resistant oil would remain as a patchy band at or above the high-tide line. • Impacts to intertidal communities are expected to be of short duration. • An exception would be where heavy concentrations of light refined product (e.g. No. 2 fuel oil) came ashore very quickly.	• Cleanup is not usually required • Access can be difficult and dangerous.

Exposed Sea Walls and Piers	1B	• Seawalls and piers are particularly common in developed areas, providing protection to residential and industrial developments.
		• They are also common along inlets, urbanized areas, and developed beachfront sites.
		• They are composed of concrete and stone, wooden, or metal bulkheads and wooden pilings.
			• Oil would percolate between the joints of the structures.
			• Oil would coat the intertidal areas of solid structures.
			• Biota would be damaged or killed under heavy accumulations.
				• High-pressure spraying may be required in order to:
				  • Remove oil;
				  • Prepare substrate for recolonization of barnacle and oyster communities;
				  • Minimize aesthetic damage;
				  • Prevent the chronic leaching of oil from the structure.

Exposed Wave-Cut Platforms	2	• The intertidal zone consists of a flat rock bench of highly variable width. • The shoreline may be backed by a steep scarp or low bluff. • There may be a narrow, perched beach of gravel- to boulder-sized sediments at the base of the scarp. • The platform surface is irregular and tidal pools are common. • Small accumulations of gravel can be found in the tidal pools and crevices in the platform. • Pockets of sandy “tidal flats” can occur on the platform in less exposed settings. • These habitats can support large populations of encrusting animals and plants, with rich tidal pool communities.	• Oil will not adhere to the rock platform, but rather be transported across the platform and accumulate along the high-tide line. • Oil can penetrate and persist in the beach sediments, if present. • Persistence of oiled sediments is usually short term, except in wave shadows or larger sediment accumulations.	• Cleanup is usually not required. • Where the high-tide areas is accessible, it may be feasible to remove heavy oil accumulations and oiled debris.

Figure F.1. Description of Shoreline Types (continued)

TYPES	ESI #	DESCRIPTION	PREDICTED OIL IMPACT	RECOMMENDED CLEANUP ACTIVITY
Fine/Medium-Grained Sandy Beaches	3	• These beaches are generally flat, wide, and hard-packed. • They are commonly backed by dunes or seawalls along exposed outer coasts. • Along sheltered bays, they are narrower, often fronted by tidal flats. • Upper beach fauna are scarce.	• Light oil accumulations will be deposited as oily swashes or bands along the upper intertidal zone. • Heavy oil accumulations will cover the entire beach surface, although the oil will be lifted off the lower beach with the rising tide. • Maximum penetration of oil into fine-grained sand will be 10 centimeters (cm). • Burial of oiled layers by clean sand within the first few weeks will be less than 30 cm along the upper beach face. • Organisms living in the beach sands may be killed either by smothering or by lethal oil concentrations in the interstitial water. • Shorebirds may be killed if oiled, though they may shift to clean sites.	• These beaches are among the easiest beach types to clean. • Cleanup should concentrate on the removal of oil from the upper swash zone after all oil has come ashore. • Removal of sand from the beach should be minimal to avoid erosion problems; special caution is necessary in areas backed by seawalls. • Activity through oiled and dune areas should be severely limited, to prevent contamination of clean areas. • Manual cleanup, rather than road graders and front-end loaders, is advised to minimize the volume of sand removed from the shore and requiring disposal. • All efforts should focus on preventing the mixture of oil being pushed deeper into the sediments by vehicle and foot traffic.
Coarse-Grained Sand/Gravel Beaches	4	• These beaches are moderate-to-steep, of variable width, and have soft sediments. • They are commonly backed by dunes seawalls along exposed outer coasts. • Generally species density and diversity is low.	• Light oil will be deposited primarily as a band along the high-tide line. • Under very heavy accumulations, oil may spread across the entire beach face, though the oil will be lifted off the lower beach with the rising tide. • Penetration of oil into coarse-grained sand can reach 25 cm. • Burial of oil layers by clean sand can be rapid, and up to 60 cm or more. • Burial over one meter is possible if the oil comes ashore at the start of the disposition period. • Biological impacts include temporary declines in faunal populations, which can also affect feeding shorebirds.	• Remove oil primarily from the upper swash lines. • Removal of sediment should be limited to avoid erosion problems. • Mechanical reworking of the sediment into the surf zone may be used to release the oil without removal. • Activity in the oiled sand should be limited to prevent mixing oil deeper into the beach. • Use of heavy equipment for oil/sand removal may result in the removal of excessive amounts of sand; manual cleanup may be more effective.

Figure F.1. Description of Shoreline Types (continued)

TYPES	ESI #	DESCRIPTION	PREDICTED OIL IMPACT	RECOMMENDED CLEANUP ACTIVITY
Mixed Sand and Gravel Beaches	5	• Moderately sloping beach composed of a mixture of sand (greater than 20%) and gravel (greater than 25%). • The high-tide berm area is usually composed of sand or fine gravel (pebbles to cobbles), whereas the lower part of the beach is coarser, with cobbles to boulders. • Because of the mixed sediment sizes, there may be zones of sand, pebbles, or cobbles. • Because of the sediment mobility and desiccation of exposed beaches, there are low densities of attached animals and plants. • The presence of attached algae, mussels, and barnacles indicated beaches that are relatively sheltered, with the more stable substrate supporting a richer biota.	• During small spills, oil will be deposited along and above the high-tide swash. • Large spills will spread across the entire intertidal area. • Oil penetration into the beach sediments may be up to 50 cm; however, the sand fraction can be quite mobile, and oil behavior is much like on a sand beach if the sand fraction exceeds about 40%. • Burial of oil may be deep at and above the high-tide line, where oil tends to persist, particularly where beaches are only intermittently exposed to waves. • On sheltered beaches, extensive pavements of asphalted sediments can form if there is no removal of heavy oil accumulations, because most of the oil remains on the surface. • Once formed, pavements are very stable and can persist for many years. • Oil can be stranded in the coarse sediments on the lower part of the beach, particularly if the oil is weathered or emulsified.	• Remove heavy accumulations of pooled oil from the upper beach face. • All oiled debris should be removed. • Sediment removal should be limited as much as possible. • Low-pressure flushing can be used to float oil away from the sediments for recovery by skimmers or sorbents. High-pressure spraying should be avoided because of potential for transporting the finer sediments (sand) to the lower intertidal or subtidal zones. • Mechanical reworking of oiled sediments from the high-tide zone to the upper intertidal zone can be effective in areas regularly exposed to wave activity (as evidence by storm berms). However, oiled sediments should not be relocated below the mid-tide zone. • In-place tilling may be used to reach deeply buried oil layers in the mid-beach on exposed beaches.
Gravel Beaches	6A	• Gravel beaches are composed of sediments ranging in size from pebbles to boulders. • They can be very steep, with multiple wave-built berms forming the upper beach. • Attached animals and plants are usually restricted to the lowest parts of the beach, where sediments are less mobile.	• Deep penetration and rapid burial of stranded oil is likely on exposed beaches. • On exposed beaches, oil can be pushed over the high-tide and storm berms, pooling and persisting above the normal zone of wave wash. • Long-term persistence will be controlled by the depth of penetration versus the depth of routine reworking by storm waves. • On relatively sheltered beaches, formation of asphalt pavements is likely where accumulations are heavy.	• Heavy accumulations of pooled oil should be quickly removed from the upper beach. • All oiled debris should be removed. • Sediment removal should be limited as much as possible. • Low- to high-pressure flushing can be used to float oil away from the sediments for recovery by skimmers or sorbents. • Mechanical reworking of oiled sediments from the high-tide zone to the upper intertidal zone can be effective in areas regularly exposed to wave activity (as evidence by storm berms). However, oiled sediments should not be relocated below the mid-tide zone. • In-place tilling may be used to reach deeply buried oil layers in the mid-beach on exposed beaches.

Figure F.1. Description of Shoreline Types (continued)

TYPES	ESI #	DESCRIPTION	PREDICTED OIL IMPACT	RECOMMENDED CLEANUP ACTIVITY
	6B	• Riprap structures are composed of cobble to boulder-size rocks. • Riprap structures are placed for shoreline protection and inlet stabilization. • Biota on the riprap may be plentiful and varied.	• On riprap structures, deep penetration of oil between boulders is likely. • If oil is left uncleaned, it may become asphalted. • Resident fauna and flora may be killed by the oil.	• It may be necessary to remove heavily oiled riprap and replace it.
Exposed Tidal Flats	7	• They are compose primarily of sand and mud. • The presence of sand indicates that tidal or wind-driven currents and waves are strong enough to mobilize the sediments. • They are always associated with another shoreline type on the landward side of the flat. • The sediments are water-saturated, with only the topographically higher ridges drying out during low tide. • Biological utilization can be very high, with large numbers of infauna and heavy use by birds for roosting and foraging.	• Oil does not usually adhere to the surface of exposed tidal flats, but rather moves across the flat and accumulates at the high-tide line. • Deposition of oil on the flat may occur on a falling tide if concentrations are heavy. • Oil does not penetrate the water-saturated sediments. • Biological damage may be severe, primarily to infauna, thereby reducing food sources for birds and other predators.	• Currents and waves can be very effective in natural removal of oil. • Cleanup is very difficult (and possible only during low tides). • The use of heavy machinery should be restricted to prevent mixing of oil into the sediments. • On sand flats, oil will be removed naturally from the flat and deposited on the adjacent beaches where cleanup is more feasible.
Sheltered Rocky Shores	8A	• They consist of bedrock shores of variable slope (from vertical cliffs to wide, rocky ledges) that are sheltered from exposure to most wave and tidal energy. • The wider shores may have some surface sediments, but the bedrock is the dominant substrate type. • Species density and diversity vary greatly, but barnacles, snails, mussels, clams, periwinkles, amphipods, polychaetes, rockweed, and crabs are often very abundant.	• On rocky shores, oil will adhere readily to the rough rocky surface, particularly along the high-tide line, formed a distinct oil band. • Fractures in the bedrock will be sites of pooling and oil persistence. • Even on wide ledges, the lower intertidal zones usually stays wet (particularly when algae covered), preventing oil from adhering to the rock surface. • Heavy and weathered oils can cover the upper zone with little impacts to the rich biological communities of the lower zone. • Where surface sediments are abundant, oil will penetrate into the crevices formed by the surface rubble and pool at the contact of the sediments and the surface. • Where the rubble is loosely packed, oil will penetrate deeply, causing long-term contamination of the subsurface sediments. • Fresh oil and light refined products have high acute toxicities that can affect attached organisms after even short exposures.	• Low- to high-pressure spraying at ambient water temperatures is most effective when the oil is fresh. • Extreme care must be taken not to spray in the biologically rich lower intertidal zone or when the tidal level reaches that zone. • Cutting of oiled, attached algae is not recommended; tidal action will eventually float this oil off, so sorbent booms should be deployed.

Figure F.1. Description of Shoreline Types (continued)

TYPES	ESI #	DESCRIPTION	PREDICTED OIL IMPACT	RECOMMENDED CLEANUP ACTIVITY
Sheltered Tidal Flats	9	• They are composed primarily of silt and clay. • They are present in calm-water habitats, sheltered from major wave activity, and frequently fronted by marshes. • Wave energy is very low, although there may be strong tidal currents active on parts of the flat and in channels across the flat. • The sediments are very soft and cannot support even light foot traffic. • There are usually large populations of clams, worms, and snails. • Bird life is seasonably abundant.	• Oil does not usually adhere to the surface of sheltered tidal flats, but rather moves across the flat and accumulates at the high-tide line. • Deposition of oil on the flat may occur on a failing tide if concentrations are heavy. • Oil will not penetrate the water-saturated sediments at all. • In areas of high suspended sediments, sorption of oil can result in contaminated sediments that can be deposited on the flats. • Biological damage may be severe.	• These are high-priority areas necessitating the use of spill protection devices to limit oil spill impact; deflection or sorbent booms and open water skimmers should be used. • Cleanup of the flat surface is very difficult because of the soft substrate and many methods may be restricted. • Manual operations and deployment of sorbents from shallow-draft boats may be helpful.
Fringing and Extensive Salt Marshes	10A	• Marshes are intertidal wetlands containing emergent, herbaceous vegetation. • Width of the marsh can vary widely, from a narrow fringe to extensive. • They are relatively sheltered from waves and strong tidal currents. • Resident flora and fauna are abundant and consist of numerous species. • Marshes provide a nursery ground for numerous fish species. • Bird life is seasonably abundant.	• Oil adheres readily to marsh vegetation. • The band of coating will vary widely, depending upon the tidal stage at the time oil slicks are in the vegetation. There may be multiple bands. • Large slicks will persist through multiple tidal cycles and coat the entire stem from the high-tide line to the base. • If the heavy vegetation is thick, heavy oil coating will be restricted to the outer fringe, with penetration and lighter oiling to the limit of tidal influence. • Medium to heavy oils do not readily adhere or penetrate the fine sediments, but they can pool on the surface and in burrows. • Light oils can penetrate the top few centimeters of sediments and deeply into burrows and cracks (up to one meter).	• Under light oiling, the best practice is to let the areas recover naturally. • Heavy accumulation of pooled oil can be removed by vacuum, sorbents, or low-pressure flushing. During flushing, care must be taken to prevent transporting oil to sensitive areas down slope or along shore. • Cleanup activities should be carefully supervised to avoid vegetation damage. • Any cleanup activity must not mix the oil deeper into the sediments. Trampling of the roots must be minimized. • Cutting of oiled vegetation should only be considered when other resources present are at great risk from leaving the oiled vegetation in place.

Figure F.1. Description of Shoreline Types (continued)

TYPES	ESI #	DESCRIPTION	PREDICTED OIL IMPACT	RECOMMENDED CLEANUP ACTIVITY

Mangroves	10B	• Mangrove forests are composed of salt-tolerant trees that form dense stands with distinct zonation: red mangroves occur on the seaward exterior while black and white mangroves occur on forest interiors.
		• The outer, fringing forests can be exposed to relatively high wave activity and strong currents; forests located in bays and estuaries are well-sheltered.
		• Sediment types range from thin layers of sand and mud to muddy peat to loose gravel on limestone beachrock.
		• Heavy wrack deposits in the storm swash are very common.
		• The topographic profile is generally very flat, and seagrass beds are common in shallow offshore areas.
		• Attached to the prop roots are moderate densities of algae, snails, and crabs.
			• Fresh spills of light refined products have acute, toxic impacts to both trees and intertidal biota. These products will penetrate deeply into the forests, stopping only at the high-tide line, where sediment contamination may result.
			• No. 2 fuel oil or fresh crude will have great persistence where it penetrates burrows and prop root cavities. Heavier oils tend to coat the intertidal zone, with heaviest concentrations at the high-tide line or storm wrack line.
			• Heavy oils will coat the intertidal section of prop roots, resulting in defoliation and eventual death of the tree if significant coverage occurs.
			• In sheltered areas, oil may persist for many years.
				• Under light accumulations of any type of oil. No cleanup is recommended.
				• If sheens are present, use sorbent booms to pick up the oil as it is naturally removed, being sure to change booms frequently.
				• The only light refined product that usually required cleanup is No. 2 fuel oil/diesel because of the potential for long-term sediment contamination.
				• Heavy accumulations could be skimmed or flushed with low-pressure water flooding, as long as there is NO disturbance or mixing of oil into the substrate. If substrate mixing is likely or unavoidable, it is better to leave the oil to weather naturally.
				• Oily debris should be removed, taking care not to disturb the substrate.
				• Live vegetation should never be cut or otherwise removed.
				• Sorbents can be used to remove wide heavy oil coatings from prop roots in areas of firm substrate and with close supervision.
				• Under moderate to heavy accumulations of crude or heavy refined products, a detailed, site-specific cleanup plan will be required. The cleanup plan should be prepared by experience personnel and include:
				  ◦ General map of entire impacted area and locations of specific areas to be cleaned up.
				  ◦ Detailed maps of each specific area showing the oil locations and type of cleanup to be performed at each location.
				  ◦ Definition of each type of cleanup allowed.
				  ◦ Specific restrictions to prevent further damage for each cleanup location.

Figure F.2. Shoreline Cleanup Technique Selection Guide

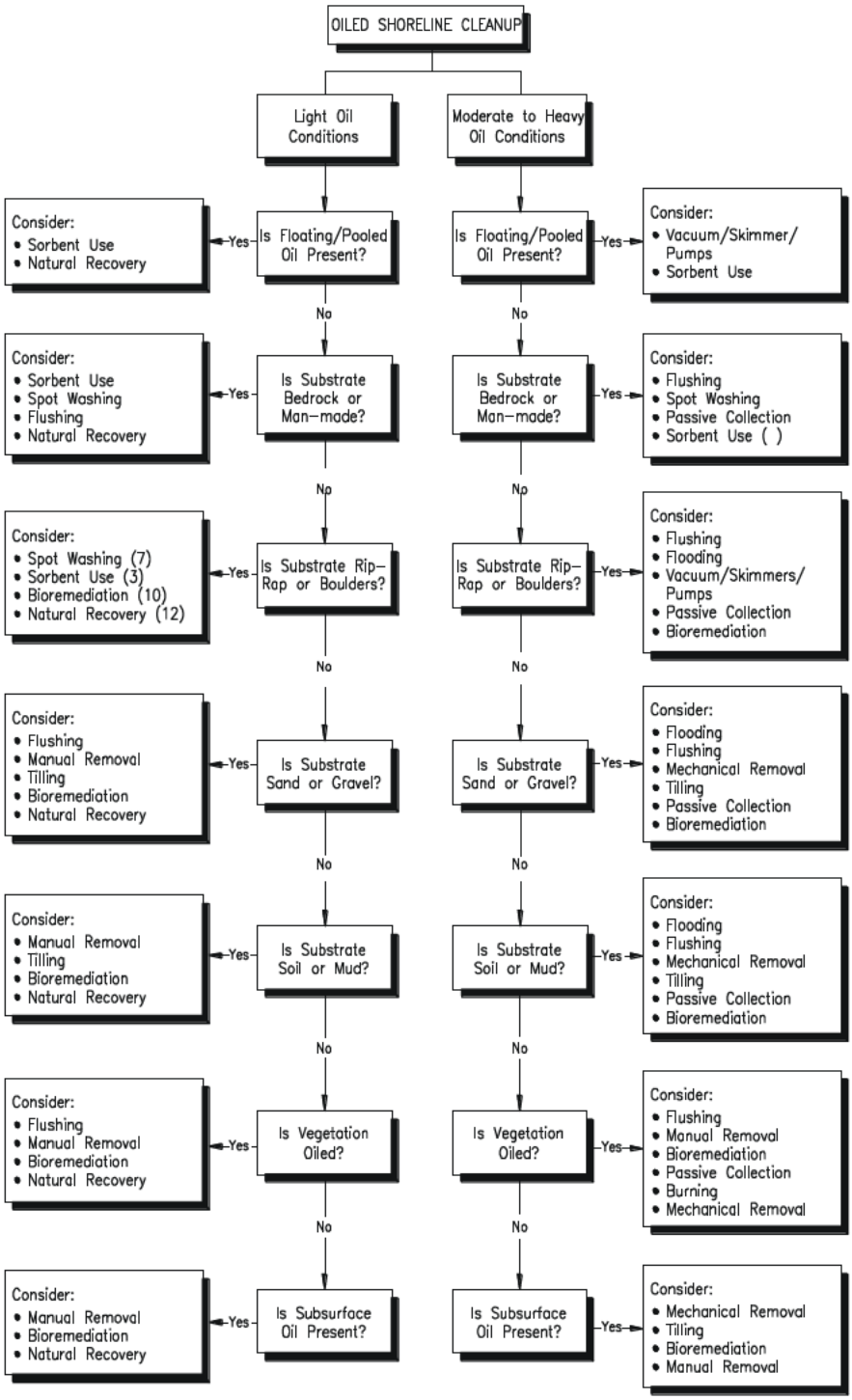

Figure F.3. Shoreline Protection Methods[2]

ON-WATER	METHOD	APPLICABILITY
EXCLUSION BOOMING	• Deployed across or around oil • Oil removed from water surface	• To protect small bays, harbors, inlets or river mouths • Currents less than 0.5 m/s
DIVERSION BOOMING	• Deployed at an angle to approaching oil • Diverts oil away from sensitive areas	• Where currents are greater than 0.5 m/s
CONTAINMENT BOOMING	• Deployed around oil • Oil removed from water surface	• Current less than 0.5 m/s • Not applicable for large slicks
SORBENT BOOMING	• Deployed across approaching oil • Oil absorbed by boom	• Quiet waters • Can be recycled and reused • Small slicks
DISPERSION AGENTS	• Reduce surface tension of oil by application of chemicals • Oil is then dispersed more rapidly into the water	• Requires permission of regulatory agencies • Increases oil mobility, therefore, stranded oil has greater potential to penetrate beach sediments
COLLECTION AGENTS	• Increase surface tension of oil by application of chemicals • Oil is prevented from spreading	• Decreases oil mobility, therefore, stranded oil has a reduced capacity to penetrate beach sediments
ONSHORE	**METHOD**	**APPLICABILITY**
SORBENTS	• Applied manually or mechanically to the beach before oil is stranded • Oil/sorbent is then removed manually or mechanically	• Prevents penetration of oil into substrate • Sorbent pads preferable to loose-fiber materials for ease of collection • Synthetic products have higher absorption capacity than natural materials • Can be recycled and reused • Usually a labor-intensive method
SURFACE TREATMENT AGENTS	• Applied to shore zone before oil is stranded • Prevents oil from adhering to the substrate	• Applicability and effectiveness not yet fully assessed • May be difficult to apply on long sections of shore • Oil must be flushed from the shore and agent removed if it does not degrade naturally
COLLECTION AGENTS	• Applied along water line before oil is stranded • Reduces natural dispersion of oil	• Reduces area of shoreline contamination • Reduces penetration into beach
DIKES AND/OR DITCHES	• Ditch up to 1.0 m deep dug parallel to shore at upper limit of wave action • Sediment removed used to build dike on landward side of the ditch • On pebble-cobble beaches can fill ditch with sorbents to collect oil and prevent oil penetration	• Prevents oil being washed onto the backshore • Can be constructed mechanically along long beach sections • Ditch acts as a collector of oil which can be removed with buckets, hand pumps, or vacuum pumps
DAMS	• Used for shallow streams where booms cannot be deployed	• Acts as a boom for exclusion of oil • Can be constructed to allow water to flow through dam
VISCOUS	• Applied manually to the beach, rock jetties, etc.	• Excellent with heavier oils • Can be recycled and reused • Reduces penetration into rocks

[2]Breuel, A. 1981. Oil Spill Cleanup and Protection Techniques for Shoreline and Marshland and Marshlands. Park Ridge, New Jersey, Noyes.

Figure F.4. Response Options for Oil or Substances with Physical and Chemical Properties Similar to Oil

	PROTECTION					CLEANING/MIXING				REMOVAL/DISPOSAL				ONSHORE DISPERSION				
ENVIRONMENT	DITCHES/DIKES	DISPERSANTS ON WATER	SINKING AGENTS	HERDING/GELLING AGENTS	BOOMS/SKIMMERS	BRACH CLEANING MACHINES	BURNING	MIXING	NATURAL CLEANING	MANUAL REMOVAL	MECHANICAL REMOVAL	VACUUM PUMPING	VEGETATION CROPPING	DISPERSANTS ON CROPPING	HIGH PRESSURE FLUSHING	LOW PRESSURE FLUSHING	SAND BLASTING	STEAM CLEANING
1. SEA GRASS BEDS		x	#	o	+				+	x			x	x		o		
2. MANGROVES		+		o	+		#		o	o	#	o	x	+	x	+		
3. MARSHES				o	+		#		+	#	#	o	x	o	#	+		#
4. SHELTERED TIDAL FLATS				o	+			#	+	o	#	o		x	#	+		
5. RIVER BANKS	o			o	+		x		+	+	o	o				o		
6. OYSTER REEFS				o	+				+			o		x		o		#
7. EXPOSED TIDAL FLATS	o	x		o	+				+					x				
8. DREDGE SPOIL BANKS	o			o	+			o	+	o	o							
9. BAY MARGINS	o			o	+	o		o	+	o	o	+				o		
10. 11. OPEN SAND BEACH	+			o		+	#	o	+	+	+	+		o	#	o		
12. MAN-MADE SHORE				o	+		x		+	o				o	o	o	o	o
13. EROSION SCARPS									+	+	x	+			x	o		
TIDAL INLETS		o		o	+				+									
LAGOONS BAYS			#	o	+				+		o							

KEY: + PREFERRED o OPTIONAL x NOT ADVISABLE # AVOID

Figure F.5. Summary of Shoreline and Terrestrial Cleanup Techniques

TECHNIQUE	DESCRIPTION	PRIMARY LOGISTICAL REQUIREMENTS[1]	USE LIMITATIONS[2]	POTENTIAL ENVIRONMENTAL EFFECTS
Removal				
1. Manual Removal	Hand tools (scrapers, wire brushes, shovels, cutting tools, wheel barrows, etc.) are used to scrape oil off surfaces or recover oiled sediments, vegetation, or debris where oil conditions are light or sporadic and/or access is limited.	Equipment Misc. hand tools Personnel 10-20 workers	• Poor access • Highly sensitive areas	• Sediment disturbance and erosion potential • Trampling of vegetation and organisms • Foot traffic can work oil deeper into soft sediments
2. Mechanical Removal	Mechanical earthmoving equipment is used to remove oiled sediments and debris from heavily impacted areas with suitable access.			
2a. Bulldozer/Front-end Loader	Used to recover moderately to heavily oiled sediments using a bulldozer to push sediments into piles for pickup by front-end loader. Front-end loader may work alone to recover sediments directly.	Equipment 1 bulldozer 2 front-end loaders Personnel 2-4 workers plus equipment operators	• Very poor trafficability • Limited access • Highly sensitive areas • Light or sporadic oil conditions	• Removes upper 2 to 12 inches of sediments • Removes shallow organisms but recolonization is typically rapid • Excessive sediment removal can cause erosion
2b. Backhoe	Used to recover surface or subsurface oiled sediments on flat or steeply sloped areas by scooping up sediments and placing directly into dump trucks or in piles for subsequent removal.	Equipment 1-2 backhoes 4-6 dump trucks Personnel 2-4 workers plus equipment operators	• Limited access • Highly sensitive areas • Unstable slopes • Light or sporadic oil conditions	• Removes minimum of 6 to 12 inches of sediments • Removes shallow organisms but recolonization is typically rapid • Can cause erosion and slope instability
3. Sorbent Use	Sorbents are applied manually to oil accumulations, coatings, sheens, etc. to remove and recover the oil.	Equipment Misc. hand tools Misc. sorbents Personnel 2-10 workers	• Poor access • Highly sensitive areas • Heavy oil conditions	• Sediment disturbance and erosion potential • Trampling of vegetation and organisms • Foot traffic can work oil deeper into soft sediments

Figure F.5. Summary of Shoreline and Terrestrial Cleanup Techniques (continued)

TECHNIQUE	DESCRIPTION	PRIMARY LOGISTICAL REQUIREMENTS[1]	USE LIMITATIONS[2]	POTENTIAL ENVIRONMENTAL EFFECTS
4. Vacuums/Pumps/ Skimmers	Pumps, vacuum trucks, skimmers are used to remove oil accumulations from land or relatively thick floating layers from the water.	Equipment 1-2 50- to 100-bbl vacuum trucks w/hoses 1-2 nozzle screens or skimmer heads Personnel 2-6 workers plus truck operators	• Poor access • Thin oil accumulations or light sheens • Highly sensitive shoreline areas • Excessive suction lift required	• Typically does not remove all oil • Can remove some surface organisms, sediments, and vegetation
Washing				
5. Flooding	High volumes of water at low pressure are used to flood the oiled area to float oil off and out of sediments and back into the water or to a containment area where it can be recovered. Frequently used with flushing.	Equipment 1-5 100- to 200-gpm pumping systems 1 100-foot perforated header hose per system 1-2 200-foot containment booms per system 1 oil recovery device per system Personnel 6-8 workers per system	• Highly permeable substrate • Highly sensitive areas • Poor access • Highly weathered oil or thin films or coatings • Typically does not remove all oil	• Can impact clean downgradient areas • Can displace some surface organisms if present • Sediments transported into water can affect water quality
6. Flushing	Water streams at low to moderate pressure, and possibly elevated temperatures, are used to remove oil from surface or near-surface sediments through agitation and direct contact. Oil is flushed back into the water or a collection point for subsequent recovery. May also be used to flush out oil trapped by shoreline or aquatic vegetation.	Equipment 1-5 50- to 100-gpm/ 100-psi pumping systems with manifold 1-4 100-foot hoses and nozzles per system 1-2 200-foot containment booms per system 1 oil recovery device per system Personnel 8-10 workers per system	• Highly permeable substrate • Highly sensitive areas • Poor access • Highly weathered oil or thin films or coatings • Typically does not remove all oil	• Can impact clean downgradient areas • Will displace many surface organisms if present • Sediments transported into water can affect water quality • Hot water can be lethal to many organisms • Can increase oil penetration depth

Figure F.5. Summary of Shoreline and Terrestrial Cleanup Techniques (continued)

TECHNIQUE	DESCRIPTION	PRIMARY LOGISTICAL REQUIREMENTS[1]	USE LIMITATIONS[2]	POTENTIAL ENVIRONMENTAL EFFECTS
7. Spot (High Pressure) Washing	High pressure water streams are used to remove oil coatings from hard surfaces in small areas where flushing is ineffective. Oil is directed back into water or collection point for subsequent recovery.	Equipment 1-5 1,200- to 4,000-psi units with hose and spray wand 1-2 100-foot containment booms per unit 1 oil recovery device per unit Personnel 2-4 workers per unit	• Poor access • Highly sensitive area • Safety hazard from high pressure water stream • Relatively soft or unconsolidated substrates	• Will remove most organisms if present • Can damage surface being cleaned • Can affect clean downgradient or nearby areas
In Situ				
8. Passive Collection	Sorbent/snare booms or other sorbent materials are anchored at the waterline adjacent to heavily oiled areas to contain and recover oil as it leaches from the sediments.	Equipment 1,000-2,000 ft sorbent/snare boom 200-400 stakes or anchor systems Personnel 4-10 workers	• Poor access • High currents/waves • Lightly oiled sediments • Oil removal process is slow	• Significant amounts of oil can remain on the shoreline for extended periods of time
9. Sediment Tilling	Mechanical equipment or hand tools are used to till light to moderately oiled surface sediments to maximize natural degradation processes.	Equipment 1 tractor fitted with tines, dicer, ripper blades, etc. or 1-4 rototillers or 1 set of hand tools Personnel 2-10 workers	• Poor access • Heavily oiled area • Highly sensitive area • Oil can be mixed deeper into substrate	• Significant amounts of oil can remain on the shoreline for extended periods of time • Disturbs surface sediments and organisms
10. In Situ Bioremediation	Fertilizer is applied to lightly or moderately oiled areas to enhance microbial growth and subsequent biodegradation of oil.	Equipment 1-2 fertilizer applicators 1 tilling device if required Personnel 2-4 workers	• May cause algal bloom and short-term water quality problems • Heavily oiled areas	• Significant amounts of oil can remain on the shoreline for extended periods of time • Can disturb surface sediments and organisms

Figure F.5. Summary of Shoreline and Terrestrial Cleanup Techniques (continued)

TECHNIQUE	DESCRIPTION	PRIMARY LOGISTICAL REQUIREMENTS[1]	USE LIMITATIONS[2]	POTENTIAL ENVIRONMENTAL EFFECTS
11. Log/Debris Burning	Oiled logs, driftwood, vegetation, and debris are burned to minimize material handling and disposal requirements. Material should be stacked in tall piles and fans used to ensure a hot, clean burn.	Equipment 1 set of fire control equipment 2-4 fans 1 supply of combustion promoter Personnel 2-4 workers	• Local air quality regulations • Close proximity to populated areas • High wind conditions • Heavy precipitation	• Heat may impact local near-surface organisms • Substantial smoke may be generated • Heat may impact adjacent vegetation
12. Natural Recovery	No action is taken and oil is allowed to degrade naturally.	None required	• Heavy oil conditions • Highly sensitive shorelines • High oil remobilization potential	• Oil may persist for significant periods of time • Remobilized oil or sheens may impact other areas • Higher probability of impacting wildlife

1 - Per 1,000 feet of shoreline or oiled area. Potential sources of equipment are provided in Section 5.0.
2 - In addition to fire and explosion hazard.

Figure F.6. Summary of Shoreline Cleanup Techniques by Surface Type

Note: The appropriate government agencies must be consulted prior to implementing shoreline clean-up techniques.

TYPE OF SURFACE CONTAINING SPILL	RECOMMENDED CLEAN-UP TECHNIQUES	ACTIONS TO AVOID
Sand	Use vacuum skimmer and sorbents to clean up pools of free flowing oil. Use shovels to remove and place oiled sand into plastic bags or 55-gallon drums.	Do not let people or equipment travel over oiled sand. Do not bury oil sand.
Pebble or Gravel	If heavily oiled, use water spray and front-end loader to remove oiled material. If lightly oiled, use water spray and detergents to wash oil films off gravel and pebbles.	Do not place oiled gravel or pebbles in streams or offshore areas.
Snow	Use shovels to place oiled snow in 55-gallon drums.	Do not place oiled snow in wetlands or offshore areas. Make sure that drums do not have holes in them.
Concrete or Asphalt	Use vacuum skimmers and sorbents to clean up oil. Wash surface with water. Remove oil between cracks.	
Wetlands	Consult Ecology, EPA, or other agencies for permits to work on wetlands. If cleanup will cause excessive damage to wetlands, request agency approval to leave oil in place.	Do not operate vehicles or heavy equipment on wetlands. Do not disturb nesting areas.
Marshes	Use booms to control oil movement. Use a low pressure water spray to herd oil to areas where it can be recovered with skimmers and sorbents. Seek agency input as to whether oil should be left in place to prevent environmental damage that could result from clean-up operation.	Do not block entrance to marsh with berms or dams. Do not use heavy equipment.
Harbors and Streams	Use booms to prevent oil from spreading. Use skimmers to clean up oil slicks.	Avoid creating waves which may cause oil to spread. Do not use dispersants or chemicals to remove oil from water surface.

Vancouver Energy
Operations Facility Oil Spill Contingency Plan
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix G
Inspection/Prevention and Maintenance

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APPENDIX G
INSPECTION/PREVENTION AND MAINTENANCE

G.1 INSPECTION/PREVENTION MEASURES

While many of the more formal inspection procedures are described in the following sections, equipment inspection, problem detection, and incident reporting are part of the daily responsibilities of all operators, maintenance personnel and inspectors.

In carrying out their day-to-day responsibilities, operators, inspectors and other employees are expected to observe the equipment around them and report to their supervisor or other appropriate personnel any leaks, spills, or conditions that could lead to leaks or spills.

The potential for a piping rupture is minimized by the regular inspection of the overall system, including relief valves. The potential for overfilling a tank is minimized by a variety of safety features in the design and operation, including overfill alarms, tank gauge sensors, and proper training of personnel. Catastrophic tank failure is the most severe form of spill event that can be reasonably anticipated. The likelihood of this type of spill event occurring is minimized by routine inspections and proper maintenance of the tank structure. Oil handling procedures are also described in the Facility Oil Handling Operations Manual.

The Vancouver Energy (Facility) conducts self-inspections on all tanks, secondary containment units, and response equipment at the facility. This section describes procedures and checklists that are followed.

G.1.1 Daily Inspections

- Tank gauges, temperature and meter readings are recorded daily. Tank levels and product inventory are manually maintained on a continuous basis, and manually reconciled daily, **Figure G.1.**
- Receiving tanks are gauged and valves set prior to receipt of product from Area 200 –Unloading Area. Verbal contact is required to initiate transfer. All transfer information is recorded in the Facility Receipt Log, on file at the terminal office.
- Terminal Operators conduct visual inspection of the tank farm, all pumps and valves, sheds, office, fire protection equipment, oil/water separators, oil spill response equipment, cathodic protection systems, and safety systems and equipment. Specific inspection items are outlined in the inspection log, **Figures G.2, G.3, G.4, G.5, G.6, and G.7**.A complete inspection of dock, pipelines, transfer equipment and tankage is performed prior to marine transfers. A pre-transfer conference and Declaration of Inspection is competed in accordance with 33 CFR Part 156.
- Storm water retained within the tank dikes is inspected and released pursuant to SPCC regulations. Records of all stormwater discharge events are retained on site.
- All tanks are hand gauged daily. Tank gauges and meters are calibrated as needed.

G.1.2 Monthly Inspections

- A safety inspection is conducted under direction of the Terminal Manager, using the form in **Figure G.3**.
- Spill response equipment at the dock is inspected and maintained by Tesoro Terminal Operators.
- Recent adoption of API Standard 653 (Tank Inspection, Repair, Alteration, and Reconstruction) initiated new visual and non-destruction testing inspection standards. Future tank inspections will be made in compliance with API 653 Guidelines, using the form in **Figure G.3**.

G.1.3 Annual Inspections

- The fire extinguishers are inspected and tested.
- The dock hoses and the marine pipelines to the dock, are pressured tested in accordance with 33 CFR Part 156.
- Additional preventive maintenance conducted on a scheduled basis includes inspection/cleaning/lubing of valves and inspection of tank roofs.

Tesoro/**Vancouver Energy** personnel will use the form in **Figure G.2** to record monthly, quarterly, and annual inspections.

G.1.4 Response Equipment Inspection

Using the Emergency Response Equipment Lists provided in **Section 7**, and **Appendix B** of this Plan, response equipment will be checked for the following in accordance with 40 CFR 112, Appendix F:

1. Inventory (item and quantity);
2. Storage location;
3. Accessibility (time to access and respond);
4. Operational status/condition;
5. Actual use/testing (last test date and frequency of testing); and
6. Shelf life (present age, expected replacement date).

Oil spill cleanup material and emergency response equipment will be inventoried and tested every six months or immediately after a spill. The Response Equipment Inspection is provided in **Figure G.4**.

G.1.5 Secondary Containment Inspection

Secondary containment units will be evaluated at the same time as tank inspections. During inspection, discrepancies are notes in any of the items and are reported to the proper facility personnel.

G.1.6 Inspection and Preventative Maintenance Records

Records are kept and maintained by the Terminal Manager. Inspection records for response equipment will be maintained for at least five years, and will be made available to Ecology upon request.

Figure G.1. Computation of Product Inventory

Vancouver Energy Facility

DATE:_____

TANK	VISC	API	FLASH	BS&W	GAUGE	TEMP	GROSS BARRELS	FACT	NET BARRELS	H2S	LEL
0300-TK-001											
0300-TK-002											
0300-TK-003											
0300-TK-004											
0300-TK-005											
0300-TK-006											

LINE	TANK	PRODUCT	COMMENT	SUCTION	SUCTION	PRESSURE RELIEF'S
24"						
24"						
24"						
36"						
8"						

LAST OIL MOVEMENT	

COMMENTS:_____

Figure G.2. Vancouver Energy Facility
Monthly, Quarterly, and Yearly Inspection Form

MONTHLY EVENTS YEAR:_____	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Check Cathodic Protection System												
Check Spill Response Equipment												
Check Fire System & Extinguishers												
Check All tank High Level Alarms												
Hold Safety & Spill Prevention Meeting												

QUARTERLY EVENTS	JANUARY	APRIL	JULY	OCTOBER
Grease Valves, Truck & Rail Rack				
Review Oil Spill Contingency Plan				
Inspection Vapor Recovery Unit				
Quarterly Safety Inspection				

YEARLY EVENTS	YEAR
Pressure Test Pipelines and Hoses	
Inspect Cathodic Protection System	
Check Fire Extinguisher and Foam System	
Check Back-Flow Preventer Valve	

Figure G.3. Monthly Terminal Inspection

ABOVEGROUND STORAGE TANKS/TANK FARM

		Yes	No
1.	Are all **tank top walkways and ladders** safe to use?	____	____
2.	Is all **tank top lighting** in good condition/working order?	____	____
3.	Are all **tank top vents** in good working condition?	____	____
4.	Are all **high-level alarms** in good working order?	____	____
5.	Is each **tank** free of visible leaks, overflow or rupture?	____	____
6.	Is all **leak detection equipment** in satisfactory condition?	____	____
7.	Are all **liquid tight connections** on all tank openings other than vents functional?	____	____
8.	Are **tank bottom water draw offs** locked when not in use?	____	____
9.	Are all **side gauges** functional/readings accurate?	____	____
10.	Are all **tank shell surfaces**, including any peeling areas, welds, rivets/bolts, and seams visually inspected for areas of rust and other deterioration?	____	____
11.	Are all **tank foundations** free from visible deterioration?	____	____
12.	Is the **slope** of the ground away from each tank toward the drainage system still maintained at 1 percent or more?	____	____
13.	Are **ground surfaces** around tanks, containment structures, and transfer areas free of signs of leakage?	____	____
14.	Is the **containment dike/berm** adequate and impervious with no erosion or cracks?	____	____
15.	Are **diked areas** free of oil and excess standing water?	____	____

Comments:_____

_____

_____

_____

		Yes	No
16.	Are the **dike containment areas/bases of tanks** free of high grass, weeds and debris?	_____	_____
17.	Are the **dike drain valves** in good condition and closed and locked when not in use?	_____	_____
18.	Are all **tank and pipeline valves** closed when not in use?	_____	_____
19.	Are all **tank fill valves** locked in closed position when not in use?	_____	_____
20.	Are **valves** inspected for signs of leakage or deterioration and serviced on a regular basis?	_____	_____
21.	Are these **inspection and service** kept on record?	_____	_____
22.	Are all **valve/flange connections** checked for leakage, signs of wear and all bolts in place/tight?	_____	_____
23.	Are the valve and pipeline coupling **bolts** free of elongation, deterioration, or signs of strain?	_____	_____
24.	**Cathodic protection** readings adequate? Amps _____ Volts _____	_____	_____
25.	Is **fire protection** (extinguisher/alarm/foam) adequate, operational, inspected and tagged, with extinguishers turned over once/month? Are hoses free from deterioration?	_____	_____
26.	Is **ground cable** present and secure?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

PIPELINES

		Yes	No
1.	Are pipelines **blanked-flanged and marked** accordingly when out of service?	_____	_____
2.	Are all pipelines **marked** with their contents?	_____	_____
3.	Are all above-ground pipelines **painted**?	_____	_____
4.	Is each **pipe support** adequate to minimize abrasion and corrosion yet allow for expansion and contraction?	_____	_____
5.	Is each pipeline to tank truck unloading rack provided with a **check valve** for automatic protection against back flow?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

OIL/WATER SEPARATOR SYSTEM

1.	Has the daily/weekly **separator maintenance** been completed?	_____	_____
2.	Is the separator free of any **internal corrosion**?	_____	_____
3.	Is the separator free of **solids and oil buildup**?	_____	_____
4.	Are any **cracks** evident?	_____	_____
5.	Are the **weirs** in good condition and working properly?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

DOCK/DOCK SHACK

		Yes	No
1.	Are **valves/flanges** free of leakage and secured with all bolts?	_____	_____
2.	Are **valves** not in use shut and locked?	_____	_____
3.	Are **valves** properly color-coded?	_____	_____
4.	Are pipelines **marked with current MAWP**?	_____	_____
5.	Are blanked pipelines **marked "not in use"**?	_____	_____
6.	Are **pipe supports** adequate and in good condition?	_____	_____
7.	Is **drip-pan cover** free of deterioration and tears?	_____	_____
8.	Is **drip pan** empty?	_____	_____
9.	Are **pressure gauges** in working order?	_____	_____
10.	Are **first aid and eye wash kits** complete and in date?	_____	_____
11.	Are **ring buoys and lifelines** present?	_____	_____
12.	Is **lighting** adequate and working?	_____	_____
13.	Is **communication equipment** working?	_____	_____
14.	Are **emergency shutdown valves** marked and operational?	_____	_____
15.	Are **loading arms** secured and operational, free from leakage?	_____	_____
16.	Are **grounding devices** in good working order?	_____	_____
17.	Are **emergency signs** posted properly and in good shape?	_____	_____
18.	Are the **planking, pilings and dolphins** in good shape?	_____	_____
19.	Are **chainfalls** and safety hook in good order?	_____	_____
20.	Is the **spill boom** stowed in the proper manner and ready for deployment?	_____	_____

Comments:_____

_____

_____

_____

		Yes	No
21.	Is the **spill boom** free of rips and tears?		
22.	Are all necessary **absorbent materials** on hand?		
23.	Is **fire protection** (extinguisher/alarm/foam) adequate, operational, inspected and tagged, with extinguishers turned over once/month? Are hoses free from deterioration?		

Comments:_____

Signature:_____

Date:_____

PUMP AREA

1.	Are pumps free of abnormal **leakage/noise/vibration**?		
2.	Are **guards** in place?		
3.	Are pump **drip containers** kept emptied?		
4.	Are **lubricant levels** maintained?		
5.	Are **pressure gauges** secure/in proper working order?		
6.	Are **slop drums** pumped down when full?		
7.	Are all electric motor **grounds** in place?		
8.	Is **fire protection** (extinguisher/alarm/foam) adequate, operational, inspected and tagged, with extinguishers turned over once/month? Are hoses free from deterioration?		

Comments:_____

Signature:_____

Date:_____

AREA 300 BOILER ROOM

		Yes	No
1.	Is the boiler room **floor** kept free of debris/trash?	_____	_____
2.	Are boiler **controls** in good working condition?	_____	_____
3.	Are **emergency shutdowns** in proper working condition?	_____	_____
4.	Are **chemical levels** kept up to requirements?	_____	_____
5.	Are boiler **chemical containers** properly marked?	_____	_____
6.	Is the **inspection** current?	_____	_____
7.	Is **fire protection** adequate, operational, inspected and tagged?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

AREA 600 BOILER ROOM

		Yes	No
8.	Is the boiler room **floor** kept free of debris/trash?	_____	_____
9.	Are boiler **controls** in good working condition?	_____	_____
10.	Are **emergency shutdowns** in proper working condition?	_____	_____
11.	Are **chemical levels** kept up to requirements?	_____	_____
12.	Are boiler **chemical containers** properly marked?	_____	_____
13.	Is the **inspection** current?	_____	_____
14.	Is **fire protection** adequate, operational, inspected and tagged?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

MOTOR CONTROL/ELECTRICAL ROOM

		Yes	No
1.	Is the **floor** clean and kept free of trash and debris?	_____	_____
2.	Are **spare parts and tools** stored in orderly manner?	_____	_____
3.	Are **electrical panel covers** in place and secure?	_____	_____
4.	Are **exits** marked, unobstructed, and well lit?	_____	_____
5.	Is all electrical **wiring and equipment** maintained as specified in the city/state electrical code?	_____	_____
6.	Is **first aid kit** complete and in date?	_____	_____
7.	Is **Lock Out/Tag Out** system properly implemented?	_____	_____
8.	Is **fire protection** (extinguisher/alarm/foam) adequate, operational, inspected and tagged, with extinguishers turned over once/month? Are hoses free from deterioration?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

LOADING RACK

		Yes	No
1.	Are **piping, valves and flanges** free of leaks?	_____	_____
2.	Are piping and handrails free of any apparent **damage**?	_____	_____
3.	Is **lighting** adequate and in working order?	_____	_____
4.	Are **"dead man" handles** operational?	_____	_____
5.	Are **ground cables** present and in good condition?	_____	_____
6.	Is **fire protection** (extinguisher/alarm/foam) adequate, operational, inspected and tagged, with extinguishers turned over once/month? Are hoses free from deterioration?	_____	_____
7.	Is **spill containment** adequate and free of cracks?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

DRUM RACK

1.	Are **spigots** threaded properly onto drum fittings, free of cracks or other deterioration, and kept closed tight/no leaks?	_____	_____
2.	Are drums **properly marked** with appropriate hazard label affixed to drum?	_____	_____
3.	Is **spill containment** adequate and in place?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

OFFICE AREA

		Yes	No
1.	Are **desks** kept neat and clean?	_____	_____
2.	Are **floors** clean, dry and free of debris?	_____	_____
3.	Are **aisles** unobstructed?	_____	_____
4.	Is **lighting** adequate and in good working order?	_____	_____
5.	Are **lunch table, countertop, and sink** kept clean?	_____	_____
6.	Is **kitchen equipment** kept clean and in working order?	_____	_____
7.	Are **cabinets** kept neat and orderly?	_____	_____
8.	Is **smoke alarm** operational?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

LAB

		Yes	No
1.	Is **lab equipment** clean and in working order?	_____	_____
2.	Are lab **work tables** free of clutter?	_____	_____
3.	Are **first aid kit and eye wash** complete and in date?	_____	_____
4.	Are **exhaust hoods** (lights, fan) operational?	_____	_____
5.	Are **spill kits** present?	_____	_____
6.	Is **fire protection** (extinguisher/alarm/foam) adequate, operational, inspected and tagged, with extinguishers turned over once/month? Are hoses free from deterioration?	_____	_____
7.	Are **lab solvent containers** in good condition and properly marked with contents?	_____	_____
8.	Are **lab liquid waste containers** in good condition, properly labeled, kept closed and emptied each day?	_____	_____
9.	Is proper **PPE** available and in good condition?	_____	_____
10.	Is **sample storage area** clean and orderly?	_____	_____
11.	Are sample **bottles** properly labeled, clean, and no apparent leaks?	_____	_____
12.	Are **retained samples** disposed of in a timely manner when no longer needed?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

ROADS/BOUNDARIES

		Yes	No
1.	Is the **road** in acceptable condition?	_____	_____
2.	Are the **gates** operating in good condition?	_____	_____
3.	Is the **fence** in good condition (no bad rust or broken chain link)?	_____	_____
4.	Is the **barbed wire** intact?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

VEHICLES

1. Record **Mileage**_____

2. Record **Fluid levels**
   - Gasoline_____
   - Motor Oil_____
   - Transmission Fluid_____
   - Coolant_____
   - Differential_____
   - Brake_____

		Yes	No
3.	**Battery**		
	Corrosion - none apparent	_____	_____
	Water level O.K.	_____	_____
4.	**Gauge Pack** - operational		
	Fuel	_____	_____
	Amps	_____	_____
	Oil Pressure	_____	_____
	Coolant Temperature	_____	_____
5.	**Brakes** - operational	_____	_____
6.	**Lights** - operational	_____	_____
	Headlights	_____	_____
	Signal lights	_____	_____
	Tail lights	_____	_____
	Brake lights	_____	_____
7.	**Tires** - good condition	_____	_____
8.	**Windshield wipers** - good condition	_____	_____
9.	**Mirrors** - present and good condition	_____	_____
10.	**Body** - good condition (report any damage)	_____	_____
11.	**Seat belts** - good condition	_____	_____
12.	**Fire extinguisher** - adequate, operational, inspected and tagged, with extinguisher turned over once/month? Are hoses free from deterioration?	_____	_____
13.	**Cleanliness**		
	Interior	_____	_____
	Exterior	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

SCBAs

		Yes	No
1.	Are all air cylinders full? Pressure_____	_____	_____
2.	Are all air cylinders within **hydro date**?	_____	_____
3.	Are all **masks** clean and available?	_____	_____
4.	Are **cleaning and disinfecting** supplies available?	_____	_____

H_2S Personal Alarms

1.	Are all personal alarms **available and in proper working order**?	_____	_____
2.	Are **calibrations** up to date? Calibration date_____	_____	_____
3.	Are **test gases/equipment** to check alarm set point available and in date?	_____	_____

Combustible gas detectors/explosimeters

1.	Are instruments **available and in proper working order**?	_____	_____
2.	Are **calibrations** up to date? Calibration date_____	_____	_____
3.	Are **test gases/equipment** to check alarm set point available and in date?	_____	_____

Drager pumps

1.	Are pumps **available and in proper working order** - bellows checked for leakage and deterioration?	_____	_____
2.	Is an adequate number of **indicator tubes** available in proper range and in date?	_____	_____

Comments:_____

_____

_____

_____

Signature:_____

Date:_____

NOTES:

1. **Answers to all above questions should be YES. If not, corrective action is to be taken immediately.**
2. **Terminal Manager shall retain a signed copy of inspection for three years from date of signature.**

Figure G.4. Vancouver Energy Facility
Oil Spill Response Equipment Inspection Log

MONTHLY EQUIPMENT INSPECTION (Date)	IS INVENTORY COMPLETE?	START & RUN BOAT MOTOR	INSPECTION COMPLETED BY

Figure G.5. Vancouver Energy Facility
Cathodic Protection Readings

LOCATION	TEST POINT READING		CHANGE FROM PREVIOUS READING, COMMENTS, ETC.	RECTIFIER READING	
	VOLTS			VOLTS	AMPS
F-1					
F-2					
F-3					
F-4					
F-5					
F-6					
F-7					
T-1					
T-2					
T-3					
T-4					
T-5					
T-6					
T-7					
P-1					
P-2					
P-3					
P-4					
P-5					
P-6					
P-7					
COMMENTS:					
DATE:			**SIGNED:**		

Figure G.6. Tank Inspection Report

DATE:

[ ] EXTERNAL [ ] INTERNAL		PLANT		TANK NO.
CODE	ROOF TYPE	PRODUCT	SIZE	BY
CLEANED BY (CONT'R)		SANDBLASTED (EXTENT)		

ITEM	CONDITION GOOD/*FAIR/*BAD/N/A	ITEM	CONDITION GOOD//*FAIR/*BAD/N/A
LEAKS		LEGS	
SETTLEMENT		ROOF RAIN	
FOUNDATION		NON-ROTATOR	
DRAINAGE		SHOES	
INSULATION		SEALS	
PAINT		HANGER ASSEMBLY	
VISUAL CORROSION (EXT)		SECONDARY SEAL	
BOTTOM ANGLE		P/V VENT	
VENTS		FLAME ARRESTOR	
WELDS		MANUAL GAUGE	
NOZZLES		AUTOMATIC GAUGE	
PIPING		FOAM SYSTEM	
WATER DRAW VALVES		HIGH LEVEL ALARM	
LADDER/STAIRWAY		INTERNAL COATING	
PLATFORMS		CORROSION (INT)	
HANDRAILS		PITTING	
SUCKLES/BULGES		SUMP	
ROOF ANGLE		ROOF STRUCTURAL	
MANWAYS		FLOATING SUCTION	
HATCHES		GAUGE WELL	
PONTOONS		STRIKING PLATE	
LADDER		MID POINT THERMOMETER	
GROUNDS		HEATING COILS	

* Explain reason for fair and bad condition on comments page.

Figure G.7. Safety Inspection Form

Vancouver Energy Facility
5501 NW Lower River Road
Vancouver, WA 98660

_____ _____ _____
TERMINAL MANAGER INSPECTION PERFORMED BY DATE

(**4**) Okay (**X**) Correction Needed (**N/A**) Not applicable

Evaluation	Date Correction to be Completed	Evaluation Item	Comments
		1. Fire Extinguisher and Fire Blankets	
		a. Checked monthly	
		b. Serviced annually	
		c. In designated place	
		d. Properly mounted	
		e. Seals intact	
		f. Refills available	
		g. Blankets in place/in good condition	
		2. Ignition controls	
		• Spills	
		a. Contained	
		b. Promptly cleaned up	
		c. Employees aware of reporting requirements and procedures followed	
		• Cleaning solvents	
		a. Gasoline not used as solvent	
		b. Approved solvents utilized	
		• Smoking, matches and open flames	
		a. Allowed only in designated area	
		b. Signs posted in appropriate locations	
		c. “Str ke anywhere” matches and lighters that do not require two actions prohibited	
		• Hot work	
		a. Hot work permits with Terminal Manager’s signature required before beginning work	
		b. Work closely supervised	
		c. Fire watch provided	
		d. Fire extinguishing equipment on standby and ready for use	
		• Power equipment	
		a. Internal combustion engines, electrical hand tools, other power equipment not allowed in flammable mixture atmosphere	
		• Heating equipment	
		a. Heating equipment supplied without ignition source	
		b. Properly installed and correct design	
		c. Heater rooms clean and orderly and not utilized for storage	
		• Electrical equipment	
		a. Installed in compliance with NFPA and API recommended practices	
		b. All breakers labeled	

(**4**) Okay (**X**) Correction Needed (**N/A**) Not applicable

Evaluation	Date Correction to be Completed	Evaluation Item	Comments
		• Spontaneous combustion and vegetation	
		a. Oily rags, trash and flammable material stored in covered metal containers or isolated	
		b. Grass, weeds, etc., controlled and good housekeeping maintained	
		3. Fire Control Procedure	
		• Written preplanned emergency procedure on hand	
		• All employees familiar with procedure and drills conducted	
		• Local fire department personnel involved and familiar with facility	
		4. Personnel Safety	
		• First Aid	
		a. Fully equipped first aid kit on premises	
		• Falls	
		a. Safe working/wa k surfaces maintained	
		b. Ladders for access available	
		c. Snow and ice treated or removed as necessary	
		• Hand tools	
		a. Special tools provided (i.e. bung wrenches, drumcarts, trucks, skids)	
		b. Defective tools removed from service	
		c. Tools properly stored for inventory control	
		• Lifting	
		a. Personnel instructed on proper lifting techniques	
		b. Assist devices provided	
		• Contact with petroleum products	
		a. Contaminated clothing removed properly	
		b. Decontamination facilities provided	
		c. Tank entry and cleaning precautions taken	
		d. Inhalation of vapors controlled	
		• Personal protective equipment	
		a. Safety shoes	
		b. Hard hats	
		c. Eye and face protection	
		d. Appropriate work clothing	
		5. Yard Safety	
		• Vehicle parking	
		a. Designated area(s) remote from operating area	
		• Drum storage	
		a. Neatly arranged	
		b. Checked and supported	
		c. Away from bu k tanks	
		d. Secured from unauthorized persons	
		e. Bungs in place on empties	
		f. Leaking drums disposed of	
		• Fences and gates	
		•	

(**4**) Okay (**X**) Correction Needed (**N/A**) Not applicable

Evaluation	Date Correction to be Completed	Evaluation Item	Comments
		a. Good condition	
		b. Total perimeter protection	
		c. Lock equipped	
		• Drainage	
		a. Adequate drainage	
		b. Ditches and sewers in repair	
		c. Public draining systems and waterways protected	
		• Walkways and Driveways	
		a. Clear and crossovers over pipes and ditches	
		b. Level and free of potholes	
		c. Fixed equipment protected with barriers	
		• General	
		a. Stop signs at highway exits	
		b. Speed limit and one-way signs	
		c. Emergency notice signs	
		d. Signs prohibiting unauthorized vehicles	
		e. "No smoking" signs posted at manifold, rack and tank areas	
		f. Road conditions checked	
		g. Weed control maintained	
		h. Overhead wiring identified	
		i. General housekeeping maintained	
		j. Man holes secured	
		6. Warehouse Safety	
		• Doors, passageways and windows	
		a. Windows and doors in good condition and mechanisms in working order	
		b. Passageways clear	
		c. Fire equipment not blocked	
		d. Exits identified	
		• Floors and stairways	
		a. Free from oil, grease, water, weak flooring and holes	
		b. Support members in good condition and load limits posted	
		• Packaged stocks	
		a. Stacked properly and secured	
		b. Pallets in good condition, empties stored outside	
		c. Drums and packaged goods sealed and spills promptly cleaned up	
		d. Drums containing material with flash points of 100 F or below not stored inside unless local fire codes met	
		• Filling portable containers	
		a. Filling done outside only and ignition sources eliminated	
		b. Drum and container connected to prevent static charge build up	
		7. Garage Safety	
		a. Exhaust vented outside or doors left open	
		b. Flammables stored outside and atmosphere vapor-free	
		c. Proper housekeeping maintained	

(**4**) Okay (**X**) Correction Needed (**N/A**) Not applicable

Evaluation	Date Correction to be Completed	Evaluation Item	Comments
		8. Pumps and Motors	
		a. Motor controls and pumps identified and remote controls provided	
		b. Ventilation in pumphouse adequate and considered off limits for storage or other purposes	
		c. Ventilators not blocked	
		d. All moving parts guarded	
		e. Free of leaks	
		f. Electrical services maintained and approved for area classifications	
		g. Pressure gauges	
		h. Drain lines and utility piping	
		i. Seals and packing	
		9. Storage Tanks	
		a. Dike stairways, walkways, ladders and handrails provided	
		b. Water draws functional	
		c. Tank shell in good condition and painted	
		d. Proper grounds – tank and pumps	
		e. Leaky valves or piping or tank repaired	
		f. Electrical wiring per code	
		g. Vacuum and relief valves functional	
		h. Hatch seals and emergency vents operational	
		i. Condition of roof checked	
		j. Housekeeping, erosion, weeds and debris checked	
		• High level alarms	
		a. Level switches functional	
		b. Properly set	
		c. Audio	
		d. Visual	
		e. Transmission of signal	
		11. Railroad Tank Cars	
		• General	
		a. Authorized personnel only	

(**4**) Okay (**X**) Correction Needed (**N/A**) Not applicable

Evaluation	Date Correction to be Completed	Evaluation Item	Comments
		• Spotting cars	
		a. Car mover tool available	
		b. Brakes set and wheels blocked	
		c. Sign – "Stop – Tank Car Connected" posted on track	
		• Opening cars	
		a. Pressure relieved before opening dome or outlet valve	
		b. Proper tools utilized	
		c. Volume and contents verified	
		• Tank delivery	
		a. Valves properly set	
		b. Checked for leaks and catch container available	
		c. Delivery lines checked for leaks	
		d. System and cars secured after delivery completed	
		• Miscellaneous	
		a. Stairways, walkways and handrails	
		b. Oily rag storage	
		c. Fire extinguishers	
		d. Truck and rack ground wires	
		e. General housekeeping	
		12. Manifold Areas	
		a. Valves and flanges	
		b. Sump covers and alarms	
		c. Electrical wiring and lights	
		d. Separators	
		e. Fire extinguishers	
		f. Housekeeping and cleanliness	
		g. Bleeder valves	
		h. Proper tanks	
		i. Valve operator	
		j. Valve numbered and tagged per line up drawing	
		k. Sample box	
		13. Sample House	
		a. Proper storage of samples – daily samples being pulled	
		b. Outdated samples	
		c. Stored material other than samples	
		d. Identification of building	
		e. No smoking	
		f. Proper ventilation	
		g. Building condition	
		h. Housekeeping	
		14. Laboratory	
		a. Gas connections checked	
		b. Flammables properly stored	
		c. Proper ventilation	
		d. Chemicals properly stored	
		e. Smoking prohibited	
		f. Adequate equipment	
		g. Drains properly set up	
		15. Building	
		a. In good repair	

(**4**) Okay (**X**) Correction Needed (**N/A**) Not applicable

Evaluation	Date Correction to be Completed	Evaluation Item	Comments
		b. Electrical wiring	
		c. Flues and vents	
		d. Restrooms	
		e. Bulletin board up to date	
		f. Proper disposal of waste	
		g. Lighting	
		16. Office Records	
		a. Administrative procedure guide	
		b. Terminal procedure guide	
		c. Filing system neat and orderly	
		d. General housekeeping	
		e. Storage of files	
		f. Phone numbers posted – emergency numbers	
		g. Operating procedure	
		h. Valve line up charts and drawing	
		i. Emergency procedure	
		j. Loading procedure	
		k. Record of keys	
		l. Loading agreements	
		m. Invoice registers	
		n. Inventory and sales report up to date	
		o. Contingency plan up to date	
		p. Reports filed and current	
		q. Meter vs. tank gauge	
		r. Tickets	
		s. Provings	
		t. Monthly distillation test results	

Vancouver Energy
Operations Facility Oil Spill Contingency Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix H
Trajectory Analysis

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Tesoro Vancouver Terminal
Trajectory Planning

Prepared by:

NJ Resources

www.njr.net

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TABLE OF CONTENTS

1.0 TRAJECTORY ANALYSIS 1
2.0 DESCRIPTION OF THE GEOGRAPHIC AREA..... 2
3.0 PLANNING AREA MAPS 3
4.0 STREAM VELOCITY 11

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1.0 Trajectory Analysis

This trajectory analysis is intended to comply with WAC 173P182P230(4)(c)(v) which requires a description of the geographic area that could be impacted from a spill at the location based on a forty-eight hour worst case spill trajectory analysis.

The trajectory analysis was conducted using speed/time/distance calculations with stream velocity data obtained from the U.S. Geographic Survey being used as the prime mover.

To select the stream velocity for the trajectory historical data from 2013 was examined and an average velocity of 2 feet per second (1.2 knots) was selected.

No wind was used in determining the trajectory. Wind is likely to result in spilled oil beaching rather than continuing down river.

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2.0 Description of the Geographic Area

The geographic area of potential impact from an incident originating in Vancouver, Washington within 48 hours of release is the Lower Columbia River from river mile 105 (45°38'4.19"N, 122°42'10.55"W) to river mile 47 (46° 8'40.52"N, 123°17'46.39"W).

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3.0 Planning Area Maps

Planning Area Maps are provided in this Section that represent the linear distance traveled in miles based on historical average stream velocity (see section 4). Maps are provided for 48 hours from the time of an incident.

Release Site

Heliport

Staging Area

ICP

Boat Ramp

GRP

Trajectory

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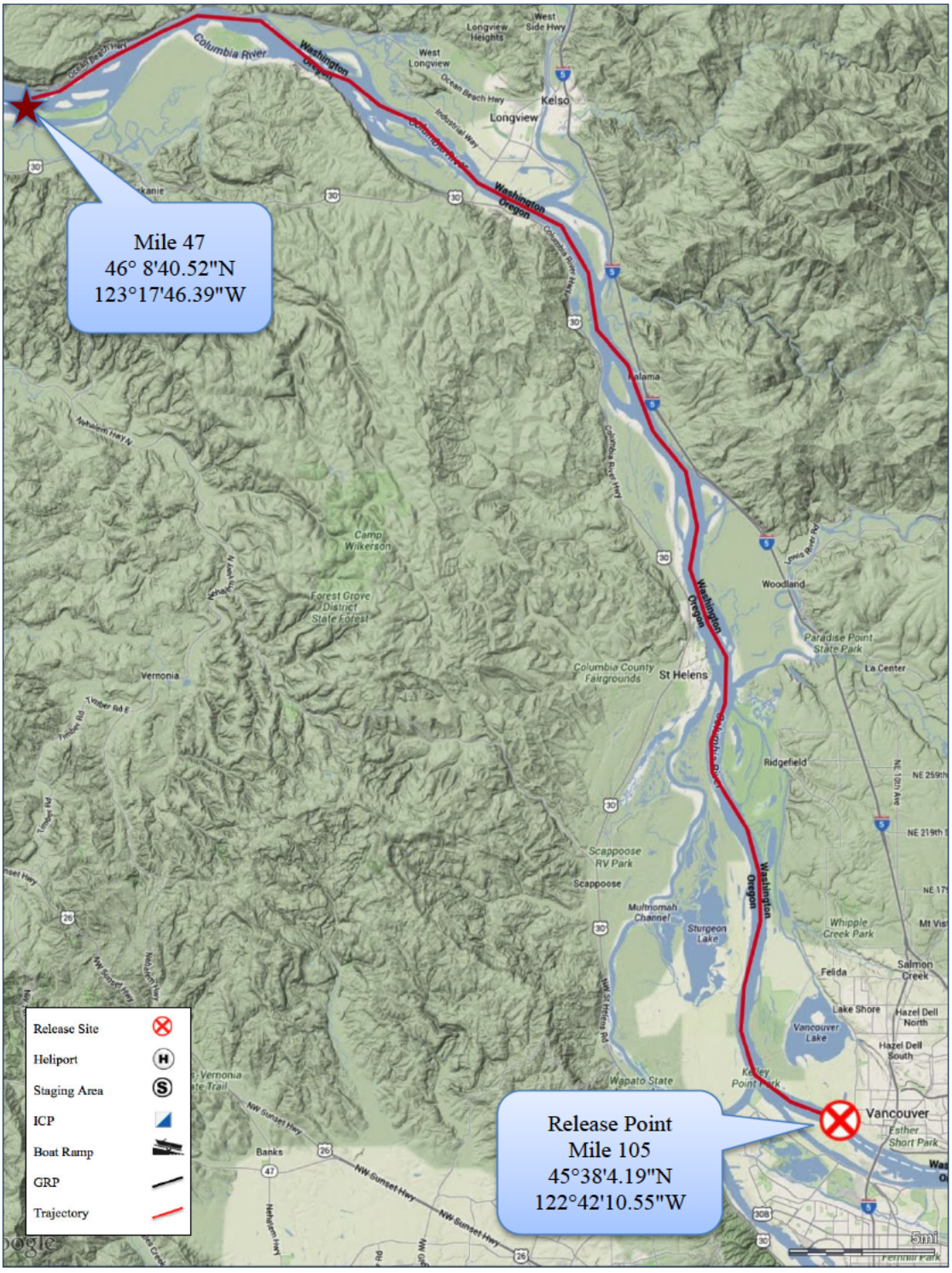
3.1 48-Hour Trajectory River Mile 105 - 47



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3.2 48 Hour Trajectory River Mile 105 – 91

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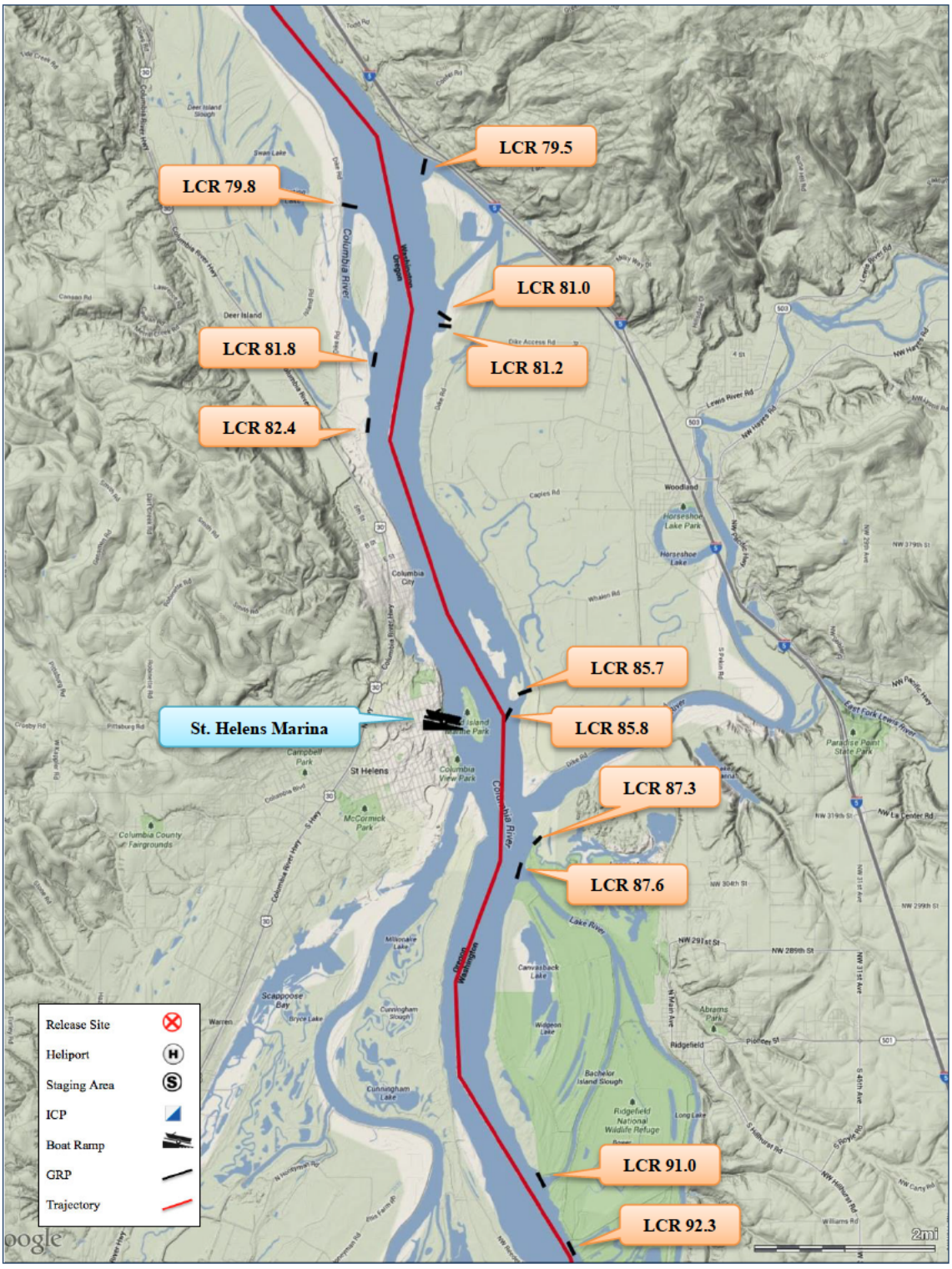
3.3 48 Hour Trajectory River Mile 91 – 78



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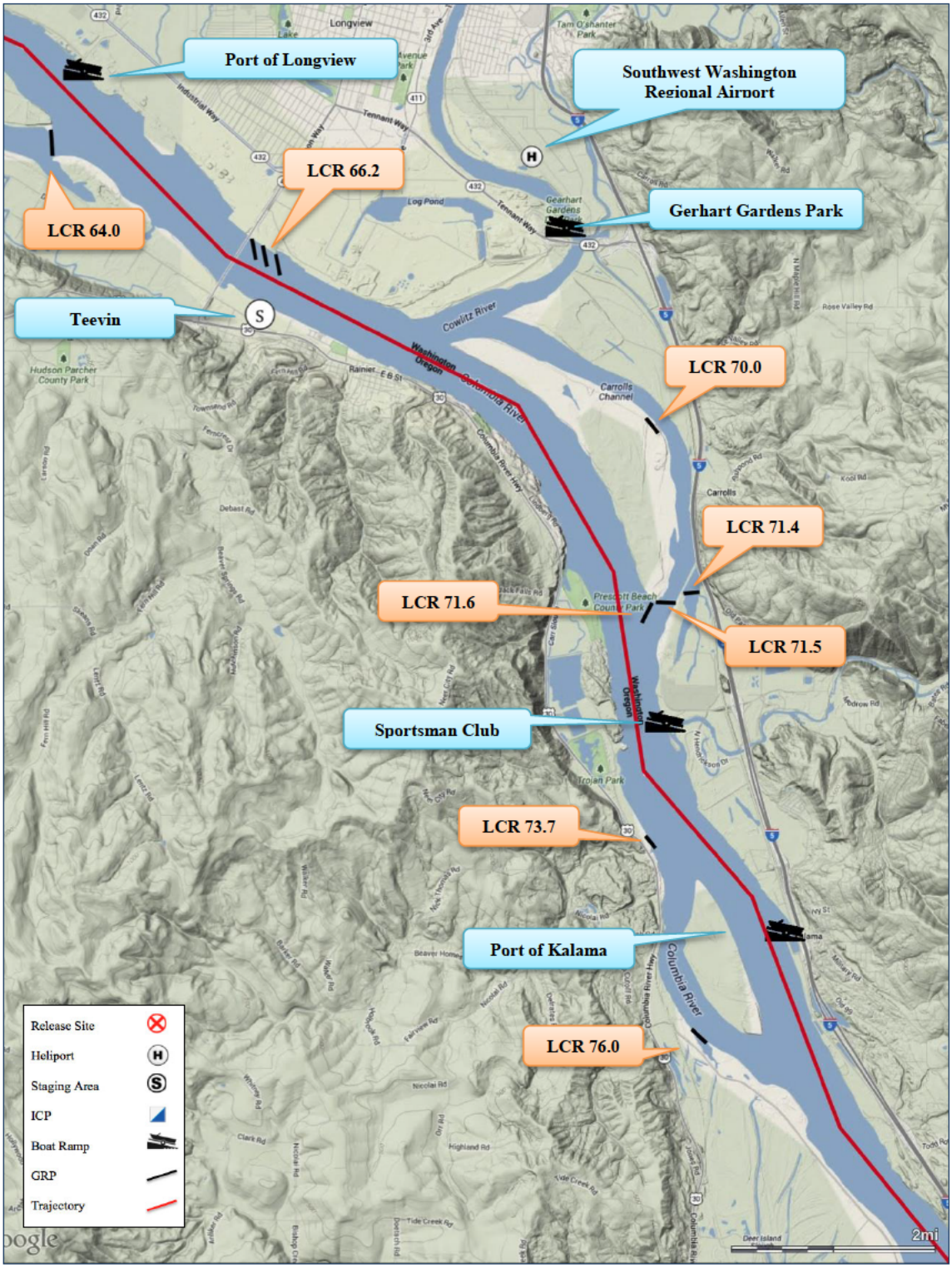
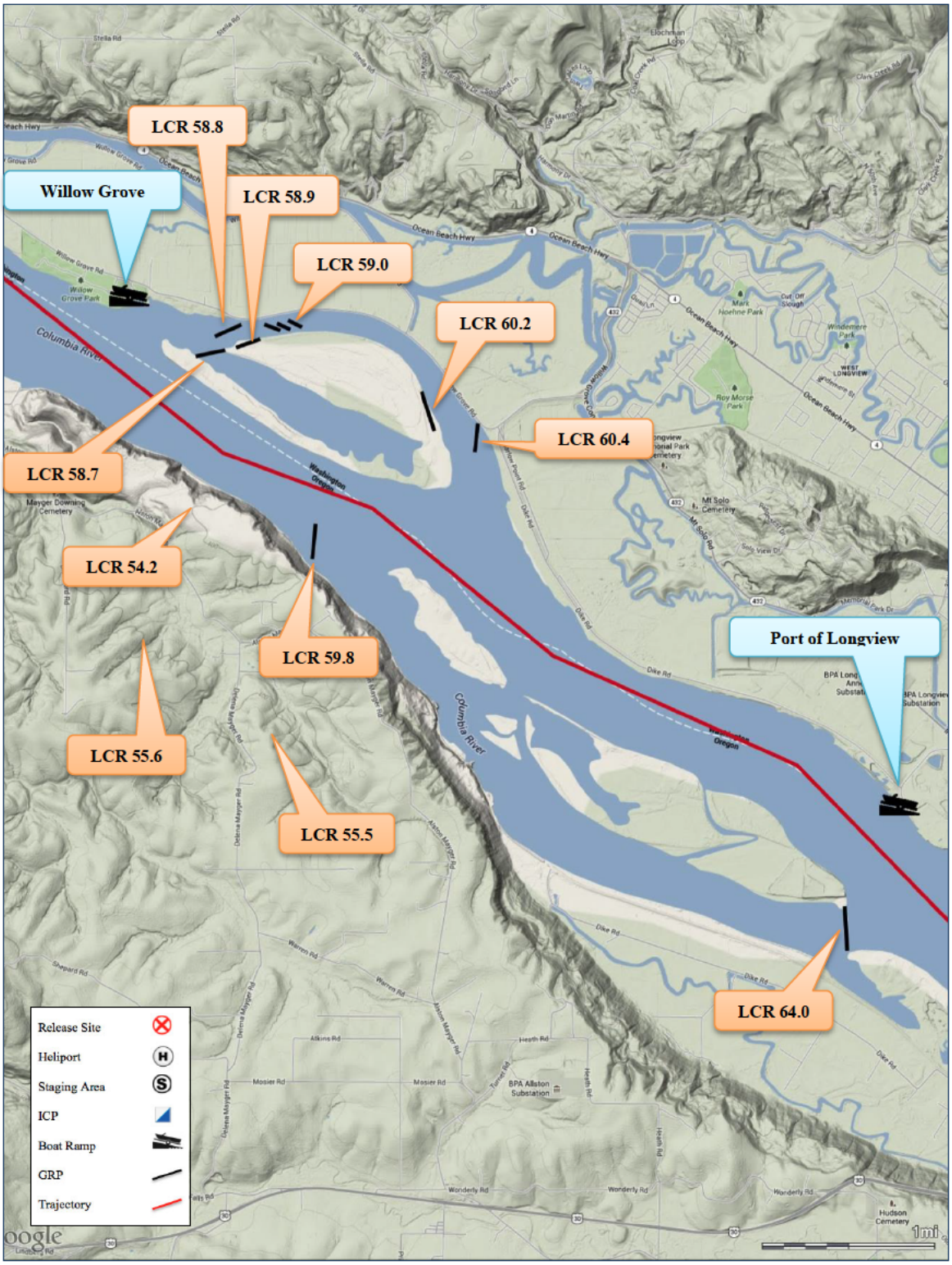
3.4 48 Hour Trajectory River Mile 78 – 63



3.5 48 Hour Trajectory River Mile 63 – 57



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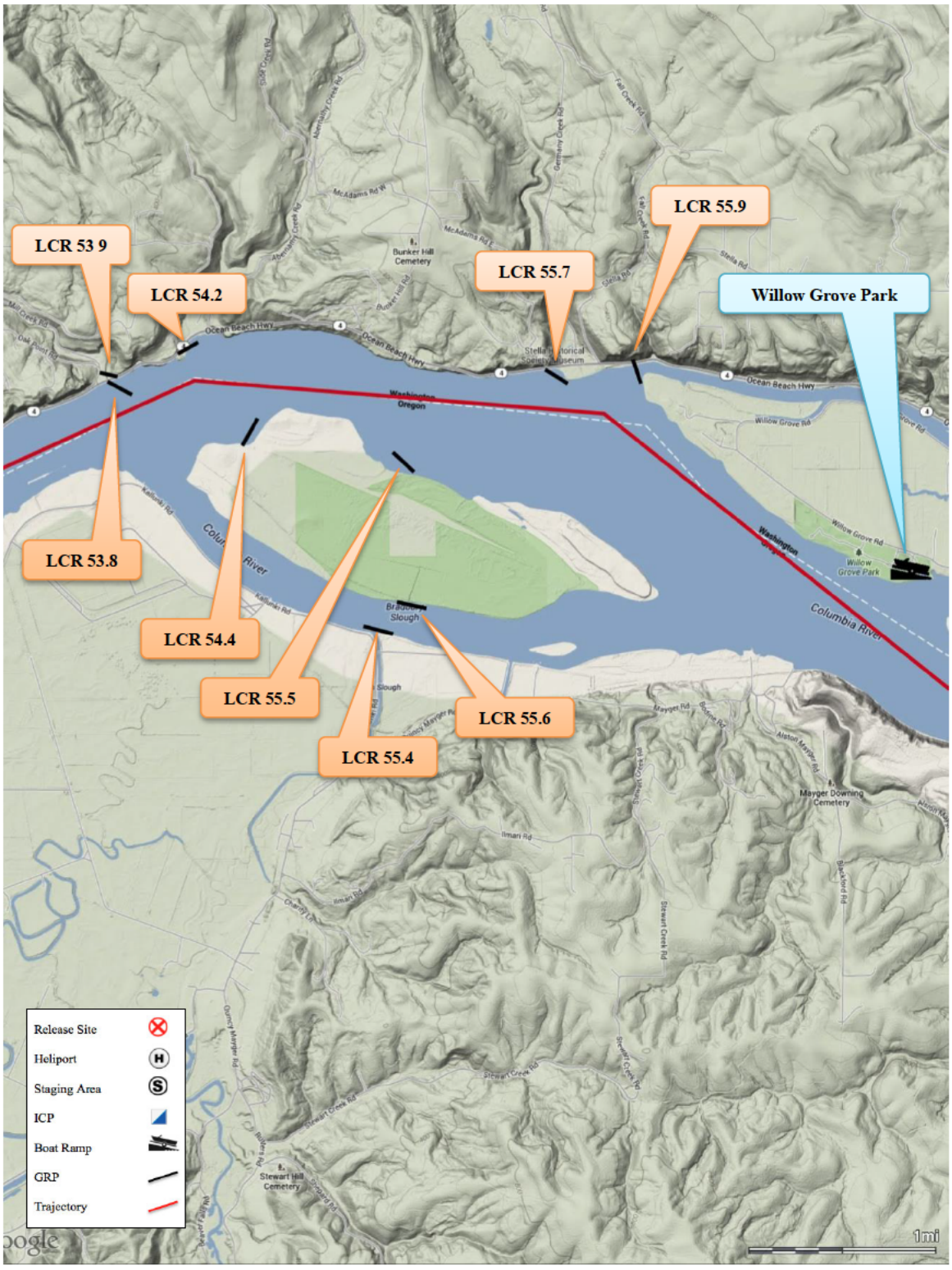
3.5 48 Hour Trajectory River Mile 57 – 53



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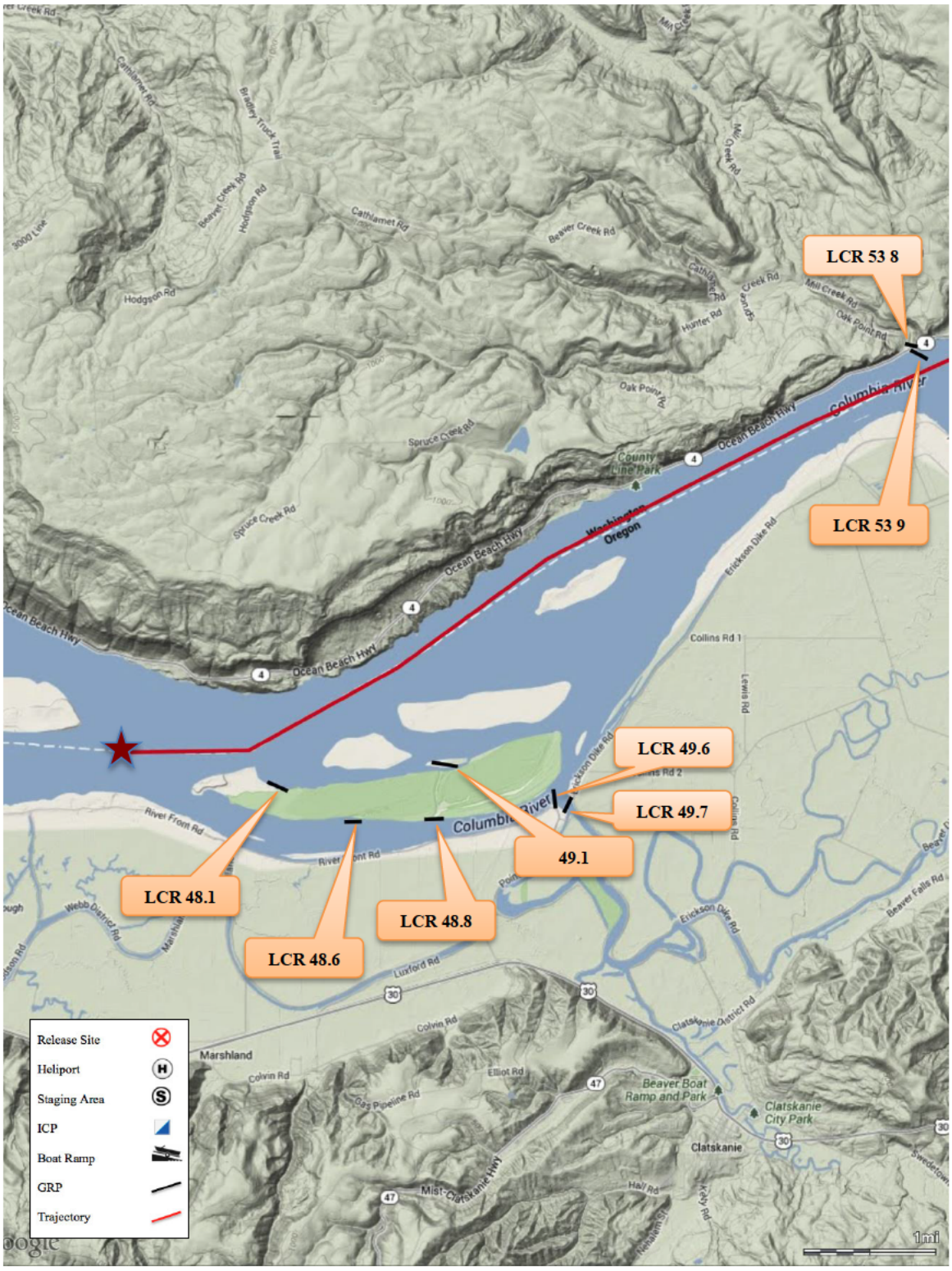
3.5 48 Hour Trajectory River Mile 54 – 47



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4.0 Stream Velocity

Stream velocity data was obtained from the U.S. Geographic Survey.

http://nwis.waterdata.usgs.gov

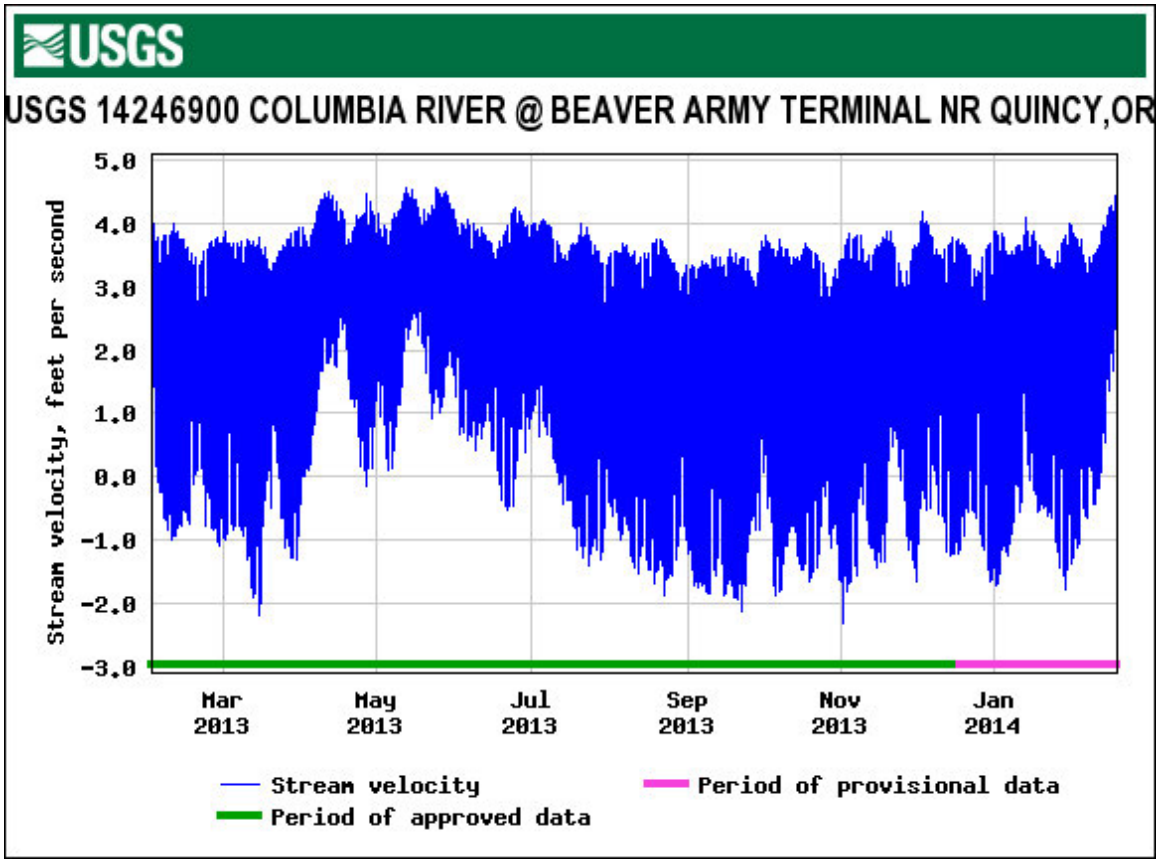

Figure 1 Stream Velocity in feet per second

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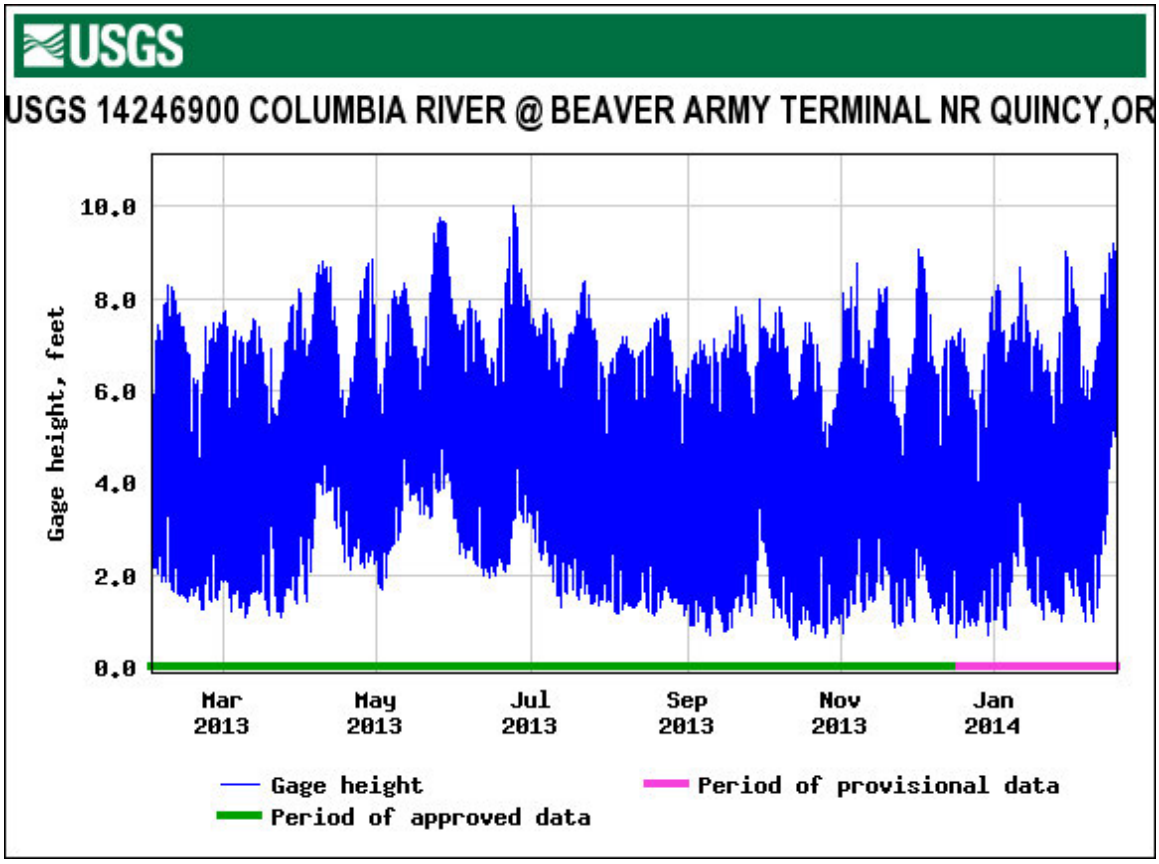

Figure 2 Gage Height, feet

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Vancouver Energy
Operations Facility Oil Spill Contingency Plan
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix I
Acronyms and Definitions

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APPENDIX I
ACRONYMS AND DEFINITIONS

ACRONYMS

ACP ..... Area Contingency Plan
API ..... American Petroleum Institute

bbl ..... barrel
BS&W ..... bottom sediment and water

CFR ..... Code of Federal Regulations
CHRIS ..... Chemical Hazards Response Information System
Company ..... Tesoro Savage Petroleum Terminal LLC
CRC ..... Clean Rivers Cooperative, Inc.

DOT ..... Department of Transportation

Ecology ..... Washington State Department of Ecology
EFSEC ..... Energy Facility Site Evaluation Council
EMD ..... Emergency Management Division
EPA ..... U. S. Environmental Protection Agency
ESA ..... Endangered Species Act
ESI ..... Ecological Site Inventory (EPA)

Facility ..... Vancouver Energy
FOSC ..... Federal On-Scene Coordinator
fps ..... feet per second
frac tanks ..... fractionation tanks
FRP ..... Facility Response Plan

gal ..... gallons
GRP ..... Geographic Response Plan

hazmat ..... hazardous materials

IBRRC ..... International Bird Rescue Research Center
IC/RP ..... Incident Commander/Responsible Party
ICS ..... Incident Command System
IMT ..... Incident Management Team
IRT ..... Initial Response Team

LOSC ..... Local On-Scene Coordinator

MFSA ..... Marine Fire and Safety Association
MMPA ..... Marine Mammal Protection Act
MRUs ..... Mobile Rehabilitation Units
MSRC ..... Marine Spill Response Corporation

NIMS ..... National Incident Management System
NMFS ..... National Marine Fisheries Service
NOAA ..... National Oceanic and Atmospheric Administration
NRC ..... National Response Center (USCG)
NRCES ..... NRC Environmental Services

OPA 90 ..... Federal Pollution Act of 1990
OSCP ..... oil spill contingency plan
OSSM ..... Oil Spill Simulation Model

PHS ..... Priority Habitats and Species
Port ..... Port of Vancouver USA
PPE ..... personal protective equipment
PRC ..... primary response contractor

RCW ..... Revised Code of Washington
RM 103.5 ..... River Mile 103.5
RRT ..... Regional Response Team

TOSC ..... Tribal On-Scene Coordinator
TPH ..... total petroleum hydrocarbons

USCG ..... U.S. Coast Guard
USDOT ..... U. S. Department of Transportation
USFWS ..... U. S. Fish and Wildlife Service (USDOI)

WAC ..... Washington Administrative Code
WDFW ..... Washington State Department of Fish and Wildlife
WSDOT ..... Washington State Department of Transportation

DEFINITIONS

Access/Staging Areas
Designated areas offering access to spill sites for the gathering and deployment of spill response equipment and personnel.

Absorbent Material
Any of the several materials designed to absorb oil, both hydrocarbon and non-hydrocarbon.

Adverse Weather
The weather conditions that will be considered when identifying response systems and equipment in a response plan for the applicable operating environment. Factors to consider include significant wave height, ice, temperature, weather-related visibility, and currents with the Captain of the Port zone in which the systems or equipment are intended to function.

Alteration
Any work on a tank or related equipment involving cutting, burning, welding, or heating operations that changes the physical dimensions or configuration of a tank.

Average Most Probable Discharge
A discharge of the lesser of 50 barrels (2,100 gallons) or 1 percent of the volume of the worst-case discharge.

Barrel
Measure of space occupied by 42 U.S. gallons at 60°F.

Boom
Any number of specially designed devices that float on water and are used to contain or redirect the flow of oil on the water's surface.

Boom Deployment
The methodology for installing boom based on differing water depths, currents, wave heights, etc.

Booming Strategies
Techniques which identify the location, quantity, and type of boom required to protect differing water bodies and their shore lines. These strategies are developed by identifying potential spill scenarios and assuming certain conditions which affect oil movement on water.

Captain of the Port Zone
A zone specified in 33 CFR Part 3 and the seaward extension of that zone to the outer boundary of the exclusive economic zone.

Coastal Waters
All tidally influenced waters extending from the head of tide seaward to the three marine league limit of state jurisdiction; and non-tidally influenced waters extending from the head of tide in the arms inland to the point at which navigation by regulated vessels is naturally or artificially obstructed.

Command Post
A site located at a safe distance from the spill site where response decisions are made, equipment and manpower deployed, and communications handled. The Incident Commander and the On-Scene Coordinators may direct the on-scene response from this location.

Communication Equipment
Equipment that will be used during response operations to maintain communication between employees, contractors, and federal/state/local agencies.

Complex
A facility possessing a combination of transportation-related and non-transportation-related components that is subject to the jurisdiction of more than one Federal agency under Section 311(j) of the CWA.

Containment Boom
A flotation/freeboard device, made with a skirt/curtain, longitudinal strength member, and ballast unit/weight designed to entrap and contain the product for recovery.

Contamination Reduction Zone
The area between the contaminated zone and the clean zone. This area is designed to reduce the probability that the clean zone will become contaminated. Also known as the warm zone.

Contingency Plan
A document used by (1) federal, state, and local agencies to guide ties planning and response procedures regarding spill of oil, hazardous substances, or other emergencies; (2) a document used by industry as a response plan to spills of oil, hazardous substances, or other emergencies occurring upon their vessels or at their facilities.

Contract or Other Approved Means
Includes

- A written contractual agreement with a response contractor. The agreement should identify and ensure the availability of the specified personnel and equipment described under USCG Regulations within stipulated response times in the specified geographic areas;

- Certification by the facility owner or operator that the specified personnel and equipment described under USCG regulations are owned, operated, or under the direct control of the facility owner and operator, and are available within stipulated times in the specified geographic areas;

- Active membership in a local or regional oil spill removal organization that has identified specific personnel and equipment described under USCG regulations that are available to respond to a discharge within stipulated times in the specified geographic areas;

- A document, which
  - Identifies the personnel, equipment, services, capable of being provided by the response contractor within stipulated response times in specified geographic areas;
  - Sets out the parties' acknowledgment that the response contractor intends to commit the resources in the event of a response;
  - Permits the U.S. Coast Guard to verify the availability of the response resources identified through tests, inspections, and drills; and
  - Is incorporated by reference into the response plan; or
  - For a facility that could reasonably be expected to cause substantial harm to the environment, with the consent of the response contractor or oil spill removal organization, the identification of a response contractor or oil spill removal organization with specified equipment and personnel which are available within stipulated response times in specific geographic areas.

Critical Areas
Areas which, if impacted by a spill, may result in threats to public health and/or safety.

Crude Oil
Any liquid hydrocarbon mixture occurring naturally in the earth, whether or not treated to render it suitable for transportation, and includes crude oil from which certain distillate fractions may have been removed and crude oil to which certain distillate fractions may have been added.

Cultural Resources
Current, historic, prehistoric, and archaeological resources which include deposits, structures, sites, ruins, buildings, graves, artifacts, fossils, or other objects of antiquity which provide information pertaining to historical or prehistoric culture of people as well as the natural history of the state.

Damage Assessment
The process of determining and measuring damages and injury to the human environment and natural resources, including cultural resources. Damages include differences between the conditions and use of natural resources and the human environment that would have occurred without the incident, and the conditions and use that ensued following the incident. Damage assessment includes planning for restoration and determining the costs of restoration.

Decontamination
The removal of hazardous substances from personnel and equipment necessary to prevent adverse health effects.

Discharge Cleanup Organization
A corporation, proprietorship, partnership, company organization, or association that has, as its primary function, engaged itself in the response to, cleanup, and removal of spills of oil or hazardous substance.

Dispersants
Those chemical agents that emulsify, disperse, or solubilize oil into the water column or promote the surface spreading of oil slicks to facilitate dispersal of the oil into the water column.

Diversion Boom
A flotation/freeboard device, made with a skirt/curtain, longitudinal strength member, and ballast unit/weight designed to deflect or divert the product towards a pick up point, or away from certain areas.

Ecology
The Washington State Department of Ecology.

Emergency Operations Center
The pre-designated site where local and state agencies direct and manage off-scene logistics support to on-scene emergency operations.

Emergency Response Phase, Emergency Phase
The portion of a spill response where the primary concern is the alleviation of the immediate danger to human life, health, safety, or property by stabilizing the real or threatened release. This incident specific definition is to be made by the Incident Commander representing an appropriate First Response Agency.

Emergency Service
Those activities provided by the state and local government to prepare for and carry out any activity to prevent, minimize, respond to, or recover from an emergency.

Exclusion Zone
The area where contamination does or may occur.

Environmentally Sensitive Areas
Streams and water bodies, aquifer recharge zones, springs, wetlands, agricultural areas, bird rookeries, endangered or threatened species (flora and fauna) habitat, wildlife preserves or conservation areas, parks, beaches, dunes, or any other area protected or managed for its natural resource value.

Exclusive Economic Zone
The zone contiguous to the territorial sea of the United States extending to a distance up to 200 nautical miles from the baseline form which the breadth of the territorial sea is measured.

Facility
Any pipeline, structure, equipment, or device used for handling oil including, but not limited to, underground and aboveground storage tanks, impoundment's, mobile or portable drilling or workover rigs, barge mounted drilling or workover rigs, and portable fueling facilities located offshore or on or adjacent to coastal waters or any place where a discharge of oil from the facility could enter coastal waters or threaten to enter the coastal waters.

Facility that could be reasonably expected to cause significant and substantial harm
Any fixed MTR onshore facility (including piping and bay structures that are used for the transfer of oil between a vessel and a facility) that is capable of transferring oil, in bulk, to or from a vessel of 250 barrels or more, and a deep-water port. This also includes any facility especially identified by the Captain of the Port.

Facility that could reasonably be expected to cause substantial harm
Any mobile MTR facility that is capable of transferring oil to or from a vessel with a capacity of 250 barrels or more.

Federal Fund
The oil spill liability trust fund established under OPA.

First Responders, First Response Agency
A public health or safety agency (i.e., fire service or police department) charged with responding to a spill during the emergency phase and alleviating immediate danger to human life, health, safety, or property.

Fish and Wildlife and Sensitive Environments
Areas that may be identified by either their legal designation or by evaluations of Area Committees (for planning) or members of the federal On-Scene Coordinator's spill response structure (during responses). These areas may include wetlands, National and State parks, critical habitats for endangered/threatened species, wilderness and natural resource areas, marine sanctuaries and estuarine reserves, conservation areas, preserves, wildlife refuges, wild and scenic rivers, recreational areas, and historical and archeological sites and parks. These areas may also include unique habitats such as aquaculture sites and agricultural surface water intakes, bird nesting areas, critical biological resource areas, designated migratory routes, and designated seasonal habitats.

Harmful Quantity of Oil
The presence of oil from an unauthorized discharge in a quantity sufficient either to create a visible film or sheen or discoloration upon water, shoreline, tidal flat, beach, or marsh, or to cause a sludge or emulsion to be deposited beneath the surface of the water or on a shoreline, tidal flat, beach, or marsh.

Hazardous Material
Any nonradioactive solid, liquid, or gaseous substance which, when uncontrolled, may be harmful to humans, animals, or the environment. Including but not limited to substances otherwise defined as hazardous wastes, dangerous wastes, extremely hazardous wastes, oil, or pollutants.

Hazardous Substance
Any substance designated as such by the Administrator of EPA pursuant to the **Comprehensive Environmental Response, Compensation, and Liability Act**; regulated pursuant to Section 311 of the **Federal Water Pollution Control Act**.

Hazardous Waste
Any solid waste identified or listed as a hazardous waste by the Administrator of the EPA pursuant to the federal **Solid Waste Disposal Act**, as amended by the **Resources Conservation and Recovery Act** (RCRA), 42 U.S.C., Section 6901, et seq as amended. The EPA Administrator has identified the characteristics of hazardous wastes and listed certain wastes as hazardous in Title 40 of the **Code of Federal Regulations**, Part 261, Subparts C and D respectively.

Heat Stress
Dangerous physical condition caused by over exposure to extremely high temperatures.

Higher Volume Port Area
Ports of

- Boston, MA
- New York, NY
- Delaware Bay and River to Philadelphia, PA
- St. Croix, VI
- Pascagoula, MS
- Mississippi River from Southwest Pass, LA to Baton Rouge, LA
- Louisiana Offshore Oil Port (LOOP), LA
- Lake Charles, LA
- Sabine-Nachez River, TX
- Galveston Bay and Houston Ship Channel, TX
- Corpus Christi, TX
- Los Angeles/Long Beach Harbor, CA
- San Francisco Bay, San Pablo Bay, Carquinez Strait, Suisun Bay to Antioch, CA
- Straits of Juan De Fuca and Puget Sound, WA
- Prince William Sound, AK

Hypothermia
Dangerous physical condition caused by over exposure to freezing temperatures.

Incident Command Agency
The agency designated under state law (RCW 70.136) as the entity responsible for coordinating all activities and resources at a spill scene, within a particular jurisdiction.

Incident Commander (IC)
The **one** individual in charge at any given time of an incident. The Incident Commander will be responsible for establishing a unified command with all on-scene coordinators.

Incident Command System (ICS)
A method by which the response to an extra-ordinary event, including a spill, is categorized into functional components and responsibility for each component assigned to the appropriate individual or agency.

Initial Cleanup
Remedial action at a site to eliminate acute hazards associated with a spill. An initial cleanup action is implemented at a site when a spill of material is an actual or potentially imminent threat to public health or the environment, or difficulty of cleanup increases significantly without timely remedial action. All sites must be evaluated to determine whether initial cleanup is total cleanup; however, this will not be possible in all cases due to site conditions (i.e., a site where overland transport or flooding may occur).

Injury
A measurable adverse change, either long- or short-term, in the chemical or physical quality of the viability of a natural resource resulting either directly or indirectly from exposure to a discharge of oil, or exposure to a product of reactions resulting from a discharge of oil.

Inland Area
The area shoreward of the boundary lines defined on 46 CFR Part 7, except in the Gulf of Mexico. In the Gulf of Mexico, it means the area shoreward of the lines of demarcations (COLREG lines) defined in 80.740 - 80.850 of Title 33 of the CFR. The inland area does not include the Great Lakes.

Interim Storage Site
A site used to temporarily store recovered oil or oily waste until the recovered oil or oily waste is disposed of at a permanent disposal site. Interim storage sites include trucks, barges, and other vehicles, used to store waste until the transport begins.

Lead Federal Agency
The agency which coordinates the federal response to incidents on navigable waters. The lead Federal agencies are:

- U.S. Coast Guard (USCG): Oil and chemically hazardous materials incidents on navigable waters.
- U.S. Environmental Protection Agency (EPA): Oil and chemically hazardous materials incidents on inland waters.

Lead State Agency
The agency which coordinates state support to Federal and/or Local governments or assumes the lead in the absence of Federal response.

Location Boundaries
Areas where oil may be expected to impact during the first day of a spill event.

Lower Explosive Limit
Air measurement to determine the lowest concentration of vapors that support combustion. This measurement must be made prior to entry into a spill area.

Marine Transportation-Related Facility (MTR Facility)
An onshore facility, including piping and any structure used to transfer oil to or from a vessel, subject to regulation under 33 CFR Part 154 and any deep-water port subject to regulation under 33 CFR Part 150.

Maximum Extent Practicable
The planning values derived from the planning criteria used to evaluate the response resources described in the response plan to provide the on-water recovery capability and the shoreline protection and clean-up capability to conduct response activities for a worst case discharge from a facility in adverse weather.

Maximum Most Probable Discharge (MMPD)
A discharge of the lesser of 2,500 barrels or 10 percent of the volume of a worst case discharge.

National Contingency Plan
The plan prepared under the Federal Water Pollution Control Act (33 United States Code -1321 et seq) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 United State Code 9601 et seq), as revised from time to time.

Navigable Waters of the State
Waters of the state, and their adjoining shorelines, that are subject to the ebb and flow of the tide and/or are presently used, have been used in the past, or may be susceptible for use to transport intrastate, interstate, or foreign commerce. Includes the Columbia River, the Willamette River up to Willamette Falls, and the coastal waters and estuaries of the state.

Nearshore Area
The area extending seaward 12 miles from the boundary lines defined in 46 CFR Part 7, except in the Gulf of Mexico. In the Gulf of Mexico, it means the area extending seaward 12 miles from the line of demarcation (COLREG) lines) defined in 80.740 - 80.850 of Title 33 of the CFR.

Non-Crude Oil
Any oil other than crude oil.

Non-Persistent or Group I Oil
A petroleum-based oil that, at the time of shipment, consists of hydrocarbon fractions:

- At least 50% of which by volume, distill at a temperature of 340ºC (645ºF); and
- At least 95% of which volume, distill at a temperature of 370ºC (700ºF).

Non-Petroleum Oil
Oil of any kind that is not petroleum-based. It includes, but is not limited to, animal and vegetable oils.

Offshore Area
The area beyond 12 nautical miles measured from the boundary lines defined in 46 CFR Part 7 extending seaward to 50 nautical miles, except in the Gulf of Mexico. In the Gulf of Mexico it is the area beyond 12 nautical miles of the line of demarcation (COLREG lines) defined in - 80-740 - 80.850 of Title 33 of the CFR extending seaward to 50 nautical miles.

Oil or Oils
Naturally occurring liquid hydrocarbons at atmospheric temperature and pressure coming from the earth, including condensate and natural gasoline, and any fractionation thereof, including, but not limited to, crude oil, petroleum gasoline, fuel oil diesel oil, oil sludge, oil refuse, and oil mixed with wastes other than dredged spoil. Oil does not include any substance listed in Table 302.4 of 40 CFR Part 302 adopted August 14, 1989, under Section 101(14) of the Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by P.L. 99-499.

Oil Spill Cooperative
Multi-company cooperative organization developed by industry to assist with oil spill response and clean up. Typically, manpower and equipment are identified by a company on a voluntary basis.

Oil Spill Removal Organization
See definition for Primary Response Contractors.

Onshore Facility
Any facility, as defined in Subsection (12) of this section, located in, on, or under any land of the state, other than submerged land, that, because of its location, could reasonably be expected to

cause substantial harm to the environment by discharging oil into or on the navigable waters of the state or the adjoining shorelines.

Operating Area
The rivers and canals, inland, nearshore, Great Lakes, or offshore geographic location(s) in which a facility is handling, storing, or transporting oil.

Operating Environment
Rivers and canals, inland, Great Lakes, or ocean. These terms are used to define the conditions in which response equipment is designed to function.

Owner or Operator
(i) in the case of a vessel, any person owning, operating, or chartering by demise, the vessel; (ii) in the case of an onshore of offshore facility, any person owning or operating the facility; and (iii) in the case of an abandoned vessel or onshore or offshore facility, the person who owned or operated the vessel or facility immediately before its abandonment. **Note:** “Operator” does not include any person who owns the land underlying a facility if the person is not involved in the facility’s operations.

Persistent Oil
A petroleum-based oil that does not meet the distillation criteria for a non-persistent oil. For the purposes of this Appendix, persistent oils are further classified based on specific gravity as follows:

- Group II - specific gravity less than .85.
- Group III - specific gravity between .85 and less than .95.
- Group IV - specific gravity .95 to and including 1.0.
- Group V - specific gravity greater than 1.0.

Primary Response Contractor(s)
An individual, company, or cooperative that has contracted directly with the plan holder to provide equipment and/or personnel for the containment or clean-up of spilled oil. For use in contingency plans, primary response contractors must be approved by Ecology.

Post-Emergency Response
The portion of a response performed after the immediate threat of a release has been stabilized or eliminated and cleanup of the sites has begun.

Qualified Individual(s)
An English-speaking representative(s) of the facility identified in the plan, located in the United States, available on a 24-hour basis, familiar with implementation of the facility response plan, and trained in his or her responsibilities under the plan. This person must have full written authority to implement the facility's response plan. This includes:

- Activating and engaging in contracting with identified oil spill removal organization(s);
- Acting as a liaison with the predesigned Federal On-Scene Coordinator (OCS); and
- Obligating, either directly or through prearranged contracts, funds required to carry out all necessary or directed response activities.

Regional Response Team
The Federal Response Organization (consisting of representatives from selected Federal and State agencies) which acts as a regional body responsible for planning and preparedness before an oil spill occurs and providing advice to the FOSC in the event of a major or substantial spill.

Repair
Any work necessary to maintain or restore a tank or related equipment to a condition suitable for safe operation.

Response Contractors
Persons/companies contracted to undertake a response action to contain and/or clean up a spill.

Response Plan
A practical plan used by industry for responding to a spill. Its features include (1) identifying the notification sequence, responsibilities, response techniques, etc. in an easy to use format; (2) using decision trees, flowcharts, and checklists to insure the proper response for spills with varying characteristics; and (3) segregating information needed during the response from that required by regulatory agencies to prevent confusion during a spill incident.

Responsible Party
Any person, owner/operator, or facility that has control over an oil or hazardous substance immediately before entry of the oil or hazardous substance into the atmosphere or in or upon the water, surface, or subsurface land of the state.

Rivers and Canals
A body of water confined within the inland area that has a projected depth of 12 feet or less, including the Intracoastal Waterway and other waterways artificially created for navigation.

Securing the Source
Steps that must be taken to stop the spill of oil at the source of the spill.

Site Security and Control
Steps that must be taken to provide safeguards needed to protect personnel and property, as well as the general public, to ensure an efficient clean-up operation.

Site Conditions
Details of the area surrounding the facility, including shoreline descriptions, typical weather conditions, socioeconomic breakdowns, etc.

Skimmers
Mechanical devices used to skim the surface of the water and recover floating oil. Skimmers fall into four basic categories (suction heads, floating weirs, oleophilic surface units, and hydrodynamic devices) which vary in efficiency depending on the type of oil and size of spill.

Sorbents
Materials ranging from natural products to synthetic polymeric foams placed in confined areas to soak up small quantities of oil. Sorbents are very effective in protecting walkways, boat decks, working areas, and previously uncontaminated or cleaned areas.

Spill
An unauthorized discharge of oil or hazardous substance into the waters of the state.

Spill Management Team
The personnel identified to staff of the organizational structure identified in a response plan to manage response plan implementation.

Designated company individuals who will fulfill the roles determined in the oil spill response plan in the event of an oil spill. They will supervise and control all response and clean-up operations.

Staging Areas
Designated areas near the spill site accessible for gathering and deploying equipment and/or personnel.

State Emergency Response Commission (SERC)
A group of officials appointed by the Governor to implement the provisions of Title III of the Federal Superfund Amendments and Reauthorization Act of 1986 (SARA). The SERC approves the State Oil and Hazardous Substance Discharge Prevention and Contingency Plan and Local Emergency Response Plans.

Substantial Threat of a Discharge
Any incident or condition involving a facility that may create a risk of discharge of fuel or cargo oil. Such incidents include, but are not limited to, storage tank or piping failures aboveground or underground leaks, fire explosions, flooding, spills contained within the facility or other similar occurrences.

Tidal Current Charts
Comprehensive charts which contain the predicted tidal current for each day of the year for designated areas. These charts specify the direction and speed of the current in the specific areas.

Tidal Current Tables
Tables which contain the predicted times and heights of high and low waters for each day of the year for designated areas.

Trajectory Analysis
Estimates made concerning spill size, location, and movement through aerial surveillance or computer models.

Unauthorized Spill
Spills excluding those authorized by an in compliance with a government permit, seepage from the earth solely from natural causes, and unavoidable, minute spills of oil from a properly functioning engine, of a harmful quantity of oil from a vessel or facility either: (1) into coastal water; or (2) on any waters or land adjacent to coastal waters where harmful quantity of oil may enter coastal waters or threaten to enter coastal waters if the spill is not abated, not contained and the oil is not removed.

Underwriter
An insurer, a surety company, a guarantor, or any person other than an owner or operator who undertakes to pay all or part of the liability of an owner or operator.

Unified Command
The method by which Local, State, and Federal agencies and the responsible party will work with the Incident Commander to:

- Determine their roles and responsibilities for a given incident.
- Determine their overall objectives for management of an incident.
- Select a strategy to achieve agreed upon objectives.
- Deploy resources to achieve agreed-upon objectives.

Waste
Oil or contaminated soil, debris, and other substances removed from coastal waters and adjacent waters, shorelines, estuaries, tidal flats, beaches, or marshes in response to an unauthorized discharge. Waste means any solid, liquid, or other material intended to be disposed of or discarded and generated as a result of an unauthorized discharge of oil. Waste does not include substances intended to be recycled if they are in fact recycled within 90 days of their generation or if they are brought to a recycling facility within that time.

Waters of the State
Includes lakes, rivers, ponds, streams, inland waters, underground water, salt water, estuaries, tidal flats, beaches and lands adjoining the seacoast of the state, sewers, and all other surface waters and watercourses within the jurisdiction of the State of Washington.

Wildlife Rescue
Efforts made in conjunction with Federal and State agencies to retrieve, clean, and rehabilitate birds and wildlife affected by an oil spill.

Worst Case Unauthorized Discharge
The largest foreseeable unauthorized spill under adverse weather conditions. For facilities located above the high water line of coastal waters, a worst case spill includes those weather conditions most likely to cause oil spilled from the facility to enter coastal waters.

Worst Case Discharge (MTR)
For facilities with belowground storage supplying oil to or receiving oil from the MTR portion means the cumulative volume of all piping carrying oil between the marine transfer manifold and the non-transportation-related portion of the facility. The discharge of each pipe is calculated as follows: the maximum time to discover the release from the pipe in hours (based on best estimate or historic discharge data) multiplied by the maximum flow rate expressed in BPH (based on the maximum daily capacity of the pipe) plus the total line drainage volume expressed in barrels for the pipes between the marine manifold and the non-transportation-related portion of the facility.

Worst-Case Discharge (EPA) (Storage Facilities)
1. Loss of the entire capacity of all aboveground tank(s) at the facility not having secondary containment; plus
2. 100% of the capacity of the largest tank within a secondary containment system or 100% of the combined capacity of the largest group of aboveground tanks permanently manifolded together within the same secondary containment system - whichever is greater.

Worst-Case Discharge (Pipeline)
1. The loss of the entire capacity of all in-line and breakout storage tanks needed for the continuous operation of the pipelines used for the purpose of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment; plus
2. The discharge from all piping carrying oil between the marine transfer manifold and the non-transportation-related portion of the facility.

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Appendix D.5

Water Quality Protection and Monitoring Plan

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Vancouver Energy
Water Quality Protection and Monitoring Plan

Plan No. C.03 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 27 February 2015

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Vancouver Energy
Water Quality Protection and Monitoring Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
27 February 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	27 February 2015	Submittal for Application Review

Vancouver Energy
Water Quality Protection and Monitoring Plan

Table of Contents

Section

1. Introduction 1
1.1 Purpose of Plan 1
1.2 Regulatory Requirements 1
1.3 Water Quality Criteria 3
1.4 Related Documents 3
2. Water Quality Protection Measures 4
2.1 General Water Quality Protection Measures 4
2.2 General Overwater Construction Work 5
2.2.1 Dock Modifications 5
2.2.2 Pile Strengthening 6
2.2.3 Dockside Equipment Installation 7
2.3 Upland Construction Work 7
2.4 Nearshore and Abutment Ground Improvements 7
3. Water Quality Monitoring 8
3.1 Visual Monitoring 8
3.1.1 Monitoring Parameters 9
3.1.2 Monitoring Schedule 9
3.1.3 Monitoring Locations 10
3.2 Instrumented Monitoring 10
3.2.1 Monitoring Locations 10
3.2.2 Monitoring Depths 12
3.2.3 Monitoring Parameters 12
3.2.4 Monitoring Schedule 12
3.3 Record Keeping and Reporting 12
3.3.1 Monitoring Reports 13
3.3.2 Notification of Exceedances 13
4. Contingency Response and Notification Plan 13
4.1 Visible Turbidity Plume 13
4.2 Instrumented Monitoring 14
4.3 Overwater Concrete Work 14
4.4 Construction Debris in Water 15
4.5 Distressed or Dying Fish 15
4.6 Nearshore and Abutment Ground Improvements 15
4.7 Discharge of Oil, Fuel, or Chemicals 16
5. List of Acronyms and Abbreviations 16

List of Tables

Table 1. Water Quality Standards for Lower Columbia River 3
Table 2. Monitoring Depth Summary 12

List of Figures

Figure 1. Facility Site Plan 2
Figure 2. Monitoring Locations 11

List of Appendices

Appendix A. Sample Daily Monitoring Log
Appendix B. Sample Report Template

1. Introduction

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5 (RM 103.5). The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 - Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 –Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude per day. Six nominal capacity 380,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move oil from Area 200 directly to Area 400. The Facility will operate 24 hours a day, 7 days a week.

1.1 Purpose of Plan

This water quality protection and monitoring plan (WQPMP) describes how Vancouver Energy will monitor and control releases of turbidity, suspended sediment, concrete, and other construction-related materials that may be generated during Facility construction activities in, over, and adjacent to the Columbia River and other adjacent water bodies. This WQPMP describes water quality protection measures; monitoring parameters, methods, evaluation criteria; and contingency response and notification procedures in the event a water quality criterion is exceeded during such construction activities. This WQPMP does not apply to Facility operations.

1.2 Regulatory Requirements

This WQPMP is implemented to provide guidance for construction activities to comply with the following regulatory requirements.

- Washington Administrative Code (WAC) 463-62-060 Water Quality, as applicable
- Section 401 of the Clean Water Act, for which the Energy Facility Site Evaluation Council (EFSEC) is delegated regulatory authority for this Facility
- Washington State Water Pollution Control Act (Chapter 90.48 Revised Code of Washington [RCW])
- Washington State Surface Water Quality Standards (Chapter 173-201A [WAC])
- National Pollutant Discharge Elimination System (NPDES) Construction General Permit

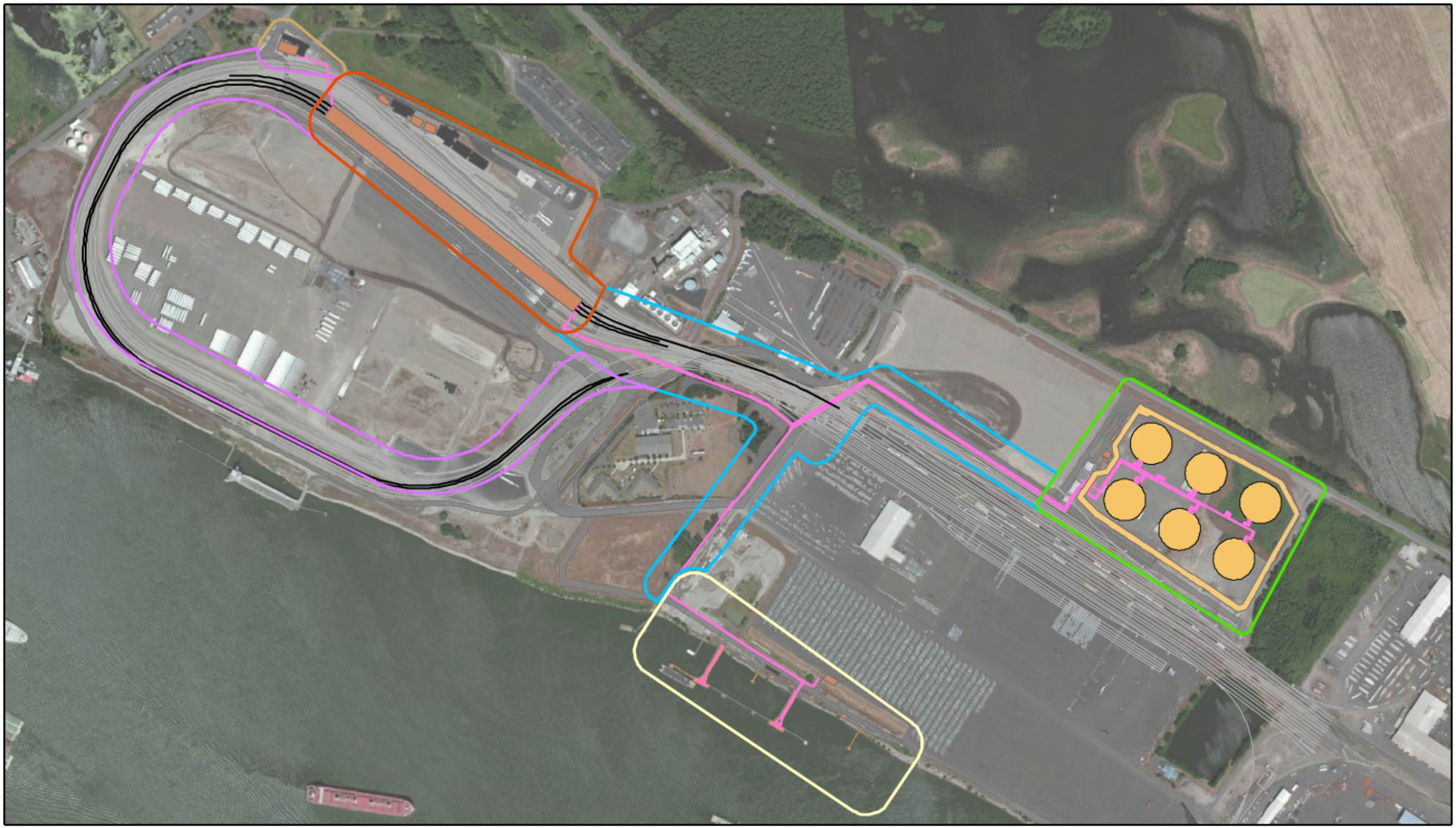

Figure 1 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000
Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

1.3 Water Quality Criteria

The designated uses for the Columbia River between the river mouth (RM-0) and the Washington-Oregon border (RM-309.3), inclusive of the Facility site, include salmonid spawning, rearing, and migration; primary contact recreation; various water supply uses (domestic, industrial, agricultural, and stock water supply); and other miscellaneous uses, such as wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics (WAC 173-201A-602). In consideration of the site construction activities (dock modifications, pile and overwater structure removal, overwater concrete work, and upland ground improvements), turbidity and pH are the primary water quality parameters of concern for this project. Table 1 presents the water quality standards for turbidity and pH (WAC 173-201A-200[1][e] and [1][g], respectively) to support the designated uses associated with this reach of the Columbia River. The water quality standards are applicable to all construction activities performed below the ordinary high water mark (OHWM) and other activities subject to this WQPMP.

Table 1. Water Quality Standards for Lower Columbia River

Monitoring Parameter	Water Quality Criterion	
Turbidity	If less than 50 NTU:	Background Turbidity plus 5 NTU
	If greater than 50 NTU:	Background Turbidity plus 20 percent
pH	pH will be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 unit.	

Note: NTU = nephelometric turbidity unit

The water quality standard for turbidity will need to be met at the compliance boundary at the edge of an authorized temporary area of mixing zone for construction activities. The mixing zone area extends 300 feet from the point of construction, as authorized in WAC 173.201A-200(1)(e) (Figure 2). The critical monitoring location will typically be directly 300 feet downstream (i.e., west-northwest) from the point of construction, although tidal reversals are possible during flood tide conditions, which could shift the critical monitoring location 300 feet upstream.

The pH standard has no area of mixing zone and must, therefore, be met at the location of the discharge with no dilution.

In addition to the numerical criteria in Table 1, the Facility must also comply with narrative water quality standards, including the following.

- No visible petroleum sheen on water observed at the construction site.
- No distressed or dying fish observed at the construction site and attributed to site activities.

These narrative criteria are not subject to a mixing zone and, therefore, must be met at the construction activity location with no dilution.

1.4 Related Documents

The following documents and plans implement additional protective measures and procedures in addition to those presented in this WQPMP.

- Construction Stormwater Pollution Prevention Plan (SWPPP) – the construction SWPPP outlines best management practices (BMPs) designed to minimize erosion from construction activities as part of NPDES compliance. This plan focuses on the prevention of stormwater pollution by minimizing, capturing, and treating runoff from construction sites.

- Construction Spill Prevention, Control, and Countermeasures Plan (SPCCP) – the construction SPCCP outlines BMPs, response actions in the event of a release, and notification and reporting procedures. The construction SPCCP also outlines management elements, such as personnel responsibilities, construction site security, site inspections, and training. Finally, the construction SPCCP lists spill response equipment and where such equipment is maintained on site.

2. Water Quality Protection Measures

This section describes the construction activities covered by this WQPMP and the protection measures or BMPs that will be implemented to minimize impacts to water quality. In addition to implementing the protection measures described in this WQPMP, water quality monitoring will be performed during specific construction activities to determine protection measures are effective, as described in section 3. General and activity-specific water quality protection measures are described in the following subsections.

2.1 General Water Quality Protection Measures

Description: Construction activities that are proposed within, over, and adjacent to waters of the state are subject to state water quality standards.

Water Quality Protection Measures: The following BMPs will be implemented during all work in, over, or near the water to minimize effects to water quality.

- The contractor's construction SWPPP and construction SPCCP will be implemented. A copy of the construction SWPPP and construction SPCCP with any updates will be maintained in the construction office at the work site.
- All equipment will be maintained in good proper running order to prevent leaking or spilling of potentially hazardous or toxic substances, including, but not limited to, hydraulic fluid, diesel, gasoline, and other petroleum products.
- All construction equipment will be inspected daily before use to verify that the equipment has no fluid leaks. Should a leak develop during use, the leaking equipment will be removed from service immediately and will not be used again until it has been adequately repaired. At no time will fuels or oils be intentionally allowed to enter the river or spilled to ground.
- In the event of inadvertent release of fuels, lubricants, or other materials during construction, containment and cleanup efforts will begin immediately and be completed in an expeditious manner, in accordance with all local, state, and federal regulations, and will take precedence over normal work. Spill response kits will be staged at the work site. Cleanup will include proper disposal of any inadvertently released material and used cleanup material.
- All equipment using hydraulics used over the water will use biodegradable hydraulic fluids.
- Debris boom(s) will be placed around the work areas to contain demolition or construction materials or litter that may inadvertently drop into the water.
- Any debris dropped into the water will promptly be removed by the contractor. The contractor will have a boat available and on site during in-water activities for debris retrieval.
- Excess or waste materials generated during construction will not be disposed of or abandoned waterward of the OHWM or allowed to enter surface waters. Waste materials will be collected and disposed of in an appropriate site.
- Demolition and construction materials will not be stored where wave action or upland runoff can cause materials to enter surface waters.
- Unless stated otherwise below, all in-water work performed "in the wet[1]" will be completed within the in-water work window approved in the Site Certification Agreement ("approved in-water work window") to protect sensitive fisheries and aquatic resources.
- Other work elements below the OHWM may be performed "in the dry" and will be removed or isolated from direct contact with the river. Examples include working on the bank during low-water conditions, conducting pile strengthening activities inside existing piles, working on structures above the water level, and moving structures or

[1] "Work in the wet" includes any activity that physically occurs in the water where equipment or materials will be submerged. Conversely, "work in the dry" is defined as an activity that does not include physical contact with water, either by equipment or material.

components built off site onto the Facility site. Such activities are, therefore, proposed to be conducted irrespective of the designated in-water work window.

- Pile cut-offs, waste, or any miscellaneous unused materials will be recovered for either disposal in a designated facility or placed in storage. No such material will be intentionally discharged or released into surface waters.
- Contractors will have emergency spill equipment available whenever working in or near the water.
- Contractors will position waterborne equipment (e.g., pile-driving barges) in a manner that will minimize damage to existing habitat.
- Corrective actions, including those listed below, will be taken in the event of any release of oil, fuel, or chemicals from construction vessels, equipment, or materials into surface waters.
- The cause of the inadvertent release will be assessed and appropriate action will be taken to prevent further incidents or environmental damage.
- Inadvertent releases will be reported to EFSEC and any local and state agency representatives delegated by EFSEC to receive such notices, for example Ecology's Southwest Regional Spill Response Office at 360/407-6300.
- Work barges will not be intentionally grounded on the river bottom during construction.

2.2 General Overwater Construction Work

Overwater construction activities are specific to Area 400 and are associated entirely with the existing dock. These activities include dock modifications, pile strengthening, and dockside equipment installation.

2.2.1 Dock Modifications

Description: Modifications to the existing dock will likely require overwater welding, cutting, and other general overwater construction work. Because this work will occur out of the water, it will not be constrained to the approved in-water work window. The construction activities will consist of adding structural capacity to the existing piles supporting the dock and mooring dolphins; removal and replacement of the decking, mooring hardware, and fendering system; and removing portions of the structure that conflict with mooring lines. Two upland mooring points will be installed above the OHWM using impact pile driving. Temporary piles will be installed with a vibratory hammer where needed for construction. They will then be removed using vibratory extraction after construction is completed. BMPs described below will be implemented to protect water quality.

Existing piles will be removed using vibratory extraction or by pulling them with a crane mounted on a barge. If a pile is unable to be completely removed using vibratory or pulling methods, the pile will be cut off at or below the mudline using an articulating diamond wire saw or cutting torch or pushed into the sediment.

The existing terminal deck will be removed and replaced with a new concrete structure. New concrete pile caps will be formed using watertight forms. The superstructure will be constructed with steel framing with a steel grid deck and a poured-in-place concrete topping slab. Grated walkways and trusses will be manufactured off site and brought to the site for installation. Deck replacement occurs above OHWM and will not be constrained to the approved in-water work window.

Water Quality Protection Measures: In addition to the general BMPs described above, the following BMPs will be implemented during pile removal.

- Checking construction vessels and equipment for leaks and/or other problems that could result in discharge of petroleum-based products or other material into surface waters.
- Facility construction will be completed in compliance with Washington State Water Quality Standards (WAC 173-201A), including
  - No petroleum products, fresh cement, lime, concrete, chemicals, or other toxic or deleterious materials will be intentionally allowed to enter surface waters.
  - There will be no intentional discharge of oil, fuels, or chemicals to surface waters or onto land where there is a potential for reentry into surface waters.

- Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. will be checked regularly for leaks, and materials will be maintained and stored properly to prevent inadvertent releases.

- Existing piles will be dislodged with a vibratory hammer, when possible, and will not be intentionally broken by twisting or bending. If a pile breaks above the mudline, it will be cut off at or below the mudline or pushed into the sediment.
- The piles will be removed in a single, slow, and continuous motion so as to minimize sediment disturbance and turbidity in the water column.
- Removed piles, stubs, and associated sediment (if any) will be promptly transferred to a barge or onto the uplands. If a barge is used, the work surface will fully contain any associated sediment or liquid removed along with the piles. Any water contained on the barge deck will not be discharged into surface waters. Water will be sent to temporary holding tanks on the barge, and pumped to approved shore-based facilities for disposal.

2.2.2 Pile Strengthening

Description: The piles are not anticipated to contain significant sediment as they were driven partially closed ended. If necessary, sediment will be removed by the contractor, likely using an air lift or auger, which will bring the sediment to the top of the existing piles. On the surface, sediments and any sediment-laden water will be pumped to temporary containment tanks/areas to prevent it from flowing into surface waters. A skirt or similar device will be attached to the top of the pile to collect any sediment or water that spills out of the pile. Sediments collected in this manner will be transported off site for disposal in an approved location.

Micropiles will be drilled into the substrate below the pile tip from within the existing pile. Any spoils generated by drilling will be fully contained within the existing pile and will be prevented from contacting surface water to the maximum extent possible. Spoils from the drill will be brought back up through the pile, similar to the extraction of sediment prior to drilling, and directed to containment tanks/areas for off-site disposal. Because all work will occur within an existing pile, the spoils will not contact surface water.

Water Quality Protection Measures: The following BMPs will be implemented to minimize effects to water quality during pile strengthening construction work.

- Blocking deck drains on the existing dock to prevent runoff during pile strengthening activities.
- A skirt or other containment will be attached to the top of the pile to collect sediment and turbid water.
- Runoff or pumpout water will be directed to temporary storage tanks for treatment if needed to meet water quality standards.
- Any piping used to convey runoff or pump-out water will be watertight to prevent leakages or discharges to surface water.

Overwater concrete work will occur when placing grout inside existing piles and replacing the concrete deck. The following BMPs will be followed during these elements.

- Wet concrete will be isolated from contact with surface water.
- Watertight forms will be used to prevent leakage.
- Forms will be kept in place until curing is complete.
- If concrete is discharged from the concrete truck directly to the form work or placed by wheelbarrow, properly sealed chutes will be constructed to avoid spillage.
- If the concrete is being placed with a concrete pump, verify that all hose and pipe connections are properly sealed and locked.
- All concrete forms will be constructed in a manner that will prevent fresh concrete or cement-laden water from leaking into the surrounding water.
- Crews will monitor all pours to verify that concrete forms are not filled to overflowing or leaking.
- All tools, pumps, pipes, hoses, and trucks used for finishing, placing, or transporting fresh concrete will be washed off to prevent the wash water and excess concrete from entering the marine environment. The wash water will be contained and disposed of upland in an environmentally acceptable manner.
- Water will not be used to cure concrete.

2.2.3 Dockside Equipment Installation

Description: Construction of transfer pipelines and shiploading infrastructure (e.g., pumps, jib cranes, piping) will occur on the modified access trestle and dock. Construction will not be constrained to the approved in-water work window as there is no in-water component, but activities will occur over water and above the OHWM elevation.

Water Quality Protection Measures: BMPs described above for dock modifications will be implemented to minimize effects to water quality.

2.3 Upland Construction Work

Description: Upland work associated with Area 400 includes the construction of shore-based infrastructure to support vessel loading activities. This includes construction of a control room and E-house, fire pump and foam facilities, a marine vapor combustion unit, and lighting. Construction will not be constrained to the approved in-water work window as there is no in-water component.

Water Quality Protection Measures: BMPs described for general water quality protection above will be implemented to minimize effects to water quality during upland construction.

2.4 Nearshore and Abutment Ground Improvements

Description: To meet seismic design requirements, upland ground improvements (stone columns[2]) have been designed to minimize potential liquefaction and lateral movement. Ground improvements will occur along the shoreline adjacent to the existing berths 13 and 14 ("nearshore ground improvements"); these nearshore-located ground improvements will be located on the top of the bank. Because of the required dock modifications, ground improvements will also be installed around the existing Berth 14 abutment ("Abutment ground improvements") and will extend from the top of bank to the OHWM in the immediate vicinity of this abutment.

Stone columns, if selected, will be installed using a downhole vibratory probe to create subsurface vertical aggregate columns to reinforce, densify, and drain potentially liquefiable soils. The preferred installation method is the dry bottom-feed process, in which the probe's weight and vibrations cause it to advance to the design depth. Then crushed gravel is fed into the soil at the vibrator tip, using air pressure through a feed pipe, attached to the vibrator. The stones displace the soil, creating a stiff, stone column that reinforces the improvement zone and densifies the surrounding soils.

Water Quality Protection Measures: The following BMPs will be implemented to minimize effects to water quality during upland ground improvements. Proposed water quality protection measures are consistent with the recommendations in Ecology's internal memorandum, Guidance on Controlling Turbidity in Nearby Waters from Ground Improvement Work for Seismic Events (Ecology 2010). The following preventative and control measures are incorporated into the design of the stone columns to minimize the potential for any turbidity effects in the river.

- An air injection method for stone columns is selected over a water injection method to minimize the amount of soil and water generated at the surface during installation.
- The nearshore stone columns behind the dock structure will be positioned with a minimum setback distance at the top of the bank based on final engineering design. Ground improvements around the abutment will extend down the slope to the OHWM.

[2] As of the writing of this WQPMP, ground improvement design has not been fully completed. Other methods for ground improvement may be implemented, including jet grouting or soil mixing.

- Wick drains will be installed between the ground improvements closest to the shoreline and the OHWM. The wick drains will help to relieve excess pore water pressure and dissipate air flow through the subsurface to reduce the potential for air or water to exit the bank face and create turbidity in the river.

During nearshore and abutment ground improvement installation, the following additional BMPs will be implemented.

- Visual turbidity monitoring will be conducted during nearshore and abutment ground improvement installation behind the dock, as described in section 3. In particular, the installation locations closest to the water will be a high priority for the monitoring program.
- As a contingency measure, if turbidity is observed during ground improvement installation, additional engineering controls will be implemented.
- The control of excess soil and water on the uplands at the ground improvement installation site is described in the construction SWPPP for this project. Upland BMPs will include an appropriate combination of perimeter controls, infiltration, and segregation of stormwater run-on/runoff.

3. Water Quality Monitoring

A combination of visual and instrumented monitoring will be conducted. Visual monitoring of turbidity generated by construction activities will be conducted for all in- and overwater work, including dock modifications, pile strengthening and replacement of concrete deck, and dockside equipment installation. In addition to turbidity, visual monitoring will be performed by a designated Vancouver Energy representative on an ongoing basis for floating debris, trash, oil sheen, etc. during in- and overwater construction activities. Specific visual monitoring protocols for ground improvements are described in section 3.1.

Instrumented turbidity monitoring will be implemented if potential violations are observed during visual monitoring. For example, a turbidity plume is observed during visual monitoring and followed up with instrumented to determine if turbidity exceeds standards.

Instrumented pH monitoring will be conducted during overwater concrete work until the concrete is set. The set period is the time it takes concrete to solidify and is no longer fluid and at risk of spilling into the water. The time required for concrete to set is dependent on the admixture specifications and environmental conditions at the time it is poured. Typically, concrete will set within a matter of hours. Instrumented monitoring will not be conducted past the set period.

In the event that an exceedance of water quality standards is indicated by either visual or instrumented monitoring, contingency response actions and agency notifications will be triggered. The contingency response and notification plan is described in section 4.

3.1 Visual Monitoring

Visual monitoring will be performed during all in-water and overwater construction activities, and installation of nearshore and abutment ground improvements. This includes

- Dock modifications, including pile removal, temporary pile placement and removal, and deck replacement
- Overwater casting of concrete pile caps and decking on the structure
- Pile strengthening
- Dockside equipment installation
- Construction of upland facilities immediately adjacent to the shoreline at Area 400
- Nearshore and abutment ground improvements adjacent to the shoreline

Visual monitoring will be performed on the water surface and a locations of installed BMPs. Instrumented monitoring, see section 3.2, will only be conducted if visual monitoring identifies a potential exceedance, e.g., visible plume or spill, to verify if an actual exceedance has occurred.

During nearshore and abutment ground improvements in the shoreline area, the adjacent river bank will be monitored from shore for air bubbles, which provide a clear visual indication of gas movement through the bank sediments. As a result of the control measures described above, it may be that no discharge of air is observed in the Columbia River. However, if air bubbles are observed, follow-up instrumented turbidity monitoring using a hydroprobe or equivalent will be performed, see section 3.2.2. If air bubbles are observed during visual monitoring of ground improvements, instrumented turbidity monitoring will be activated. Turbidity measurements will be collected as close as practicable to the discharge area. The turbidity measurements will be compared to a turbidity benchmark of 25 NTU, as an increase above the Background Station (i.e., Background +25 NTU). This benchmark will be considered an action level for implementing additional controls, which are described in further detail in the next paragraph, and conducting instrumented turbidity monitoring.

If air bubbles are observed in the river during ground improvement installation, the following sequence of response procedures will be conducted.

- Turbidity will be measured as close as practicable to the discharge area. If turbidity is below the benchmark described above and continues to stay below the benchmark for three consecutive days, monitoring may revert to visual monitoring for stone columns installed at similar or greater setback distances.
- If turbidity is above the benchmark, an additional set of measurements will be collected 5 minutes later to confirm (or not confirm) a potential exceedance.
- If the potential exceedance is confirmed and is attributed to ground improvement installation activities, the contractor and designated Vancouver Energy representative will be immediately notified. The contractor will be directed to immediately modify operations to control turbidity, as feasible, potentially including slowing the pace of the work.
- Retake turbidity measurements 30 minutes later at the discharge site and the background location after additional operational modifications are implemented to assess the effectiveness of the modifications.

3.1.1 Monitoring Parameters

The following parameters will be assessed during visual monitoring.

- Turbidity
- Sheen
- Construction debris in the water
- Operation and effectiveness of BMPs

Visual monitoring will include photographic documentation.

3.1.2 Monitoring Schedule

The frequency of visual monitoring will be as follows.

- Ongoing monitoring by the contractor conducting the activity(ies) subject to this WQPMP during said construction operations.
- Monitoring by the designated Vancouver Energy representative every 4 hours during construction activities subject to this WQPMP.

Immediate visual confirmation by the designated Vancouver Energy representative is required if notified by the contractor of a potential water quality exceedance. If a visual exceedance is confirmed, follow-up instrumented monitoring will be implemented until water quality returns to compliance levels.

3.1.3 Monitoring Locations

Visual monitoring will be performed at the following locations.

- For BMP performance, at the location of the installed BMP
- For turbidity, at the locations specified in section 3.2.1 (i.e., 150 feet and 300 feet downstream from construction activity, plus upstream background)
- For visible sheen, at the point of discharge to the river
- For construction debris, including wet concrete, at the point of discharge to the river
- For ground improvements, the length of shoreline parallel to the marine terminal

Note that multiple activities requiring monitoring may occur simultaneously. Flow reversals in the river may shift monitoring locations. Upstream and downstream is used in conjunction with the direction of flow.

3.2 Instrumented Monitoring

Instrumented turbidity monitoring will be performed when visual monitoring detects a potential water quality exceedance during the following construction activities.

- As a contingency measure in response to visual observation of a significant turbidity plume, to better assess compliance with water quality standards and the effectiveness of any supplemental BMPs that may be implemented to control turbidity.
- Instrumented pH monitoring will be performed during overwater casting of concrete pile caps and decking until the concrete is completely cured.

The monitoring procedures outlined in the following subsections will be implemented during instrumented monitoring.

3.2.1 Monitoring Locations

During each monitoring event, the appropriate water quality parameters (i.e., turbidity and/or pH, depending on the activity) will be measured at the following stations (see Figure 2). Typically, monitoring stations are located with respect to the direction of river flow. Tidal flow reversals are possible on the section of the river, which essentially flips the location of the compliance, early warning, and background stations.

The Compliance Station varies by water quality parameter and construction activity. The Compliance Station for turbidity is at the edge of the mixing zone, 300 downstream from the construction activity. The Compliance Station for pH is as close as practicable to the construction activity involving active concrete work because pH has no mixing zone allowance.

The Early Warning Station for turbidity is at the midpoint of the authorized mixing zone, 150 feet downstream from the construction activity. The objective of the Early Warning Station is to become quickly aware of possible water quality excursions at the construction site and to be able to adjust construction operations and BMPs before an exceedance occurs at the Compliance Station.

The Background Station will be positioned approximately 500 feet upstream of the project site and beyond the influence of construction activities. The Background Station will be located along a part of the shoreline with comparable water depth and other physical characteristics (e.g., slope and substrate) to the extent possible. This station will be monitored during every monitoring event because the turbidity criterion is based on an acceptably small increase above ambient background levels in the river.

Figure 2 - Monitoring Locations

LEGEND

Proposed Project Facilities

- Transfer Pipeline
- Roads
- Buildings
- Marine Terminal
- Parking

- Ordinary High Water
- 150 Foot Early Warning Boundary
- 300 Foot Compliance Boundary

0 100 200 400

Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerail photo dated July 2010, courtesy of ESRI World Imagery service

3.2.2 Monitoring Depths

At each monitoring station, measurements of activity-appropriate water quality parameters will be made at three depths in the water column dependent on the river depth at the time of sampling. In shallow water depths, it will not be possible to collect all three measurements. In water depths less than 12 feet, only two depths will be monitored, and in water depths less than 6 feet, only one depth will be monitored.

Table 2. Monitoring Depth Summary

Measurement Location[a]	Shallow Depths (< 6 feet)	Depths < 12 feet	Depths > 12 feet
Surface	X	X	X
Middle			X
Bottom		X	X

[a] Measurement locations are defined as follows: Surface. within 3 feet (approximately 1 m) of the water surface; Middle. at the mid-depth of the water column; Bottom. within 6 feet (approximately 2 m) of the river bed

3.2.3 Monitoring Parameters

Real-time field measurements of the following water quality parameters will be collected during instrumented monitoring, as appropriate to the activity.

- Turbidity (in NTU)
- pH (in standard units)

3.2.4 Monitoring Schedule

Turbidity: In response to a visual observation of a turbidity plume, instrumented monitoring will be conducted immediately. If the result does not indicate an exceedance, no further monitoring is necessary and construction can resume. If the water quality standard is exceeded, a second sample will be conducted 30 minutes later. If the water quality standard remains exceeded, subsequent sample will be conducted at 30-minute intervals until the water quality standard is achieved.

Wet Concrete Work: Monitoring will be undertaken once every 4 hours during active work.

If any exceedances of water quality criteria are observed at any time during the monitoring program and it is determined that the exceedance is caused by construction activities rather than an ambient background condition, then the contingency response and notification procedures will be initiated as described in section 4.

3.3 Record Keeping and Reporting

The designated Vancouver Energy representative or his/her designee will keep a written record of monitoring activities and inspections during both visual and instrumented monitoring. These records will be maintained in the Facility construction files and provided to EFSEC staff and any agency personnel designated by EFSEC to receive notifications. Daily monitoring logs will be kept by the designated Vancouver Energy representative. Daily logs will be compiled into weekly monitoring reports and notifications of water quality exceedances as described in detail below, which will be submitted to EFSEC.

3.3.1 Monitoring Reports

Daily monitoring logs will be kept throughout the duration of construction activities. Daily logs will include the following information. A sample daily monitoring log is included in Appendix A.

- Date and time of sample
- Sample location
- Sample results
- Monitoring type (i.e., visual or instrumented)
- Name of person collecting the sample
- Weather conditions
- Corrective actions needed/taken

Results of the water quality monitoring will be documented and submitted to EFSEC and any agency personnel designated by EFSEC on a weekly basis during construction. The weekly reports will contain summaries of the daily logs, and will be submitted to EFSEC within one week following the completion of each week of construction activities.

3.3.2 Notification of Exceedances

In the event of an exceedance of water quality standards, the attendant project personnel will immediately notify the designated Vancouver Energy representative, construction site environmental manager, or their designee, who will notify EFSEC and any other state agency personnel designated by EFSEC. Notification to EFSEC will be made within 24 hours of the occurrence, or the next business day if the violation occurs outside of normal business hours. A detailed written report will be submitted to EFSEC within five business days after the notification.

The report will include the following information. Appendix B contains a sample report template.

- Nature, extent, and duration of the water quality exceedance, including detailed visual observations and, if applicable, field parameter measurements
- Identification of the likely cause of the exceedance
- Description of control measures or BMPs implemented to mitigate the exceedance
- Notifications to agency, including timing and names of agency personnel contacted
- Documentation that control measures were effective at mitigating the water quality exceedance and stabilizing environmental conditions in the construction area

4. Contingency Response and Notification Plan

In the event of an exceedance of water quality standards, as observed during visual or instrumented monitoring, personnel will immediately assess the source of the impact or exceedance. Once the source has been identified, personnel will implement operational modifications or other control measures to prevent further occurrences and limit additional environmental impact. Monitoring will continue to confirm the control measures are effective and the observed water quality exceedances have been mitigated.

4.1 Visible Turbidity Plume

In the event a significant turbidity plume[3] is observed during visual monitoring of construction activities, construction operations and BMPs will be thoroughly inspected to identify the source of the turbidity exceedance, and appropriate operational controls, engineering controls, or enhanced BMPs will be

[3] A turbidity plume is considered significant when it extends the entire length of the mixing zone and remains visible 300 feet from the construction activity.

implemented to reduce turbidity to acceptable levels. Based on the shape and extent of the turbidity plume, it should be evident that the plume is sourced from a construction activity subject to this WQPMP rather than an anomalous background condition.

If a visible turbidity plume is evident at the compliance boundary, follow-up instrumented turbidity monitoring will be initiated to better assess compliance with water quality standards and to track the effectiveness of any supplemental controls or BMPs that may be implemented. Instrumented monitoring is described in the next section.

4.2 Instrumented Monitoring

Instrumented monitoring for turbidity, using a calibrated turbidimeter, will be implemented as a follow-up contingency measure in response to visual evidence of a significant turbidity plume or air bubbles observed during nearshore and abutment ground improvement installation. Instrumented monitoring for pH, using a hydroprobe or equivalent, will be implemented during in-water or overwater wet concrete work until the concrete is set.

Field measurements of turbidity and pH will be compared with the water quality criteria specified in Table 1 (see section 1.2). Compliance with water quality criteria will be evaluated at the Compliance Station locations described in section 3.2.1, which are parameter specific. If there is an exceedance of water quality criteria at the Compliance Station, the following sequence of events will be initiated.

1. Evaluate the concurrent measurements at the Background Station to determine whether the exceedance is caused by ambient river conditions versus site-related construction activities.
2. Retake field measurements 5 minutes later at the Compliance Station to confirm (or not confirm) the exceedance.
3. If the exceedance is confirmed and is attributed to site construction activities, immediately notify the contractor and designated Vancouver Energy representative. The contractor will be directed to immediately modify operations or implement additional BMPs to mitigate the exceedance.
4. Retake field measurements at the Compliance Station boundary within 30 minutes of the exceedance, after additional BMPs or operational modifications are implemented.
5. If the immediate response actions are not successful at mitigating the water quality exceedance within 30 minutes, the work will cease. The contractor and designated Vancouver Energy representative (or their designee) will assess the cause of the water quality problem and take immediate action to stop, contain, and correct the problem, and prevent further water quality exceedances. This may include implementing more aggressive BMPs and/or operational modifications.
6. Within 24 hours of occurrence, notify EFSEC of the exceedance (nature, extent, and duration), actions taken to mitigate the exceedance, and the results of the follow-up measurements.
7. Within five days after notification, submit a written report to EFSEC describing the exceedance, the mitigation measures implemented, and documentation of their effectiveness.

4.3 Overwater Concrete Work

If an exceedance of pH criteria is observed during overwater concrete work, the sequence of events specified in section 4.2 will be implemented. If the exceedance is confirmed and attributed to site construction activities, the contractor and designated Vancouver Energy representative or their designee will be notified and directed to modify operations or implement additional BMPs to mitigate the exceedance. The following contingency response actions will be initiated.

- Evaluate whether the BMPs identified in section 2.2 are in use and are functioning properly with no visible signs of concrete or concrete laden water leaving the work area. If BMPs are missing or installed improperly, the contractor will be directed to immediately stop the concrete work and install or fix the BMPs until they are functioning properly and pH levels are within the acceptable range.

- If BMPs are in place and functioning properly, all areas of concrete work will be evaluated for potential sources of pH exceedances. Additional BMPs or operational controls will be identified and implemented based on the source of the exceedances. Potential BMPs may include
  - Installation of tarps, work platforms or other methods to provide secondary containment for overwater concrete pours.
  - Placement of impermeable blankets to prevent precipitation from coming into contact with concrete until fully cured.

4.4 Construction Debris in Water

In the event of an observed release to the water of construction debris, the contractor will cease operations (if needed for safety) and recover the debris. Repairs to equipment, containment measures, or modification to work practices will be made prior to resuming work. Once the source has been identified and addressed, work may proceed. If the debris is environmentally innocuous (e.g., untreated wood, plastic, old concrete, and steel), work may proceed simultaneously with recovery efforts.

4.5 Distressed or Dying Fish

In the event distressed or dying fish are observed at the construction site and are attributed to site activities, work will immediately stop and EFSEC, the Washington Department of Fish and Wildlife (WDFW), and the National Marine Fisheries Service (NMFS) will be contacted at the numbers listed as follows.

- EFSEC at (phone number to be determined)
- WDFW at 360/906-6764
- NMFS Office of Law Enforcement at 503/231-6240 or 206/526-6133

The condition of the fish (dead, dying, or erratic behavior); an estimate of the number, species, and size of fish in each condition; and the location of fish relative to construction operations will be noted. If any dead listed species are present, samples will be frozen in secure storage under chain-of-custody for possible agency inspection. Additional fish and water sampling may be conducted at the direction of the resource agencies.

4.6 Nearshore and Abutment Ground Improvements

In the event that activities associated with installation of nearshore or abutment ground improvements result inturbidity exceedances, notify EFSEC of the exceedance, actions taken to mitigate the exceedance, and the results of the follow-up measurements. If the turbidity exceedance continues to persist in the discharge area, a path forward will be discussed with EFSEC. The path forward will likely include implementation of additional in-water and/or upland engineering controls, potentially including one or more of the following, depending on river conditions.

- Installation of a silt curtain to contain turbidity near the discharge area. Following installation of a silt curtain, the compliance monitoring location will move to the outside of the curtain.
- Installation of a fish diversion structure upstream of the discharge area. Following installation of a fish diversion structure, the compliance monitoring location will move to the boundary of the exclusion area, as projected downstream from the structure.
- Installation of additional wick drains on the uplands to further alleviate excess pore pressure on the bank of the river.
- Rotation of column installation sites, from forward to back, to minimize the temporal impacts of installation at the locations nearest the water.

4.7 Discharge of Oil, Fuel, or Chemicals

In the event of a discharge of oil, fuel, or chemicals (including wet concrete) into state waters, work will stop and containment and cleanup efforts will begin immediately and be completed as soon as possible. Work may resume only after the source of the spill or leak has been identified and controlled, as long as the work does not interfere with, delay, or hinder the containment and cleanup efforts. Cleanup includes appropriate disposal of any spilled material and cleanup material. The following agencies will be immediately notified.

- EFSEC at (phone number to be determined)
- Ecology's Spill Response Office at 360/407-6300
- Washington State Emergency Management at 800/258-5990 (24-hour)
- National Response Center at 800/424-8802 (24-hour)

5. List of Acronyms and Abbreviations

bbl: barrel or barrels

BMPs: best management practices

Ecology: Washington State Department of Ecology

EFSEC: Energy Facility Site Evaluation Council

Facility: Vancouver Energy

NMFS: National Marine Fisheries Service

NTU: nephelometric turbidity unit

OHWM: ordinary high water mark

Port: Port of Vancouver USA

RCW: Revised Code of Washington

RM 103.5: River Mile 103.5

SPCCP: spill prevention, control, and countermeasures plan

SWPPP: stormwater pollution prevention plan

WAC: Washington Administrative Code

WDFW: Washington Department of Fish and Wildlife

WQPMP: water quality protection and monitoring plan

Appendix A
Sample Daily Monitoring Log

Appendix A - Water Quality Monitoring Daily Log

Date	Name	Method	Background Station		Early Warning Station		Compliance Station		Weather	Corrective Actions Needed/Taken
			Time	Reading	Time	Reading	Time	Reading		

Vancouver Energy
Water Quality Protection and Monitoring Plan
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix B
Sample Report Template

Appendix B, Sample Report Template

1. Introduction

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5 (RM 103.5). Construction of the Facility started [date] in accordance with approved construction plans. Weekly monitoring reports have been submitted to Energy Facility Site Evaluation Council (EFSEC) to document compliance with water quality standards.

2. Water Quality Exceedance

On [date], a water quality exceedance for [parameter] was detected during routine monitoring of water quality during construction. The following section summarize the nature and source of the violoation.

2.1 Location

Nature, extent, and duration of the water quality exceedance, including detailed visual observations and, if applicable, field parameter measurements

Identification of the likely cause of the exceedance.

2.2 Contigency Response Actions

Describe work stoppage procedures and immediation action, if any, taken to minimize further violation.

Describe notifications to agency, including timing and names of agency personnel contacted.

2.3 Corrective Action

Description of control measures or best management practices (BMPs) implemented to mitigate the exceedance.

Documentation that control measures were effective at mitigating the water quality exceedance and stabilizing environmental conditions in the construction area.

Appendix D.6

Operation Stormwater Pollution Prevention Plan

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Vancouver Energy
Operations Stormwater Pollution Prevention Plan

Plan No. OP.01 | Revision 01

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 27 February 2015

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Vancouver Energy
Operations Stormwater Pollution Prevention Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
27 February 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

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Vancouver Energy
Operations Stormwater Pollution Prevention Plan

Table of Contents

Section

Executive Summary ..... **v**
1. Essential Information **1**
1.1 Facility Information 1
1.2 Facility Contact Information 1
1.3 Agency Information 2
1.4 Stormwater Pollution Prevention Team 2
2. Facility Description and Contact Information **3**
2.1 Facility Information 3
3. Facility Assessment **6**
3.1 Facility Description 6
3.1.1 Area 200 – Unloading and Office 6
3.1.2 Area 300 – Storage 7
3.1.3 Area 400 – Marine Terminal 8
3.1.4 Area 500 – Transfer Pipelines 8
3.1.5 Area 600 – West Boiler 9
3.1.6 Rail Improvements 9
3.1.7 Regular Business Hours 10
3.1.8 General Layout 10
3.2 Industrial Activity, Materials Inventory, and Associated Pollutants 11
3.2.1 Area 200 – Unloading and Office 11
3.2.2 Area 300 – Storage 12
3.2.3 Area 400 – Marine Terminal 12
3.2.4 Area 500 – Transfer Pipelines 12
3.2.5 Areas 600 – West Boiler 13
3.2.6 Rail Improvements 13
3.3 Materials and Pollutants 13
3.4 Spills and Leaks 15
4. Best Management Practices **16**
4.1 Operational Source Control BMPs 16
4.1.1 Good Housekeeping 16
4.1.2 Docks and Vessels 16
4.1.3 Landscaping and Lawn/Vegetation Management 17
4.1.4 Loading and Unloading Areas for Liquid Material 18
4.1.5 Maintenance of Utility Corridors and Facilities 18
4.1.6 Maintenance of Stormwater Drainage and Treatment Systems 19
4.1.7 Parking and Storage of Vehicles and Equipment 19

4.1.8 Railroad Yards 19
4.1.9 Roof/Building Drains at Manufacturing and Commercial Buildings 19
4.1.10 Soil Erosion and Sediment Control at Industrial Sites 19
4.1.11 Storage of Liquid 19
4.1.12 Storage of Liquids in Permanent Aboveground Tanks 20
4.1.13 Washing and Steam Cleaning Vehicles/Equipment/Building Structures 20
4.1.14 Preventive Maintenance: 20
4.1.15 Spill Prevention and Emergency Cleanup 20
4.1.16 BMPs for Spills of Oil and Hazardous Substances 20
4.1.17 Illicit Connections to Storm Drains 21
4.1.18 Employee Training 21
4.1.19 Inspections, Reporting, and Recordkeeping 22
4.1.20 Illicit Discharges 23
4.2 Structural Source Control BMPs 24
4.2.1 Loading and Unloading Areas for Liquid Material 24
4.2.2 Storage of Liquid or Dangerous Waste Containers 24
4.2.3 Storage of Liquids in Permanent Aboveground Tanks 24
4.3 Treatment BMPs 25
4.4 Stormwater Peak Runoff and Volume Control BMPs 28
4.5 Erosion and Sediment Control BMPs 29
5. Sampling Plan 29
5.1 Discharge Location(s) 29
5.2 Identify Each Sampling Location 30
5.2.1 Staff Responsible for Sampling 31
5.2.2 Sample Collection and Handling 31
5.3 Discharge Monitoring Reports 32
5.4 Sampling Parameters 32
6. SWPPP Certification 33
7. List of Acronyms and Abbreviations 33

List of Tables

Table 1. Summary of Facility Areas 6
Table 2. Industrial Activities and Potential Pollutants 14
Table 3. Facility Areas Where Potential Spills/Leaks Could Occur 15
Table 4. Potential Stormwater Pollutants, Sources, and Likelihood 15
Table 5. Training Schedule and Implementation 21
Table 6. Reporting Requirements 23
Table 7. Required Record Keeping 23
Table 8. Treatment BMPs 25
Table 9. Erosion and Sediment Control BMPs 29
Table 10. Discharge Location Summary 30
Table 11. Sampling Location Summary 30
Table 12. Benchmarks and Sampling Requirements Applicable to All Facilities 31
Table 13. Discharge Monitoring Report Submission Dates 32

List of Figures

Figure 1. Vicinity Map 4
Figure 2. Site Plan 5

List of Appendices

Appendix A. Site and Civil Drawings
Appendix B. Training Log
Appendix C. Industrial Stormwater Monthly Inspection Report
Appendix D. Individual Industrial Stormwater Permit [reserved]
Appendix E. Permit Coverage Letter [reserved]
Appendix F. Sample Collection Sample Form
Appendix G. SWPPP Certification Form

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Executive Summary

This operations stormwater pollution prevention plan (SWPPP) has been prepared as part of the National Pollutant Discharge Elimination System (NPDES) stormwater permit requirements as issued by the Washington State Energy Facility Site Evaluation Council (EFSEC) for the Vancouver Energy project (Facility) in Vancouver, Washington. The site is located within the Port of Vancouver USA (Port) and consists of a total of 47.4 acres located in six distinct "areas," including the rail improvements. A vicinity map and a site map are shown in Figure 1 and Figure 2, respectively.

The site primarily consists of existing vacant or underutilized industrial land. A portion of the site is located within the northern portion of the former Evergreen/ALCOA aluminum smelter. The proposed project consists of the construction of a rail unloading facility, transfer pipelines, storage tanks, and vessel loading berth for the transloading of crude oil from rail to vessel. The Facility includes support buildings and structures such as administrative offices, access roads, employee parking and facilities, and the future West Boiler.

The purpose of this operations SWPPP is to describe the proposed Facility functions, structural best management practices (BMPs), operations BMPs, inspection/monitoring activities, and recordkeeping that will be implemented during the Facility operations. The objectives of the operations SWPPP are to

1. Protect existing water quality and comply with all required operations phase NPDES permits.
2. Identify activities that have the potential to cause surface water or groundwater contamination and the BMPs required to reduce, eliminate, or prevent contamination.

This operations SWPPP was prepared in reference to the Washington State Department of Ecology (Ecology) SWPPP template downloaded from the Ecology website on 23 December 2014. This operations SWPPP was prepared based upon the requirements of the NPDES Industrial Stormwater General Permit and Ecology's *2012 Stormwater Management Manual for Western Washington*.

The operations SWPPP is divided into six main sections with several appendices that include reference materials related to stormwater and how it will be handled on the site. The main sections describe the site and the proposed Facility. Discussions follow of each of the types of operations, and the structural BMPs that will be employed during the operation of the Facility. The operation SWPPP then discusses site inspections and monitoring and reporting and recordkeeping.

This SWPPP is implemented in association with the other following operational plans, which also implement BMPs that minimize or prevent the potential release of pollutants to stormwater.

- Facility Operations Manual
- Operations Spill Prevention Control and Countermeasures Plan
- Oil Spill Contingency Plan
- Facility Oil Handling Manual

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1. Essential Information

1.1 Facility Information

Facility Information	
Name of Facility:	Vancouver Energy
Site Address:	5501 NW Old Lower River Road
City, State, Zip Code	Vancouver, WA 98660
County:	Clark
SIC Code(s)	5171 Petroleum Bulk Stations and Terminals
Permit Number:	WAR (To Be Issued)
Latitude:	45° 39' 02" N
Longitude	122° 43' 41" W

1.2 Facility Contact Information

Facility Owner/Lessee	
Name:	Tesoro Savage Petroleum Terminal, LLC
Address:	901 W Legacy Center Way
City, State, Zip Code	Midvale, UT 94047
Telephone Number:	(801) 944-6600
Fax Number:	
Email Address:	
Property Owner	
Name:	Port of Vancouver USA
Address:	3103 NW Lower River Road
City, State, Zip Code	Vancouver, WA 98660
Telephone Number:	(360) 693-3611
Fax Number:	(360) 735-1565
Email Address:	info@portvanusa.com
Primary Operations SWPPP Contact	
Name:	TBD prior to Facility start/up and operations
Address:	
City, State, Zip Code	
Telephone Number:	
Fax Number:	
Email Address:	

1.3 Agency Information

Responsible Agency	
Name:	Energy Facility Site Evaluation Council
Address:	1300 South Evergreen Park Drive Southwest
City, State, Zip Code	Olympia, WA 98504-3172
Telephone Number:	(360) 664-1345
Fax Number:	
Email Address:	efsec@utc.wa.gov
Name:	Washington State Department of Ecology, Southwest Regional Office
Address:	300 Desmond Drive
City, State, Zip Code	Lacey, WA 98503
Telephone Number:	(360) 407-6300
Fax Number:	(360) 407-6305
Email Address:	
Name:	Washington State Department of Ecology, Vancouver Field Office
Address:	2108 Grand Boulevard
City, State, Zip Code	Vancouver, WA 98661-4622
Telephone Number:	(360) 690-7171
Fax Number:	
Email Address:	
Emergency Numbers	
General Emergency:	9-1-1
Port of Vancouver Security	(360) 992-1120
Ecology – to report a spill:	(360) 407-6300

1.4 Stormwater Pollution Prevention Team

Primary Operations SWPPP Contact	
Name:	TBD prior to Facility start/up and operations
Address:	
City, State, Zip Code	
Telephone Number:	
Fax Number:	
Email Address:	
Staff Name/Title	**Individual Responsibilities**
Name TBD, Terminal Manager	Daily terminal operations, signature authority, SWPPP development, maintenance, and modification
Name TBD, Terminal Environmental Manager	Monthly inspections, water quality monitoring, best management practices (BMPs) implementation
Name TBD, Marine Operations Manager	Daily marine loading operations, including pre-booming, management of person-in-charge, vessel loading safety, maintenance of spill response equipment and compliance with 40 CFR 112.
Testing Agency	Laboratory testing

2. Facility Description and Contact Information

2.1 Facility Information

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The site is approximately 47.4[1] acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 –Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude per day. Six nominal capacity 380,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move oil from Area 200 directly to Area 400. The Terminal is operated 24 hours a day, 7 days a week.

Facility site and civil plans are included as Appendix A. Each area of the proposed Facility is described in further detail below.

Most of the site is leased from the Port and is used exclusively by Tesoro Savage Petroleum Terminal LLC (the Applicant) for the operation of the Facility. The transfer pipelines and portions of the rail improvements are located on non-exclusive easements within the port.

The site is located in the SE 1/4 of Section 18, NW 1/4 of Section 19, and the NW and NE 1/4 of Section 20, Township 2 North, Range 1 East W.M.

This operations stormwater pollution prevention plan (SWPPP) describes the site conditions and industrial activities and enumerates the mitigation measures and best management practices (BMPs) that apply to each activity. The operations SWPPP has been prepared as part of the requirements for the National Pollutant Discharge Elimination System (NPDES) stormwater permit as issued by the Washington State Energy Facility Site Evaluation Council (EFSEC) for the Vancouver Energy project.

The Facility is developed in six "areas." Figure 2 is a site plan schematic that shows the site development plan, including the location on the site of each Facility area. Table 1 lists the six Facility areas and facilities and operations within each area are discussed in detail below.

[1] Previous information submitted to EFSEC indicated an approximate site acreage of 45 acres. The addition of 2.74 acres primarily occurs relative to an increase in the transfer pipeline corridor width in locations where ground surface is currently disturbed and already subject to industrial activity. This increase in acreage does not substantively modify the analysis of environmental impacts described in the Application for Site Certification Supplement as submitted to EFSEC in January 2014. However, to present accurate conditions in this operations SWPPP, the adjusted site acreage has been used herein, as well as in the construction SWPPP and Engineering Report submitted under separate cover. The Applicant also acknowledges that final Facility design will take into account actual permit conditions that are not available at this time; such conditions could also result in further adjustments to the final site boundary.

Figure 1 - Vicinity Map

LEGEND

- Project Boundary
- Vancouver_WA
- Portland,_Oregon

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

N

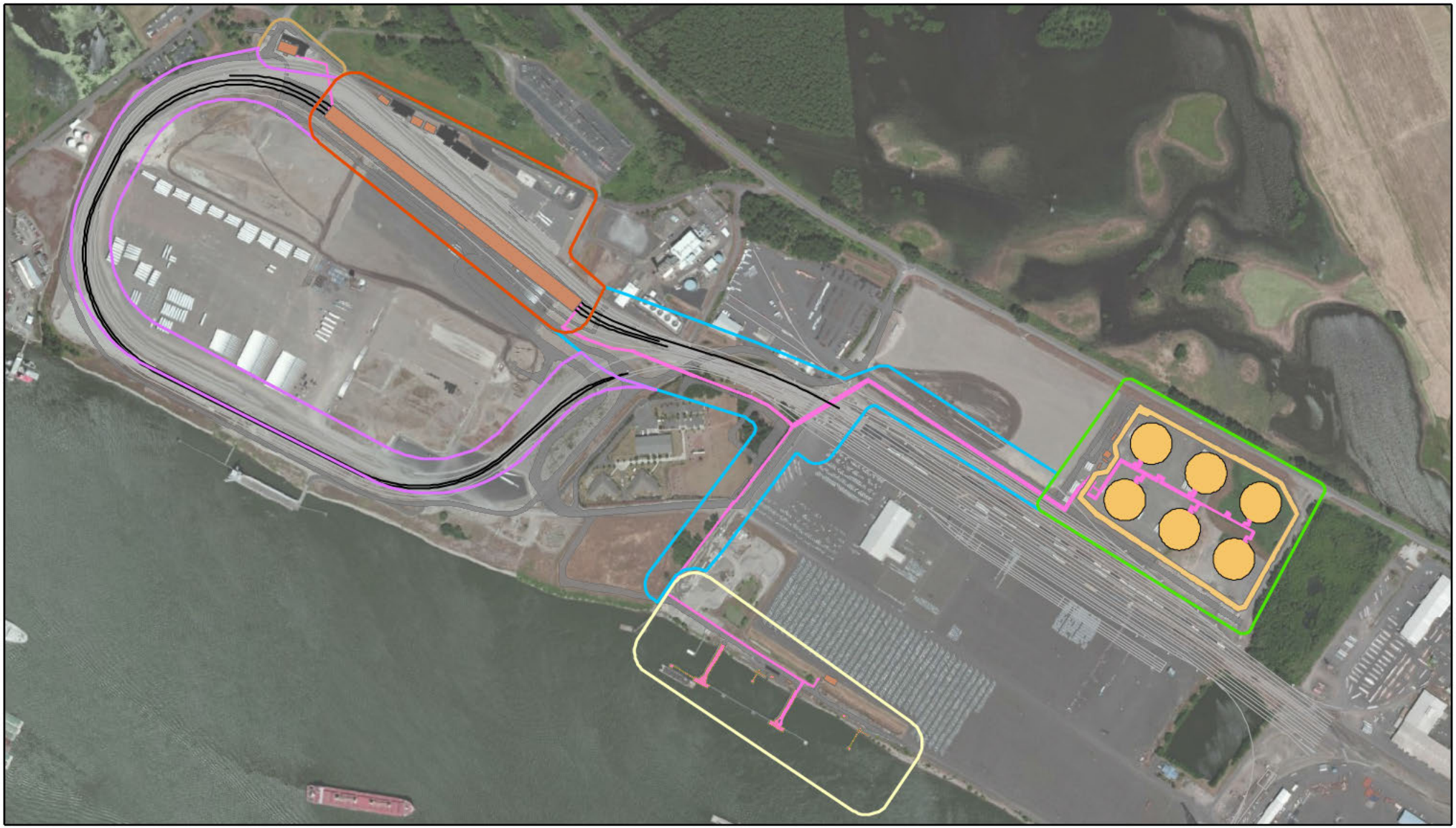

Figure 2 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000
Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

Table 1. Summary of Facility Areas

Facility Area	Project Elements	Acreage
200 – Unloading and Office	Unloading Facility Control Rooms/E-houses Fire Pump and Foam Building Admin/Support Buildings	7.8 Acres
300 – Storage	Crude Oil Storage Tanks Secondary Containment Berm Storage Building Pump Basin Control Room/E-house Fire Pump and Foam Building	20.8 Acres
400 – Marine Terminal	Marine Vessel Loading Hoses and Equipment Control Room/E-house Dock Safety Unit Marine Vapor Control Units (MVCU) Vapor Blower Skid Spill Prevention, Response, and Containment Equipment Dock Improvements Piping from Vessel Loading to MVCU	7.7 Acres
500 – Transfer Pipelines	Transfer Piping from Area 200 to Area 300 Transfer Piping from Area 300 to Area 400	4.9 Acres
600 – West Boiler	West Boiler Building Transfer Piping from Area 600 to Area 200	0.8 Acre
Rail Improvements	Rail Transportation Corridor	5.4 Acres
Total		47.4 Acres

3. Facility Assessment

3.1 Facility Description

3.1.1 Area 200 – Unloading and Office

The primary elements within Area 200 are the rail unloading facility and administrative/support buildings. The rail unloading facility is a covered structure through which the trains are pulled and secured for unloading. The structure is approximately 1,850 feet long by 91 feet wide with a maximum height of approximately 50 feet. The building structure is open on the north, west, and east sides, while the southern wall is partially enclosed with built segments acting as a weather break along the southern wall.

Each track includes 30 unloading stations for handling of crude oil. Each station will use a completely closed loop of piping to prevent by design any atmospheric contact with the crude oil during unloading. The entire 1,850 feet of the rail car unloading facility will include full coverage rail collection pans, and the interior ground surfaces are concrete to contain any accident releases as well as provide catchments for all stormwater that drips from rail cars or is blown into the rail unloading facility by the wind.

All mechanical piping will be located in concrete secondary containment trenches and the pump basins will be used for transferring product from the rail car unloading facility to Area 300 Storage will be in underground concrete basins. The collection piping from the rail drip pans and rail unloading facility floor

drains will also be located in these concrete trenches with discharge pumps located in the pump basins. Any water collected from within the rail unloading facility will be collected in these systems and pumped to two containment tanks located in the area of the administrative/support buildings. There is no connection to storm or sanitary sewer from within the rail unloading facility.

Several accessory structures and equipment pads will be located adjacent to the rail unloading facility. They include electrical houses (E-houses) control rooms, fire pump and foam building, electrical equipment pads, and mechanical equipment pads.

The administrative/support buildings are located north of the rail unloading facility adjacent to Old Lower River Road. This area consists of three proposed modular structures, parking, and associated landscaping. In addition, the containment tanks for discharges from the rail unloading facility are located near the parking lot. A pedestrian bridge is proposed to connect the administrative/support buildings to the rail unloading facility.

The project also includes associated utility extensions and relocations for communication, electrical, water service and sanitary sewer.

3.1.2 Area 300 – Storage

Area 300 is the location of six storage tanks and associated containment areas. In addition, the area includes a single pump basin used to transfer crude oil from the storage tanks to the Marine Terminal and associated support buildings and equipment pads.

Each of the aboveground storage tanks (AST) for storing crude oil includes a double-bottom and internal floating-roof. The tanks are approximately 48 feet in height and 240 feet in diameter and have a shell capacity of approximately 380,000 bbl each. Each tank can store a maximum of approximately 360,000 bbl of product, which accounts for the presence of the internal floating roof and the headspace required to allow product movement in the event of a seismic event.

An impervious liner system will be installed within the containment area to protect sub-surface native soils from any accidental discharge. The containment area includes an earthen perimeter berm approximately 6 feet in height sized to contain the release of an entire tank volume plus 10 percent and a 100-year rainfall event. Intermediate berms approximately 2 feet tall between each tank additionally segregate the containment area. This berm containment capacity reflects the most stringent of Washington spill prevention and control and National Fire Protection Association requirements.

Each tank will have a fixed roof to keep precipitation from reaching the inside of the tank and an internal floating roof to control vapor emissions from the tank to the atmosphere. The floating roof will be designed to avoid tipping during operations. The floating roof in the heated tanks will be equipped with a scraping device to maintain free movement of the roof in the event of wax buildup on the storage tank walls.

The double-bottomed tanks will include a leak detection system between the tank floors, and will be cathodically protected to prevent corrosion. The entire tank containment area will be lined with an impervious membrane to prevent any spills from leaving the containment area via the ground.

The support buildings, including a storage building, fire pump and foam building, E-houses, electrical pads, and mechanical pads, will be constructed outside the containment area on slab on grade footings. The pump basin will be isolated from the containment area by its concrete walls and basin that will serve as secondary containment.

The tank containment area will include a stormwater system segregated from the rest of the site. The system inside the containment area will include catch basins, structures, piping, control structures, and oil-water separators. All stormwater structures inside the containment area will be installed above the impervious membrane liner system. Visual confirmation that the water is free from oil or other

contamination will be required before stormwater could be discharged from the containment area into the storm drainage system.

Stormwater collected in the bottom of the berm will gravity-drain to the containment area control structure. The control structure will limit the flow from the containment area to two parallel oil-water separators. After visual inspection, stormwater will be pumped to the collection system for the remainder of Area 300. If the visual inspection identified oil products, the contaminated stormwater will be pumped to a vacuum truck, and the oily water will be disposed of off site at an authorized location.

A portion of the aboveground crude oil transfer piping is also installed within Area 300.

3.1.3 Area 400 – Marine Terminal

Crude oil is transferred from the Storage Area to the Marine Terminal.

High-velocity hoses will be used to transfer the crude oil from the piping system to the vessel being loaded. The high-velocity hoses will be connected to the grounding grid to protect from the buildup of static electricity. The loading system will incorporate automatic shutoff valves with a maximum 30-second shutoff time.

Facilities upland include fire pump and fire-fighting foam building, a combined control room and electrical house (E-house), marine vapor combustion units, and stormwater facilities, access roads and parking, and landscaping.

The face of the dock includes a containment area for the work areas, including all flanges and transfer hose areas. The containment area is sized to contain at least 3 bbl of volume within a steel- lined concrete-curbed area. The containment volume is based upon the total volume of liquid contained in the loading hoses as required by 33 CFR 154.530. Pedestrian walkways connect the dock to the dolphins and mooring points. The access trestle is a prefabricated steel deck with concrete infill.

Upland electrical gear and marine vapor combustion units are located on slab-on-grade foundations. The site includes a portion of the transfer pipelines, paved access roads and parking, and stormwater facilities.

One approximately 16- to 22-inch-diameter, 600-foot-long pipe will deliver hydrocarbon vapor captured during loading of marine vessels to the marine vapor control unit (MVCU).

3.1.4 Area 500 – Transfer Pipelines

A combination of above- and below-ground steel transfer pipelines convey crude oil from the rail unloading structure in Area 200 to the storage tanks in Area 300 and from the storage tanks to the marine vessel loading system in Area 400. Three pipelines, each 24 inches in diameter and approximately 5,500 feet long, will connect the rail car unloading facility to the storage tanks in Area 300; one of these pipes will be electrically heat-traced to keep the viscosity of the crude oil requiring heating is maintained while the oil is conveyed from the rail car unloading facility to the Storage Area.

A 36-inch-diameter, approximately 5,300-foot-long pipeline will connect the storage tanks with the marine vessel loading system in Area 400. An 8-inch-diameter pipeline will return crude oil from the marine vessel loading system to the storage tanks and serve as the return line for the pressure relief system to prevent pipe hammer.

Aboveground pipe sections will be supported on spread footings located every 20 to 25 feet. Vertical expansion loops will be located at key locations along the pipeline and supports for the expansion loops will also be on spread footings. Underground sections of the pipelines will be located in fully sealed, welded casing sections, and transition concrete vaults.

Most of the location of the transfer pipelines falls within non-exclusive lease area with the Port. The transfer pipelines will be located a minimum of 1 foot above the ground and in cleared and gravel-surface corridors to facilitate frequent inspection. Downstream catch basins and drainages will be retrofitted with spill control devices capable of capturing a minimum of 5 gallons of oil.

Piping is constructed of 836 Grade B low carbon steel welded pipe. Aboveground runs of piping will be supported so that the bottom of the piping will be approximately 1 foot minimum off the ground on vertical supports located every 20 to 25 feet. The vertical supports will be fixed on concrete foundations. Where multiple pipes are placed within the routing, the pipelines may be either laid side-to-side, or stacked. Expansion loops are constructed throughout the transfer pipeline runs to accommodate the thermal expansion of the pipelines.

At roads or rail crossings, the piping will be housed in underground steel casings or raised aboveground for standard American Railway Engineering and Maintenance-of-Way Association clearances. The casings will be sealed and leak detection will be incorporated within the casings. Runs of aboveground pipeline are single-walled, consistent with industry for ease of inspection and maintenance, and in accordance with the applicable requirements of Washington Administrative Code (WAC) 173-180-340 and 49 CFR 195.246 through 49 CFR 195.254.

The piping system and associated supports and foundations are grounded to protect against the buildup of static electricity during crude oil conveyance. Manual isolation valves will be located on the piping system at its exit from the rail car unloading facility and at its entrance to the Storage Area.

3.1.5 Area 600 – West Boiler

A boiler building, paved parking and access areas, aboveground steam and condensate piping, and site landscaping comprise the West Boiler Area. The building has a footprint of approximately 6,000 square feet and approximately 45 feet high. The building will house two primary and one standby natural gas-fired boilers, each with a capacity of 62 million British thermal units (MMBTU) per hour. The boilers will provide steam (two boilers operating) to heat the rail cars during unloading.

The boiler building, equipment pads, E-house, and pipeline supports all use slab on grade or spread footings. The stormwater system from Area 200 is extended to Area 600 for stormwater drainage.

3.1.6 Rail Improvements

One additional rail loops will be constructed on approximately 1.8 acres at Terminal 5. In addition, rail infrastructure will be added in the vicinity of the Area 200 rail unloading structure to facilitate the switching and departure of trains.

To support the staging of unit trains, the Facility will operate on two existing rail lines, each approximately 7,700 feet long. The track operated by the Facility consists of railroad ballast (rock), 115-pound hardened steel rails that are continuously welded and mounted on either 8-foot x 6-inch or 8-foot x 3-inch crossties, and other miscellaneous materials. Crossties are concrete for the most part, except at crossings where timber is used. The rails are be continuously welded to reduce noise and increase safety. The rail loops are be designed to comply with railroad and federal requirements.

The additional rail loop will be constructed when the Facility operations requires three rails of capacity or during the second phase of construction. Upon completion, the Facility will operate on three of the existing loop tracks on Terminal 5. At that time, the lease boundary and EFSEC jurisdictional boundary will be adjusted.

Maintenance activities necessary for rail transportation will be conducted on the rail spur located at the southeast corner of the rail unloading building. The maintenance activities for rail cars may include the following.

- Wheel replacement
- Wheel bearing maintenance, repairs, or replacement
- Brake shoe replacement
- Brake chains, boots, cylinder repairs and/or replacement
- Brake pipe
- Platform, running boards repairs and replacement
- Ladder repairs and replacement
- Manifold repairs and replacement
- Valve repairs and replacement
- Grab iron, hand hold, sill step repairs, and replacement
- Stenciling
- Head-shield repairs
- Hose replacement, hanger repair and replacement
- Truck inspection, repair, replacement
- Placard/holder repair and replacement
- Coupler repairs
- Tank testing
- Welding and plasma cutting
- Knuckle pins
- Cage chains, and
- Manifold replacement

Maintenance activities, in addition to those listed above, specific for the switching locomotives may occur on-site less frequently for repairs to

- Traction motors
- Main generators
- Prime mover
- Oil changes (performed within rail unloading building where track pans are installed)

Occasionally maintenance to the rail infrastructure will be necessary. Maintenance to the rail track may include:

- Welding
- Grinding
- Gas cutting
- Tamping of rail bed
- Regulating
- Placement and spreading rock/ballast
- Rail replacement

3.1.7 Regular Business Hours

The Facility operates 24 hours per day, 7 days per week, and 52 weeks per year.

3.1.8 General Layout

The general layout of the Facility is shown on Figure 2.

3.2 Industrial Activity, Materials Inventory, and Associated Pollutants

The entire project site was associated with previous industrial activities. Sites of the proposed Facility currently involved in industrial activities include the rail car unloading facility, tank farm, and dock area. The West Boiler, office and change rooms, and rail car unloading facility were previously on the site of the Evergreen/ALCOA aluminum plant. The former plant was dismantled and the site underwent extensive cleanup efforts in 2009 removing pollutants from the site. There are several deed restrictive environmental caps where known pollutants remain. These deed restrictive areas are shown in Figure 2.

Since the dismantling of the smelter, its site has been used to transfer and store materials from rail cars. Area 300 was formerly used to store dry material and cargo. Changes to the former site of the aluminum plant have been significant. New rail lines and underground utilities have been added and grading has been extensive.

Operations within the Facility will be limited to loading, unloading, storing, and transferring liquid crude oil. These operations are described below in more detail.

3.2.1 Area 200 – Unloading and Office

The rail car unloading facility is designed to receive and unload both non-heated pipeline quality crude oil unit trains and heated non-pipeline quality crude oil unit trains. Two of the unloading tracks will accommodate trains carrying pipeline quality crude oil that can be drained and conveyed without being heated; the third unloading track will accommodate trains carrying non-pipeline quality crude oil that needs to be heated prior to draining and conveying it to Area 300 for storage. It is expected that the Facility will receive an average of four unit trains per day.

The 30 unloading stations dedicated to heated non-pipeline quality crude oil unit trains will be equipped with steam connections to heat the crude oil to decrease its viscosity and allow it to flow more easily. Steam will be produced in the West Boiler in Area 600 and be piped to the rail unloading facility. Tank cars that receive steam will be fitted with permanent internal steam manifolds at the bottom of the car. Inlet steam hoses will be connected to each car to allow steam to circulate in the manifold, thereby warming the contents of the tank car. Steam condensate exiting the manifolds will be collected via condensate hoses, and piped back to the steam boilers in a closed loop system.

Unloading will be accomplished with a closed-loop system, i.e., the crude oil will be contained in an enclosed system from when it leaves the rail car to when it enters the storage tanks. During the unloading process, the crude oil will never be exposed to the atmosphere. Unloading hoses will be manually connected to the valves on the cars using dry fit connectors, one hose per tank car. Dry fit connectors are designed so that the crude oil in the hose cannot come into contact with the atmosphere. Each hose will be equipped with an automatic shutoff valve. Once the dry fit connector has been secured, the crude oil will gravity-drain from the cars to a collection header.

The collection header collects the flow from a grouping of six cars. The collection headers will be housed in underground trenches running parallel to the rail tracks. A single 9-foot-wide by 5-foot-deep trench will serve the two train tracks dedicated to non-heated crude oil unloading; a 9-foot-wide by 5-foot-deep trench will serve the single track dedicated to unloading heated crude oil. Although the primary purpose of the trench is to house the product collection lines, spill collection line, and electrical and data lines, the trench can also act as secondary containment if the collection and spill lines leak.

Each collection header will be directly connected to a dedicated pumping station, which will transfer the crude oil into a 24-inch-diameter transfer pipeline. One such pipeline will be installed per track, and will collect the flow from all five groupings of unloading stations on that track. As the crude oil flows from the offloading header to the pumping stations, it will pass through a basket strainer to remove solids. The pumping stations will monitor volumetric flow rate and crude oil density and contaminants (sediment and

water), and collect regular samples of the crude for analysis. The discharge of all five unloading pumping stations will be combined into one 24-inch-diameter transfer pipeline per track, which will convey the crude oil to the storage tanks in Area 300. This transfer pipeline is part of Area 500 and is described in detail below. There will be a total of two non-heated 24-inch transfer pipelines, one per track, from the unloading stations to the inlet manifold in Area 300. The discharge of the heated unloading pumping stations will be combined into a separate heat-traced, 24-inch transfer pipe to the heated inlet manifold in Area 300.

The collection headers will convey the crude oil to pumps that will pump the crude oil to one of three 24-inch pipelines that will convey the crude oil to the tanks in Area 300. The pumps will be housed in pump basins. Each of the five pump basins serving the non-heated unloading track will measure approximately 15 feet wide by 34 feet long and 15 feet deep. The five pump basins serving the track unloading non-pipeline quality crude oil will measure 10 feet wide by 34 feet long and 15 feet deep. Two pumps will serve each offloading header, with one acting as a primary and the second as an online spare on standby. During pumping, the crude oil will not come into contact with the vaults; however, the vaults are designed as secondary containment if the pumps or piping leak. The concrete trenches and pump vaults will be constructed watertight.

3.2.2 Area 300 – Storage

Crude oil will be pumped to and stored in the six storage tanks within the containment berm that surrounds Area 300. Two of the tanks will be equipped with electrically powered heating coils. These coils are sized to maintain temperature of the crude oil after it enters the tanks. Mixers in the tanks will keep the crude oil well mixed and keep any minor solids or water from separating out of solution. Water will not be drawn off from the bottom of the storage tanks.

The tanks will have sample ports to allow sampling and monitoring of the crude oil. The level of oil in the tanks will be controlled with telemetry systems. Additionally, a physical pump shutoff switch located on top of the floating roof will protect against overfill.

Crude oil stored in the tanks will be pumped to the dock for transfer to a marine vessel. Four variable speed pumps will pump the crude oil; three pumps will be in operation and one will be on standby. The pumps will be housed in the tank farm pump basin located on the west side of the Storage Area.

A small building at Area 300 will be used to store frequently needed spare parts and tools and the cleaners/solvents used for maintenance.

3.2.3 Area 400 – Marine Terminal

Crude oil will be loaded onto the marine vessels through transfer pipelines on the dock. Crude oil is pumped to Marine Terminal predominantly from Area 300 through steel transfer pipelines. The transfer pipeline delivers crude oil to two loading arms and high velocity hoses. The hoses are connected to a manifold system on the receiving vessel.

Generally, the marine vessels will arrive at the berth empty. While they are being loaded, vapors from the vessel tanks will be captured and routed to the marine vapor control unit where they are combusted to control the emissions released to the air. Piping from the dock will convey the vapors to the MVCUs. Depending on the selected method, this unit will consist of a 100- by 50-foot concrete slab housing equipment and up to eight 4-1/2-foot-diameter steel stacks approximately 30 feet in height.

3.2.4 Area 500 – Transfer Pipelines

The transfer pipelines described above will convey crude oil between the different areas. A prover will be installed immediately downstream of the rail unloading facility. The prover is used to verify that the

custody transfer coreolis meter is accurate. Valving will be installed near the old alignment of Gateway Avenue to allow the direct transfer of crude oils from the rail cars to a berthed vessel.

3.2.5 Areas 600 – West Boiler

Water circulates through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot boiler combustion gases and radiant heat transfer. Natural gas will be supplied to the boiler building from the existing pipeline serving the area. An existing gas line in Old Lower River Road will provide service to the site. Steam from the boilers will be delivered to the point of use via insulated pipelines. The gas-fired boiler may also provide steam to pipes and ancillary equipment and space heating.

3.2.6 Rail Improvements

The rail improvements will only transport crude oil by rail.

3.3 Materials and Pollutants

No materials or products will be stored outdoors. All crude oil within the Facility will be contained within rail cars, pipelines, and storage tanks. Fire-fighting foam and diesel fuel stored on site for the fire water pump engines will be contained within double-walled storage tanks located within the fire water pump skids. Small quantities of on-site dust or particulates may be generated by the impervious surfaces, including gravel surfacing. Miscellaneous operational cleaning supplies, solvents, and chemicals will be stored indoors, protected from stormwater. Some roof runoff will be routed directly to storm drain sewers, and all the remaining stormwater runoff will be routed through water quality treatment units. Table 2 below summarizes the Facility areas and the potential stormwater pollutants in each area.

On-site wastewater treatment and storage will occur at the following locations.

- West Boiler – Pretreatment of West Boiler blowdown prior to disposal to the municipal sanitary sewer. The treatment process is continuous and will not require storage for treated wastewater.
- Marine Vapor Combustion – During loading of crude oil into marine vessels, vapors expelled from the vessel cargo hold are directed to the MVCUs at the dock area; the MVCUs will combust the vapors prior to their discharge to the atmosphere. The MVCUs are not a continuous source of wastewater. Bottom drawoff from condensate will produce approximately 5 gallons of wastewater every few years. This wastewater will be collected by operations staff and discharged to the containment tanks located at the administrative/ support buildings.
- Rail Car Spill Containment – In the event of an accidental oil spill within the rail car unloading area, spilled oil will drain into the rail spill pans and, into secondary containment trenches that extend the full length of the rail car unloading building. Pumping systems will transfer spilled oil to aboveground containment tanks located adjacent to the parking lot by the office and change room facilities. Liquid in the containment tanks will be hauled off site for disposal at a licensed hazardous materials handling facility.
- Miscellaneous Parts Wash – A part washing station will be located within the rail unloading building. The equipment will be used to clean miscellaneous connection parts. Runoff from the part wash will be contributed to containment collection system and pumps connected to the containment tanks.
- Foam Fire Protection Systems – The unloading building, storage tanks, and Marine Terminal are equipped with foam retardant fire suppressing systems. Environmentally friendly foam (fluorosurfactant free) will be used for this Facility. This type of foam does not contain surfactants that persist and bioaccumulate in the environment. Fire pumps are operated weekly to confirm proper operation but no foam is discharged. When foam system is tested, any foam discharge will be collected and disposed off site.

Table 2. Industrial Activities and Potential Pollutants

Facility Areas, Industrial Activity, and Potential Sources of Pollutants	Project Elements	Likelihood of Contact with Stormwater (if yes, describe reason)
200 – Unloading and Office		
Crude Oil	Rail Unloading Area	None; rail cars, drainage header, pump basins, and transfer pipelines located within rail building
Fire Retardant	Fire Pump and Foam Building	None; double-walled AST located within fire pump and foam building
Diesel Fuel	Fire Pump and Foam Building	None; double-walled AST located within fire pump and foam building
Mineral Oil	Electrical Transformers	Leaks could be mobilized during precipitation events
Equipment Lubricants	Rail Unloading Area Air Compressor	None; valving and fittings located within rail building Leaks could be mobilized during precipitation events
Cleaners & Solvents	Unloading Area	None; indoor storage provided
Vehicle Parking & Maneuvering	Admin/Support Buildings - Parking & Drive Aisles	Vehicle leaks (gas, oil, and anti-freeze) and brake dust (zinc and copper) could be mobilized during precipitation events.
Rail Transportation	Unloading Building	None; located within structure; will be collected and hauled off site for disposal
300 – Storage		
Crude Oil	Storage Tanks	None; stored within double-bottomed AST with internal floating roof and fixed roof
Fire Retardant	Fire Pump and Foam Building	None; double-walled AST located within fire pump and foam building
Diesel Fuel	Fire Pump and Foam Building	None; Double-walled AST located within fire pump and foam building
Mineral Oil	Electrical Transformers	Leaks could be mobilized during precipitation events
Equipment Lubricants	Storage Building Air Compressor	None; indoor storage provided Leaks could be mobilized during precipitation events
Cleaners & Solvents	Storage Building	None; indoor storage provided
Vehicle Parking & Maneuvering	Parking and Driveway	Vehicle leaks (gas, oil, and anti-freeze) and brake dust (zinc and copper) could be mobilized during precipitation events.
400 – Marine Terminal		
Crude Oil	Transfer Pipelines	None; fully contained within transfer pipelines.
Fire Retardant	Fire Pump Building	None; double-walled AST located within fire pump building
Diesel Fuel	Fire Pump Building	None; double-walled AST located within fire pump building
Mineral Oil	Electrical Transformers	Leaks could be mobilized during precipitation events
Equipment Lubricants	Control Room/E-house Marine Vapor System	None; indoor storage provided Leaks could be mobilized during precipitation events
Cleaners & Solvents	Control Room/E-house	None; indoor storage provided

Facility Areas, Industrial Activity, and Potential Sources of Pollutants	Project Elements	Likelihood of Contact with Stormwater (if yes, describe reason)
Vehicle Parking & Maneuvering	Parking and Driveway	Vehicle leaks (gas, oil, and anti-freeze) and brake dust (zinc and copper) could be mobilized during precipitation events.
500 – Transfer Pipelines		
Crude Oil	Transfer Pipelines	None; fully contained within transfer pipelines
600 – West Boiler		
Equipment Lubricants	Boiler Building Air Compressor	None; indoor storage provided Leaks could be mobilized during precipitation events
Cleaners & Solvents	Boiler Building	None; indoor storage provided
Boiler Additives & Treatment	Boiler Building	None; indoor storage provided
Vehicle Parking & Maneuvering	Parking and Driveway	Vehicle leaks (gas, oil, and anti-freeze) and brake dust (zinc and copper) could be mobilized during precipitation events.
Rail Improvements		
Rail Transportation	Terminal 5 Loop Track	Rail transportation leaks (lubricants, oil, fuel, anti-freeze) and brake dust (zinc and copper) could be mobilized during precipitation events

3.4 Spills and Leaks

Terminal operations do not use a significant of amount of liquid fuels, lubricants, cleaners, solvents, boiler additives, or other hazardous substances that could contribute significant volumes to the stormwater system. Where sources of crude oil could contribute to the stormwater system, containment and monitoring measures will be installed. Table 3 summarizes the Facility areas and downstream outfalls.

Table 3. Facility Areas Where Potential Spills/Leaks Could Occur

Location	Outfalls
200 – Unloading and Office	Terminal 5 Outfall
300 – Storage	Terminal 4 Outfall
400 – Marine Terminal	Bio-infiltration Swales
500 – Transfer Pipelines	Terminal 4 and Terminal 5 Outfalls
600 – West Boiler	Terminal 5 Outfall
Rail Improvements	NA

Table 4 summarizes the potential stormwater pollutants and the likelihood of the pollutant being present in stormwater discharges from the Facility.

Table 4. Potential Stormwater Pollutants, Sources, and Likelihood

Potential Stormwater Pollutant	Pollutant Sources	Likelihood of Pollutant Being Present in Stormwater Discharge
Crude Oil	Rail Cars, Transfer Pipelines, & Storage Tanks	Not likely; crude oil unloading operations fully contained within protective building, pipelines constructed to meet all industry and agency standards for safety, and storage tanks fully contained within protective containment berm
Diesel Fuel	Three 500-Gal Double-Walled ASTs	Not likely; AST located within fire pump building
Fire Foam	Three 1,000-Gal Double-Walled ASTs	Not likely; AST located within fire pump building

Potential Stormwater Pollutant	Pollutant Sources	Likelihood of Pollutant Being Present in Stormwater Discharge
Mineral Oil	Electric Transformers	Not likely; transformers located on concrete pads to facilitate inspection and maintenance
Equipment Lubricants	Indoor Storage, Air Compressors, & MVCUs	Not likely; indoor storage provided; equipment located on concrete pads to facilitate inspection and maintenance
Cleaners and Solvents	Indoor Storage	Not likely; indoor storage provided
Boiler Additives	Indoor Storage	Not likely; indoor storage provided
Leaks and Drips	Parking, Driveway, & Rail Corridor	Not likely; vehicle areas considered low volume; rail transportation corridor unchanged from existing condition
Turbidity and Suspended Solids	Gravel Industrial Yard Areas	Not likely; foot traffic only; vehicle areas used only for required maintenance

4. Best Management Practices

4.1 Operational Source Control BMPs

4.1.1 Good Housekeeping

- Vacuum paved surfaces with a vacuum sweeper (or a sweeper with a vacuum appendix) to remove accumulated pollutants a minimum of once per quarter.
- Identify and control all on-site sources of dust to minimize stormwater contamination from the deposition of dust on areas exposed to precipitation.
- Keep all dumpsters under cover or fit with a lid that must remain closed when not in use.

4.1.2 Docks and Vessels

- Clean regularly all accessible work, service, and storage areas to remove debris and any other potential stormwater pollutants.
- Sweep rather than hose debris on the dock. If hosing is unavoidable, collect the hose water and convey it to treatment.
- Dispose of greasy rags and degreasers properly in trash receptacles. Trash will be hauled daily from the Marine Terminal to the Admin/Support areas for disposal in the dumpsters.
- Immediately repair or replace leaking connections, valves, pipes, hoses, and equipment that causes the contamination of stormwater.
- Use drip pans, drop cloths, tarpaulins, or other protective devices in all paint mixing and solvent operations unless carried out in impervious contained and covered areas.
- Prohibit uncontained spray painting, blasting, or sanding activities over open water.
- Do not dump or pour waste materials down floor drains, sinks, or outdoor storm drain inlets that discharge to surface water. Plug floor drains that are connected to storm drains or to surface water. If necessary, install a sump that is pumped regularly.
- Prohibit outside spray painting, blasting, or sanding activities during windy conditions that render containment ineffective.
- Do not burn paint and/or use spray guns on topsides or above decks.
- Immediately clean up any spillage on dock, boat, or ship deck areas and dispose of the wastes properly.
- Implement BMPs and operational measures described in the Facility Oil Spill Contingency Plan and Facility Oil Handling Operations Manual. In the event of an accidental discharge of oil or hazardous material into waters of the state or onto land with a potential for entry into state waters, immediately notify Facility management, the Port, EFSEC, Washington State Department of Ecology (Ecology), and the National Response Center at 1-800-424-8802 (24-hour). If the spill can reach or has reached marine water, call the U.S. Coast Guard at (206) 217-6232.

4.1.3 Landscaping and Lawn/Vegetation Management

4.1.3.1 Landscaping

- Landscape and soil installed outside cap limits will be engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.
- Vegetation and clippings collected as a result of landscape vegetation maintenances will not be disposed of into waterways or storm drainage systems.

4.1.3.2 Pesticides

- Pesticide use will be restricted to use as a last resort and will consider the following steps to treat pest infestations:

  Step 1: Correctly identify problem pests and understand their life cycle.

  Step 2: Establish tolerance thresholds for pests.

  Step 3: Monitor to detect and prevent pest problems.

  Step 4: Modify the maintenance program to promote healthy plants and discourage pests.

  Step 5: Use cultural, physical, mechanical, or biological controls first if pests exceed the tolerance thresholds.

  Step 6: Evaluate and record the effectiveness of the control and modify maintenance practices to support lawn or landscape recovery and prevent recurrence.
- Choose the least toxic pesticide available that is capable of reducing the infestation to acceptable levels. The pesticide should degrade readily in the environment and/or have properties that strongly bind it to the soil. Any pest control used should be conducted at the life stage when the pest is most vulnerable. For example, if it is necessary to use a *Bacillus thuringiens* as application to control tent caterpillars, it must be applied before the caterpillars cocoon or it will be ineffective. Any method used should be site-specific and not used wholesale over a wide area.
- Apply the pesticide according to label directions. Under no conditions will pesticides be applied in quantities that exceed manufacturer's instructions.
- Mix the pesticides and clean the application equipment in an area where accidental spills will not enter surface or ground waters, and will not contaminate the soil.
- Store pesticides in enclosed areas or in covered impervious containment. Maintain that pesticide contaminated stormwater or spills/leaks of pesticides are not discharged to storm drains. Do not hose down the paved areas to a storm drain or conveyance ditch. Store and maintain appropriate spill cleanup materials in a location known to all near the storage area.
- Clean up any spilled pesticides and keep any pesticide contaminated waste materials are kept in designated covered and contained areas.
- The pesticide application equipment must be capable of immediate shutoff in the event of an emergency.
- Do not spray pesticides within 100 feet of open waters (including wetlands, ponds, and streams), sloughs, or any drainage ditch or channel that leads to open water except when approved by Ecology or the local jurisdiction. All sensitive areas, including wells, creeks, and wetlands, must be flagged prior to spraying.
- If public notification is required by the local jurisdiction or by Ecology, complete public posting of the area to be sprayed prior to the application.
- Conduct spray applications only during weather conditions as specified in the label direction and applicable local and state regulations. Do not apply during rain or immediately before expected rain.

4.1.3.3 Vegetation Management

- Use at least an 8-inch "topsoil" layer with at least 8 percent organic matter to provide a sufficient vegetation-growing medium. Amending existing landscapes and turf systems by increasing the percent organic matter and depth of topsoil can substantially improve the permeability of the soil and the disease and drought resistance of the vegetation, and reduce fertilizer demand. This reduces the demand for fertilizers, herbicides, and pesticides. Organic matter is the least water-soluble form of nutrients that can be added to the soil. Composted organic matter generally releases only between 2 and 10 percent of its total nitrogen annually, and this release corresponds closely to the plant growth cycle. If natural plant debris and mulch are returned to the soil, this system can continue recycling nutrients indefinitely.
- Select the appropriate turfgrass mixture for the climate and soil type. Certain tall fescues and rye grasses resist insect attack because the symbiotic endophytic fungi found naturally in their tissues repel or kill common leaf and stem-eating lawn insects. They do not, however, repel root-feeding lawn pests, such as crane fly larvae, and are

toxic to ruminants, such as cattle and sheep. The fungus causes no known adverse effects to the host plant or to humans.

- Use the following seeding and planting BMPs, or equivalent BMPs, to obtain information on grass mixtures, temporary and permanent seeding procedures, maintenance of a recently planted area, and fertilizer application rates: temporary seeding, mulching and matting, clear plastic covering, permanent seeding and planting, and sodding as described in Volume II of the stormwater manual.
- Desired plant species can be selected by adjusting the soil properties of the subject site.

4.1.3.4 Irrigation

- Landscape irrigation is provided to new trees, shrubs, and ground cover plantings to accelerate plant establishment and to provide supplemental water for plant maintenance. Irrigation is important during the establishment period to maximize plant survival and encourage strong root development during the formative years. The plantings are native and drought tolerant to minimize irrigation demand. Native seed areas are established and maintained with seasonal rainfall and irrigation beyond established is not necessary. Irrigation at the site is a combination of efficient overhead rotary spray and point-source drip irrigation to promote plant growth, maximize water efficiency, and minimize maintenance. Water is sourced from a municipal water supply and an automatic irrigation control system will control the irrigation zones and includes sensors to turn off the system when weather conditions dictate.

4.1.3.5 Fertilizer Management

- Top soil and amendments provides a proper growing medium, nutrients for plant growth, improve soil structure and improve water retention. The correct application of soil amendments and fertilizer promotes plant growth and survival. Exact fertilization and soil amendment application rates will be based on the recommendations provided by the testing laboratory. Three inches of organic bark mulch is maintained over planting beds to increase water retention, provide nutrients and provide weed control.

4.1.4 Loading and Unloading Areas for Liquid Material

4.1.4.1 All Loading/Unloading Areas

- Place drip pans, or another appropriate temporary containment device, at locations where leaks or spills may occur, such as hose connections, hose reels, and filler nozzles. Drip pans must always be used when making and breaking connections. Check loading/unloading equipment such as valves, pumps, flanges, and connections regularly for leaks and repair them as needed.

4.1.4.2 Rail Transfer Areas to Storage Tanks

- Implement the Facility Operations Manual
- Report spills of reportable quantities as described in section 1.3
- Prepare and implement the Facility Oil Spill Contingency Plan
- Install a containment pan system within the rails to collect spills/leaks from tank cars and hose connections, hose reels, and filler nozzles

4.1.4.3 Loading/Unloading from/to Marine Vessels

- Facilities and procedures for the loading of crude oil must comply with measures described in the Oil Spill Contingency Plan and the Operations Facility Oil Handling Manual.

4.1.4.4 Transfer of Small Quantities from Tanks

- Refer to section 4.1.12 for BMPs for the storage of liquids in permanent aboveground tanks, and section 4.2.2 for BMPs for storage of liquid or dangerous waste containers, for requirements on the transfer of small quantities from tanks and containers, respectively.

4.1.5 Maintenance of Utility Corridors and Facilities

- Within transfer pipeline corridors, surfacing will be gravel to prevent the erosion of soil.
- Stormwater will be conveyed through rail/roadside ditches and culverts. The adjacent road is crowned and utility corridor and access roads are shed sections to sheet flow runoff to existing port stormwater systems. The corridors will be appropriately maintained and grassy roadside ditches discharging to surface waters is an effective way of removing some pollutants associated with sediments carried by stormwater.

- Maintain any adjacent ditches.

4.1.6 Maintenance of Stormwater Drainage and Treatment Systems

- Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed or directed in this plan, and determine whether improvements in operations and maintenance are needed.
- Promptly repair any deterioration threatening the structural integrity of the Facility or its components. These include replacing clean-out gates, catch basin lids, and rock in emergency spillways.
- Verify that storm sewer capacities are not exceeded and that heavy sediment discharges to the sewer system are prevented.
- Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc., and truck it to a disposal site approved by the local or state government.
- Clean catch basins when the depth of deposits reaches 60 percent of the sump depth as measured from the bottom of basin to the invert of the lowest pipe into or out of the basin. However, in no case should there be less than 6 inches clearance from the debris surface to the invert of the lowest pipe.
- Clean woody debris in a catch basin as frequently as needed to maintain proper operation of the catch basin.
- Post warning signs that say “Dump No Waste - Drains to Surface Water” or emboss this wording on or adjacent to all storm drain inlets where practical.
- Disposal of sediments and liquids from the catch basins must comply with “Recommendations for Management of Street Wastes” described in Appendix IV-G of the stormwater manual.
- Operational source control BMPs for soil erosion and sediment control at industrial sites can be found in section 4.1.10, for storage of liquid in section 4.1.11, for spills of oil and hazardous substances in section 4.1.16, and for illicit connections to storm drains in section 4.1.17.

4.1.7 Parking and Storage of Vehicles and Equipment

- Do not hose down the area to a storm drain or to a receiving water. Sweep parking lots, storage areas, and driveways regularly to collect dirt, waste, and debris.

4.1.8 Railroad Yards

- Do not discharge to outside areas from toilets while a train is in transit. Use designated off-site pumpout facilities to service these units.
- During liquid transfer, use drip pans at hose/pipe connections and other leak-prone areas.

4.1.9 Roof/Building Drains at Manufacturing and Commercial Buildings

- If a roof/building stormwater pollutant source is identified, implement appropriate source control measures, such as air pollution control equipment, selection of materials, painting galvanized surfaces, operational changes, material recycle, process changes, etc.

4.1.10 Soil Erosion and Sediment Control at Industrial Sites

- Maintain gravel surfacing in the rail yard areas. Where existing surfacing is exposed, replace it with gravel surfacing or equal to prevent soil erosion.

4.1.11 Storage of Liquid

- Place drip pans beneath all mounted container taps and at all potential drip and spill locations during filling and unloading of containers.
- Inspect tanks or container storage areas regularly for corrosion, structural failure, spills, leaks, overfills, and failure of piping systems. Check containers daily for leaks/spills. Replace containers, and replace and tighten bungs in drums as needed.
- Keep all liquid storage within closed and locked storage areas and buildings.
- Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code.
- Cover dumpsters, or keep them under cover such as a lean-to, to prevent the entry of stormwater. Replace or repair leaking garbage dumpsters.

- Maintain lids on dumpsters in closed position. Schedule regular pick up so dumpster lids do not become propped open.

4.1.12 Storage of Liquids in Permanent Aboveground Tanks

- Inspect the tank containment areas regularly to identify problem components such as fittings, pipe connections, and valves for leaks/spills, cracks, corrosion, etc.
- Place adequately sized drip pans beneath all mounted taps and drip/spill locations during filling/ unloading of tanks. Valved drain tubing may be needed in mounted drip pans.
- Pick up trash, debris and other deleterious material.
- Repair tanks that are leaking, corroded, or otherwise deteriorating.
- All installations must comply with the API, Uniform Fire Code, and the National Electric Code.

4.1.13 Washing and Steam Cleaning Vehicles/Equipment/Building Structures

- Wash vehicles at an off-site commercial washing facility where the washing occurs in an enclosure and drains to the sanitary sewer.
- Wash miscellaneous parts/equipment within the rail unloading facility at a designated location which drains to containment storage for haul off.

4.1.14 Preventive Maintenance:

The preventive maintenance program includes (1) regular inspection and maintenance of stormwater management system BMPs and (2) routine inspection of vehicles and machinery/equipment, transfer pipelines, vessel loading systems, air compressors and electrical equipment.

The following additional preventive BMPs are implemented at Vancouver Energy.

- All crude handling facilities are inspected and maintained in accordance with API standards.
- Catch basins will be inspected monthly and cleaned at a minimum quarterly by collecting any accumulated debris or sediments from the catch basin and surrounding areas.
- Catch basin filters will be inspected monthly or after storm events greater than 1 inch of rainfall. Catch basin insert filters will be replaced when the filter capacity is reduced by 60 percent or at least annually.
- Place catch basin solids in a dumpster and dispose as solid waste.
- Water quality filters and oil-water separators will be inspected monthly during the wet weather season, and quarterly during the dry season. Systems will be fully cleaned and media changed at a minimum frequency of once per year or as recommended by the maintenance vendor.
- Promptly repair any deterioration threatening the structural integrity of the stormwater facilities.
- Inspect ponds for accumulation of sediments and debris which reduce overall storage and treatment volumes.
- Inspect all equipment and vehicles monthly for leaking fluids, such as oil, antifreeze, lubricants, hydraulic fluid etc. Take leaking equipment and vehicles out of service or prevent leaks from spilling on the ground until they are repaired.
- Immediately clean up spills and leaks (e.g., using absorbents, vacuuming, etc.) to prevent the discharge of pollutants.

4.1.15 Spill Prevention and Emergency Cleanup

Implement the provisions of the operations spill prevention, control, and countermeasures plan (SPCCP) and Oil Spill Contingency Plan.

4.1.16 BMPs for Spills of Oil and Hazardous Substances

- Implement the provision of the Facility Operations SPCCP and an Oil Spill Contingency Plan.
- Locate emergency spill containment and cleanup kit(s) in each facility area and where transfers of liquids. The contents of the kit must be appropriate for the type and quantities of chemical liquids stored at the Facility.

4.1.17 Illicit Connections to Storm Drains

Water from washing vehicles or equipment, steam cleaning and/or pressure washing is considered process wastewater. The Permittee must not allow this process wastewater to comingle with stormwater or enter storm drains; and must collect in a tank for off-site disposal, or discharge it to a sanitary sewer, with written approval from the local sewage authority.

During each monthly site inspection, look for signs of illicit discharges, especially during dry weather when stormwater is not discharging from the site. Each monthly site inspection will include the following.

- Observations made at stormwater sampling locations and areas where stormwater associated with industrial activity is discharged off site, or discharged to waters of the state, or to a storm sewer system that drains to waters of the state.
- Observations for the presence of floating materials, visible oil sheen, discoloration, turbidity, odor, etc. in the stormwater discharge(s).
- Observations for the presence of illicit discharges, such as domestic wastewater, noncontact cooling water, or process wastewater (including leachate).
- If an illicit discharge is discovered, Vancouver Energy will notify Ecology within 7 days, as required.
- Ecology requires the permittee to eliminate the illicit discharge within 30 days.

4.1.18 Employee Training

Vancouver Energy trains employees responsible for overseeing and maintaining the activities described in this document consistent with this section. Training will be conducted by qualified personnel once per year and will typically involve an on-site meeting and a tour of the Facility. Table 5 summarizes the training topics, Vancouver Energy staff to be trained, and the frequency of trainings. A training log (Appendix B) that identifies the date and a summary of the training, any special issues or events discussed, and names and titles of the staff members in attendance will be maintained at the Facility. The training identified below can be combined with training associated with other spill prevention and preparedness activities at the Facility.

Table 5. Training Schedule and Implementation

Training Topics	Brief Description of Training Program/Materials	Schedule for Training (Dates)
All Site Employees		
NPDES Permit	Summarize the purpose and intent of the NPDES program and the role of the SWPPP Provide site map of key stormwater features, including catch basin and outfall locations Highlight how employees are key to SWPPP compliance and prevention of stormwater contamination	Once per year
Spill Prevention and Response	Present and explain spill prevention Describe spill response procedures Give examples of spills and responses needed	Once per year
Good Housekeeping	Demonstrate acceptable procedures	Once per year
Maintenance Requirements	Present and explain maintenance procedures for stormwater and spill control facilities	Once per year
Material Management Practices	Discuss labeling (hazardous and nonhazardous) Discuss grain handling practices Discuss proper fueling practices	Once per year

Training Topics	Brief Description of Training Program/Materials	Schedule for Training (Dates)
SWPPP Team		
SWPPP Implementation	Discuss elements of the SWPPP Discuss results of quarterly inspections Discuss possible recommendations	Once per quarter
Monitoring Procedures	Discuss sampling location and procedures	Once per year
Special Issues	Results of any Ecology inspections Level 1, 2, or 3 responses complete Specific maintenance issues Specific incidents/spills and response taken	Once per quarter as needed

4.1.19 Inspections, Reporting, and Recordkeeping

4.1.19.1 Site Inspections

Qualified Vancouver Energy SWPPP team members who are familiar with the SWPPP and the requirements of the NPDES permit will be assigned to conduct monthly visual inspections. Inspections will be conducted separately from typical day-to-day terminal responsibilities.

The following inspection procedure will be followed.

1. Obtain a copy of the inspection checklist (Appendix C).
2. Enter the inspection date and the inspector's name.
3. Conduct visual observations of all the items identified in the checklist. Check off each of the items listed as the inspection is completed. Make an appropriate check as to whether the observation is in compliance with the SWPPP. In the notes section, note any observations along with the identification of any necessary follow-up tasks, such as any maintenance activity that needs to be conducted.
4. If a violation is found that cannot be corrected immediately, such as those requiring replacement parts that are not available or capital improvements, or a need for engineered controls is identified, note the recommended corrective action on the inspection form and discuss it with the Vancouver Energy manager.
5. When recommended actions have been completed, indicate the date that the areas for corrective actions was addressed.
6. Sign and date the completed inspection form and place it within the inspection notebook maintained at the Facility. In addition, take a scan of the inspection form and store it electronically.

4.1.19.2 Reporting

Vancouver Energy SWPPP team personnel will file all required reports with EFSEC and any state or local agencies designated by EFSEC. Table 6 lists the necessary reports, their frequency, and due date. All reports must be signed by a corporate officer of at least the level of vice president or other Vancouver Energy staff member responsible for the overall operation of or environmental matters at the terminal.

Table 6. Reporting Requirements

Report	Frequency	Due Date	Format
DMRs	Quarterly	Within 45 days of the end of the quarter (May 15, Aug 15, Nov 14, Feb 14)	Ecology online submittal
Annual Report	Yearly	May 15	Ecology-provided
SWPPP	If requested by Ecology	Within 14 days of request	Document from Vancouver Energy
Noncompliance Notification	As necessary	Within 30 days of event that triggers the notice.	Written report with the description, date, and time of event; corrective actions and date and additional steps taken to reduce, eliminate, and prevent reoccurrence.

If changes to the Facility will result in different or increased pollutants, if new industrial activity is added, or if stormwater volumes increase by 25 percent or more, a "Request Modification of Permit Coverage" will be submitted to Ecology.

4.1.19.3 Record Keeping

The Vancouver Energy SWPPP team will maintain paper and electronic copies of the records as indicated in Table 7.

Table 7. Required Record Keeping

Report/Record	Notes
Individual Industrial Stormwater Permit	As issued by EFSEC (included as Appendix D to this document).
SWPPP	As amended. Must be made available to the public upon written request.
Original Sampling Records	Include field notes and laboratory results. See section 5.3 for details.
Discharge Monitoring Reports	As provided to EFSEC on a quarterly basis.
Annual Report	As provided to EFSEC
Inspection Reports	As completed (see Appendix C for template).
BMP Maintenance Records	Sections 4.2 through 4.5 identify applicable BMPs with maintenance requirements.
Corrective Action	Documentation of Level One, Two, or Three corrective actions taken in response to exceeding benchmark values for discharge.

4.1.20 Illicit Discharges

The Vancouver Energy Terminal will not conduct activities that will result in discharge of process wastewater, domestic wastewater, cooling water, or other prohibited discharges to the stormwater system or to surface waters and groundwaters of the state that have not been approved under the Site Certification Agreement or permits attached there-to.

Signs of illicit discharges will be monitored during monthly site inspections to verify that illicit discharges do not occur, especially during dry weather when stormwater is not discharging from the site.

Each monthly site inspection will include the following.

- Observations made at stormwater sampling locations and areas where stormwater associated with industrial activity is discharged off site, or discharged to waters of the state, or to a storm sewer system that drains to waters of the state.
- Observations for the presence of floating materials, visible oil sheen, discoloration, turbidity, odor, etc., in the stormwater discharge(s).

- Observations for the presence of illicit discharges such as domestic wastewater, noncontact cooling water, or process wastewater (including leachate).
- If an illicit discharge is discovered, Vancouver Energy will notify EFSEC within 7 days and implement appropriate corrective actions in accordance with the Facility NPDES stormwater permit.

4.2 Structural Source Control BMPs

Mandatory structural source control BMPs required by Condition S3 of the Industrial Stormwater General Permit include the following.

- Provide a containment berm around the storage tanks capable of containing 110 percent of the largest tank plus a 100-year stormwater event.
- Contain the rail unloading facility fully within a rain sheltering structure complete with rail drip pans, containment trenches, spill evacuation pumps, and a curbed exterior capable of containing 110 percent of the largest design rail car.
- Complete miscellaneous part cleaning within the rail unloading building in an area designed to collect wash water and pumping it to the containment tanks for haul off.
- Drain all wash water to a collection system that directs the washwater to containment tanks for haul off by licensed disposal companies for treatment and discharge.

4.2.1 Loading and Unloading Areas for Liquid Material

4.2.1.1 All Loading/Unloading Areas

- Consistent with UFC requirements (Appendix IV-D R.2) and to the extent practicable, all unloading is will be conducted within a covered building to isolate stormwater.
- Use hoses and hard piping during loading operations to maintain no exposure to the atmosphere.
- Unloading area/building to prevent run-on of stormwater and to direct any runoff or spills in the area to the interior containment systems.
- Conduct the loading operations at the berth in an area fully encompassed by containment curbing. Containment area slopes to inlets that drains system to upland treatment BMPs.

4.2.2 Storage of Liquid or Dangerous Waste Containers

- Containers with liquid or dangerous waste will be stored inside the rail unloading facility, the storage building, or at the E-house, or control room at the Marine Terminal unless this is impracticable because of site constraints or UFC requirements.
- Store containers in a designated area, which is covered, bermed or diked, paved and impervious in order to contain leaks and spills. Slope the secondary containment to drain into a dead-end sump for the collection of leaks and small spills.
- Store liquid wastes in containers within the rail unloading facility, storage building, containment area, or at the E-house/control room at the Marine Terminal. Where material is temporarily stored in drums, use a containment system in lieu of the above system.
- Place containers mounted for direct removal of a liquid chemical for use by employees inside a containment area as described above. Use a drip pan during liquid transfer.

4.2.3 Storage of Liquids in Permanent Aboveground Tanks

- Permanent tanks will be located in impervious secondary containment surrounded by dike or UL-approved double-walled. The containment berm will be designed to provide a containment volume of 110 percent of the largest tank plus the 100-year storm event.
- Each of the six crude oil tanks will be located in an intermediate berm and is sloped to a sump for the collection of small spills.
- Tank overfill protection, including level control and physical shut-off switches, will be provided to minimize the risk of spillage during loading.
- Diesel fuel and fire suppression foam will be stored in double-walled storage tanks located in the Fire Foam Buildings.

4.3 Treatment BMPs

Table 8 lists BMPs employed on site to treat stormwater to remove pollutants prior to discharge of stormwater off site.

Table 8. Treatment BMPs

Structure:	Coalescing Plate Separator Bay
Date of Implementation:	2016
Discharge Point:	Area 300 – Containment Control Structure
Area(s) Treated:	Area 300 – Containment Area
Pollutants Removed:	Oil
Maintenance Requirement(s):	**Frequency or Conditions When Maintenance is Needed:**
Regular inspections	Inspect oil/water separators monthly during wet season and immediately after storm events ≥ 1 inch per 24 hours.
Clean accumulated oil	Cleaning must occur before October 15 to remove material accumulated during dry season, or when oil thickness reaches 1 inch.
Remove accumulated sludge	Cleaning must occur before October 15 to remove material accumulated during dry season, or when sludge reaches 6 inches.
Remove trash and debris from inlet and outlet pipes	When trash and debris in any inlet or outlet pipe blocks more than 1/3 of its height.
Inspect the basin walls/bottom for fractures or cracks	If maintenance personnel determine the structure is unsound, replace or repair basin to design standards.
Inspect grout	When a grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks. Pipe should be regrouted and secure at basin wall.
Inspect for settlement/misalignment	Maintenance is required if failure of basin has created a safety, function, or design problem. Basin should be replaced or repaired to design standards.
Remove vegetation blocking opening to basin	When vegetation is growing across and blocks more than 10% of the basin opening.
Remove vegetation at inlet/ outlet pipe joints	When vegetation is growing in inlet/outlet pipe joints and is more than 6 inches tall and less than 6 inches apart.

Structure:	API (Baffle Type) Separator Bay
Date of Implementation:	2016
Discharge Point:	Area 300 – Containment Coalescing Plate Separatory Bay
Area(s) Treated:	Area 300 – Containment Area
Pollutants Removed:	Oil
Maintenance Requirement(s):	**Frequency or Conditions When Maintenance is Needed:**
Regular inspections	Inspect oil/water separators monthly during wet season and immediately after storm events ≥ 1 inch per 24 hours.
Clean accumulated oil	Cleaning must occur before October 15 to remove material accumulated during dry season, or when oil thickness reaches 1 inch.
Remove accumulated sludge	Cleaning must occur before October 15 to remove material accumulated during dry season, or when sludge reaches 6 inches.

Remove trash and debris from inlet and outlet pipes	When trash and debris in any inlet or outlet pipe blocks more than 1/3 of its height.
Inspect the basin walls/bottom for fractures or cracks	If maintenance personnel determines the structure is unsound, replace or repair basin to design standards.
Inspect grout	When a grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks. Pipe should be regrouted and secure at basin wall.
Inspect for settlement/misalignment	Maintenance is required if failure of basin has created a safety, function, or design problem. Basin should be replaced or repaired to design standards.
Remove vegetation blocking opening to basin	When vegetation is growing across and blocks more than 10% of the basin opening.
Remove vegetation at inlet/ outlet pipe joints	When vegetation is growing in inlet/outlet pipe joints that is more than six inches tall and less than 6 inches apart.

Structure:	Water Quality Vaults (0200-WQV-001, 0200-WQV-002, 0300-WQV-001, 0300-WQV-002, 0400-WQV-001, and 0400-WQV-002)
Date of Implementation:	2016
Discharge Point:	0200-WQV-001: Discharge Location #1, Monitoring Point #1 0200-WQV-002: Discharge Location #2, Monitoring Point #2 0300-WQV-001: Discharge Location #4, Monitoring Point #3 0300-WQV-002: Upstream of 0300-WQV-002 0400-WQV-001: 0400-WQV-002 0400-WQV-002: Discharge Location #6, Monitoring Point #4
Area(s) Treated:	0200-WQV-001: Administration & Support Area, West Boiler, and western half of Rail Unloading Area 0200-WQV-002: Eastern half of Rail Unloading Area 0300-WQV-001: Area 300 Support & Containment Area 0300-WQV-002: Area 300 Containment Area 0400-WQV-001: Dock Containment Area 0400-WQV-002: Dock Containment Area
Pollutants Removed:	Turbidity, suspended solids, volatile organics (BTEX), metals
Maintenance Requirement(s):	**Frequency or Conditions When Maintenance is Needed:**
Regular Inspections	Inspect water quality vaults monthly during wet season and immediately after storm events ≥ 1 inch per 24 hours.
Replace StormFilter media	Completely replace all cartridges and media annually.
Removed sediments and pressure wash vault	Complete annually or as needed.
Replace filters inserts	Quarterly or as needed (monthly inspections)
Remove trash and debris in forebay	When trash or debris is located immediately in the forebay or is blocking flow separator of the basin by more than 10%.
Remove trash and debris from inlet and outlet pipes	When trash and debris in any inlet or outlet pipe blocking more than 1/3 of its height.
Inspect the top slab for holes and cracks	Maintenance is required when top slab has holes larger than 2 inches or cracks wider than 1/4 inch.
Inspect frames to verify it is sitting flush on the riser rings or top slab and firmly attached	Maintenance is required if there is a separation of more than ¾ inch of the frame from the top slab or if the frame is not securely attached.
Inspect the basin walls/bottom for fractures or cracks	If maintenance personnel determines the structure is unsound, replace or repair basin to design standards.

Inspect grout	When a grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks. Pipe should be regrouted and secure at basin wall.
Inspect for settlement/misalignment	Maintenance is required if failure of basin has created a safety, function, or design problem. Basin should be replaced or repaired to design standards.
Inspect for any evidence of oil, gasoline, contaminants, or other pollutants	If evidence of contaminants, coordinate removal/cleanup with local water quality response agency.
Replace or repair metal grate	If grate is missing or has a broken member(s) on the grate or if the grate has an opening wider than 7/8 inch.

Structure:	Media Filter Drain
Date of Implementation:	2016
Discharge Point:	Bio-infiltration swales at Area 400
Area(s) Treated:	Area 400 Parking and support areas
Pollutants Removed:	Turbidity, suspended solids, volatile organics (BTEX), metals.
Maintenance Requirement(s):	**Frequency or Conditions When Maintenance is Needed:**
Regular Inspections	Inspect media filter drain monthly during wet season and immediately after storm events ≥ 1 inch per 24 hours.
Control Noxious Weeds	When needed during inspections.

Structure:	Bio-filtration & Bio-infiltration Swales
Date of Implementation:	1995
Discharge Point:	Infiltration to groundwater
Area(s) Treated:	"Marine Terminal" drainage area including Facility Parking and Support areas at Area 400, portions of the Auto Terminal north of the Facility, and CalPortland west of the Facility.
Pollutants Removed:	Turbidity, suspended solids, volatile organics (BTEX), metals.
Maintenance Requirement(s):	**Frequency or Conditions When Maintenance is Needed:**
Regular Inspections	Inspect bio-filtration and bio-infiltration swales monthly during wet season and immediately after storm events ≥ 1 inch per 24 hours.
Mow grasses	Maintain grasses between 4 and 9-inches
Remove debris, leaves, litter, and oils	When needed during inspections
Control Noxious Weeds & Perform weed removal	When needed during inspections
Remove Sediments	When needed during inspections
Replace Planting	When needed during inspections
Replace Mulch	Annually where heavy metal deposition is high

Structure:	Stormwater catch basins & area inlets
Date of Implementation:	2016
Discharge Point:	See Civil Plans
Area(s) Treated:	Paved areas on the west side of the grain silos
Pollutants Removed:	Turbidity, suspended solids
Maintenance Requirement(s):	**Frequency or Conditions When Maintenance is Needed:**
Replace filters inserts	Quarterly or as needed (monthly inspections)
Clean out catch basin sumps monthly	Quarterly or as needed (monthly inspections)
Remove trash and debris in front of catch basin or on grate opening	When trash or debris is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.
Remove sediment, trash, and debris in the catch basin	When trash or debris exceeds 60% of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the debris surface to the invert of the lowest pipe.
Remove trash and debris from inlet and outlet pipes	When trash and debris in any inlet or outlet pipe blocking more than 1/3 of its height.
Remove dead animals or vegetation within the catch basin	When dead animals or vegetation could generate odors that could cause complaints or dangerous gases (e.g. methane).
Inspect the top slab for holes and cracks	Maintenance is required when top slab has holes larger than 2 inches or cracks wider than 1/4 inch.
Inspect the frame to verify it is sitting flush on the riser rings or top slab and firmly attached	Maintenance is required if there is a separation of more than ¾ inch of the frame from the top slab or if the frame is not securely attached.
Inspect the basin walls/bottom for fractures or cracks	If maintenance personnel determines the structure is unsound, replace or repair basin to design standards.
Inspect grout	When a grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks. Pipe should be regrouted and secure at basin wall.
Inspect for settlement/misalignment	Maintenance is required if failure of basin has created a safety, function, or design problem. Basin should be replaced or repaired to design standards.
Remove vegetation blocking opening to basin	When vegetation is growing across and blocking more than 10% of the basin opening.
Remove vegetation at inlet/ outlet pipe joints	When vegetation is growing in inlet/outlet pipe joints that is more than six inches tall and less than 6 inches apart.
Inspect for any evidence of oil, gasoline, contaminants, or other pollutants	If evidence of contaminants, coordinate removal/cleanup with local water quality response agency.
Close catch basin cover	If the cover is missing or only partially in place.
Test catch basin cover removal to allow for maintenance	If one maintenance person cannot remove the lid, perform maintenance on the cover.
Replace or repair metal grate	If grate is missing or has a broken member(s) on the grate or if the grate has an opening wider than 7/8 inch.
Remove trash or debris from metal grate	When trash and debris is blocking more than 20% of the grate surface inletting capacity.

4.4 Stormwater Peak Runoff and Volume Control BMPs

Volume control facilities are not required for discharge into the Columbia River.

4.5 Erosion and Sediment Control BMPs

Erosion and sediment control BMPs will prevent the sedimentation of adjacent properties and the discharge of sediment-laden stormwater to the receiving water. Most of the Vancouver Energy site is developed and, where possible, unused areas will be landscaped. The Facility will be constructed in an area with little to no slope, and the potential for erosion therefore is quite low. Table 9 lists BMPs used at the Facility to minimize erosion or remove sediments from stormwater.

Table 9. Erosion and Sediment Control BMPs

Structure:	Undeveloped areas of the site will be maintained with existing vegetation or gravel surfacing
Date of Implementation:	Unknown
Discharge Point:	N/A
Area(s) Treated:	Adjacent parking, maneuvering, and Facility activity
Pollutants Removed:	Turbidity, metals, oil residue from vehicles using or parking at the Facility
Maintenance Requirement(s):	**Frequency or Conditions When Maintenance is Needed:**
Brush and grass is cut to maintain safety.	As necessary

5. Sampling Plan

5.1 Discharge Location(s)

The Vancouver Energy Terminal discharges stormwater at the following locations.

1. Discharge Location 1 is at the west end of the rail unloading building and is a manhole located on a 24-inch storm drain that is part of the Port's existing stormwater system. This connection is for the Administration and Office Area, West Boiler Building, and the western portions of the yard on the south-side of the rail unloading building and the western portion of the rail unloading building roof.
2. Discharge Location 2 is located approximately at the midpoint of the rail unloading area at a manhole located on a 24-inch storm drain that is part of the Port's existing stormwater system. This is a manhole connection to the existing stormwater system at Terminal 5. This connection is for a portion of rerouted runoff from the top of the Vanexco Cap, and from collected yard area on the southeast portion of the rail unloading area.
3. Discharge Location 3 is at the east end of the rail unloading building at a manhole located on a 24-inch storm drain that is part of the Port's existing stormwater system. This is a manhole connection to the existing system at Terminal 5. This connection is for the upstream NGL Energy stormwater, rerouted runoff from the top of the Vanexco Cap, and runoff from the eastern half of the Rail Unloading Building.
4. Discharge Location 4 is located at the west end of the Storage Area located at an existing manhole on a 36-inch storm drain that is part of the Port's existing stormwater system. This connection is to an existing stormwater system in Terminal 4 constructed for the sole use of Port tenant stormwater. This connection includes all collected pollution generating surfaces, as well as the containment area. Discharges are also comingled with roof runoff.
5. Discharge Location 5 is located at the east end of the Storage Area at a manhole located on a 42-inch storm drain that is part of the Port's existing stormwater system. This connection is to an existing stormwater system in Terminal 4 constructed for the sole use of Port tenant stormwater. This connection is for tank roof runoff only.
6. Discharge Location 6 is located immediately west of the MVCU and has its discharge to the existing biofiltration and bioinfiltration swales.

Identify all points of discharge to surface water, storm sewers, or discrete groundwater infiltration locations, such as dry wells or detention ponds (see Table 10).

Table 10. Discharge Location Summary

Discharge ID	Common Description	Latitude (optional)	Longitude (optional)	Discharge Type	Comments
DL: 1	Storm connection to existing storm sewer at Unloading Area (West)	45°39'05"	122°44'00"	Existing storm sewer	Existing storm drain discharges to Columbia River
DL: 2	Storm connection to existing storm sewer at Unloading Area (Central)	45°39'00"	122°43'50"	Existing storm sewer	Existing storm drain discharges to Columbia River
DL: 3	Storm connection to existing storm sewer at Unloading Area (East)	45°38'57"	122°43'43"	Existing storm sewer	Existing storm drain discharges to Columbia River
DL: 4	Storm connection to existing storm sewer at Storage Area (West)	45°38'47"	122°42'55"	Existing storm sewer	Existing storm drain discharges to Columbia River
DL: 5	Storm connection to existing storm sewer at Storage Area (East)	45°38'41"	122°42'42"	Existing storm sewer	Existing storm drain discharges to Columbia River
DL: 6	Storm connection to existing catch basin at Marine Terminal	45°38'37"	122°43'18"	Existing bio-filtration swale	Existing bio-filtration swale discharges to bio-infiltration swale

5.2 Identify Each Sampling Location

Identify each sampling location by its unique identifying number such as A1, A2, etc. Include these sampling locations on site map (see Table 11).

Table 11. Sampling Location Summary

Discharge ID	Common Description	Latitude (optional)	Longitude (optional)	Discharge Type	Comments
MP: 1	Storm connection to existing storm sewer at Office Area	45°39'05"	122°44'00"	Existing storm sewer	Existing storm drain discharges to Columbia River
MP: 2	Storm connection to existing storm sewer at Unloading Area	45°39'00"	122°43'50"	Existing storm sewer	Existing storm drain discharges to Columbia River
MP: 3	Storm connection to existing storm sewer at Tank Farm	45°38'47"	122°42'55"	Existing storm sewer	Existing storm drain discharges to Columbia River
MP: 4	Storm connection to existing catch basin at Marine Terminal	45°38'37"	122°43'18"	Existing storm sewer	Existing storm drain discharges to upland swales

5.2.1 Staff Responsible for Sampling

Collection of samples for testing is conducted by Terminal maintenance staff. Typically, the Environmental or Terminal Manager conducts all sampling activities.

5.2.2 Sample Collection and Handling

Timing: Samples are collected at least once per quarter for the parameters shown in Table 12 below.

Table 12. Benchmarks and Sampling Requirements Applicable to All Facilities

Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency [b]
Oil and Grease	mg/L	15	EPA 1664A	5.0	Monthly
Total Suspended Solids	mg/L	30	EPA 180.1 Meter	0.5	Monthly
BTEX	µg/L	100	EPA SW 846 8021/8260	2.0	Monthly
Benzene	µg/L	1.2	EPA 624	2.0	Monthly
pH	Standard Units	Between 5.0 and 9.0	Meter	±0.5	Metered
Copper, Total	µg/L	14	EPA 200.8	2.0	Monthly
Zinc, Total	µg/L	117	EPA 200.8	2.5	Monthly

a The Permittee will is responsible to verify laboratory results comply with the quantitation level (QL) specified in the table. However, if an alternate method from 40 CFR Part 136 is sufficient to produce measurable results in the sample, the Permittee may use that method for analysis. If the Permittee uses an alternative method it must report the test method and QL on the discharge monitoring report.

b 1/quarter means at least one sample taken each quarter, year round.

During the quarter, samples are taken during precipitation events that result in a discharge at the outfall. Samples are taken within the first 12 hours of a stormwater discharge event. Sampling will occur at any time during the quarter with the exception of the fourth quarter. During the fourth quarter, samples are taken during the first discharge event occurring after 1 October.

Method of Collection: Sampling will be conducted as a grab sample at all Discharge Locations. Using bottles supplied by the lab, samples will be taken by hand (using powder-free nitrile or latex gloves) by placing the open container within the flow as it falls from the outfall pipe. Bottles will be filled to the marked level and care will be taken to not overfill.

Sample Documentation: Staff responsible for sample collection must record the following information on the form contained in Appendix F.

- Date and time the sample was taken
- Notation on whether the sample was taken within the first 30 minutes of stormwater discharge event and if not taken during this time, an explanation of the factors preventing sampling within the first 30 minutes
- Location of sample
- Method of sampling and preservation
- Date and time of testing and/or shipment to the laboratory
- Name of the individual performing the sampling
- Results of the visual oil sheen observation

5.3 Discharge Monitoring Reports

Discharge monitoring reports (DMRs) must be submitted to Ecology within 45 days of the end of the quarter as specified in Table 13. DMRs must be submitted to Ecology by using the web-based reporting system (http://www.ecy.wa.gov/programs/wq/permits/paris/index.html) or by mail.

- Department of Ecology

  Water Quality Program – Industrial Stormwater
  P.O. Box 47696
  Olympia, WA 98504-7696

Table 13. Discharge Monitoring Report Submission Dates

Quarter	Months Covered	Discharge Monitoring Report Due Date
1st Quarter	January, February, and March	May 15
2nd Quarter	April, May, and June	August 14
3rd Quarter	July, August, and September	November 14
4th Quarter	October, November, and December	February 14

A DMR must be sent during each quarter regardless of whether or not the Facility has discharged stormwater from the site. If discharge(s) occurred during normal working hours and during safe conditions, but no sample was collected during the entire quarter, the permittee must submit a DMR indicating "no sample obtained." If no discharge(s) occurred during the entire quarter or the discharges during the quarter occurred outside normal working hours or during unsafe conditions, the permittee must submit a DMR indicating "no discharge."

If discharge(s) occurred during normal working hours, and during safe conditions; but no sample was collected during the entire quarter, the Permittee will submit a DMR form indicating "no sample obtained." If no discharge(s) occurred during the entire quarter or the discharges during the quarter occurred outside normal working hours or during unsafe conditions, the Permittee will submit a DMR indicating "no discharge."

If a Permittee has suspended sampling for a parameter due to consistent attainment, the Permittee will submit a DMR and indicate that it has achieved Consistent Attainment for that parameter(s).

5.4 Sampling Parameters

Testing of the collected samples must be done for the parameters identified in Table 12. All of the testing of these parameters will be accomplished by sending the collected samples to an Ecology accredited laboratory. The samples will be properly preserved (as specified by the laboratory) and will be sent to the laboratory within their hold times.

Visible Oil Sheen: Operationally a check for a visible oil sheen is required prior to release of stormwater collected at the following locations:

1. Area 400 – Containment area located at the face of the dock. Check for oil sheen is required following loading operations and prior to releasing collected stormwater upland for treatment and discharge. Upstream treatment includes oil-water separation, and water quality treatment.
2. Area 300 – Stormwater Pump Station. Check for oil sheen is required prior to manual operation of the stormwater pump station. A visual check for an oil sheen will be completed. Downstream treatment includes water quality treatment. Oil-water separation is installed upstream of this facility.

6. SWPPP Certification

The Industrial General Stormwater Permit requires that this document and any modification be certified by a corporate officer of at least the level of vice president or other Vancouver Energy personnel who are responsible for the overall operation or environmental matters at the terminal. Currently, (Staff Names to be Determined), have been granted signature authority. Each time a Level 1, 2, or 3 Corrective Action is required, this form needs to be resigned and recertified and attached to the SWPPP. The certification form is included as Appendix G.

7. List of Acronyms and Abbreviations

Applicant: Tesoro Savage Petroleum Terminal LLC

AST: aboveground storage tank

bbl: barrel and barrels

BMP: best management practice

BTEX: benzene, toluene, ethylbenzene, and xylenes

CFR: Code of Federal Regulations

City: City of Vancouver

DMR: discharge monitoring report

Ecology: Washington State Department of Ecology

EFSEC: Energy Facility Site Evaluation Council

Facility: Vancouver Energy Terminal

MMBTU: million British thermal unit

MVCU: marine vapor control unit

NPDES: National Pollutant Discharge Elimination System

Port: Port of Vancouver USA

SPCCP: spill prevention, control, and countermeasures plan

SWPPP: stormwater pollution prevention plan

WAC: Washington Administrative Code

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Operations Stormwater Pollution Prevention Plan

Vancouver Energy Terminal
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix A
Site and Civil Drawings

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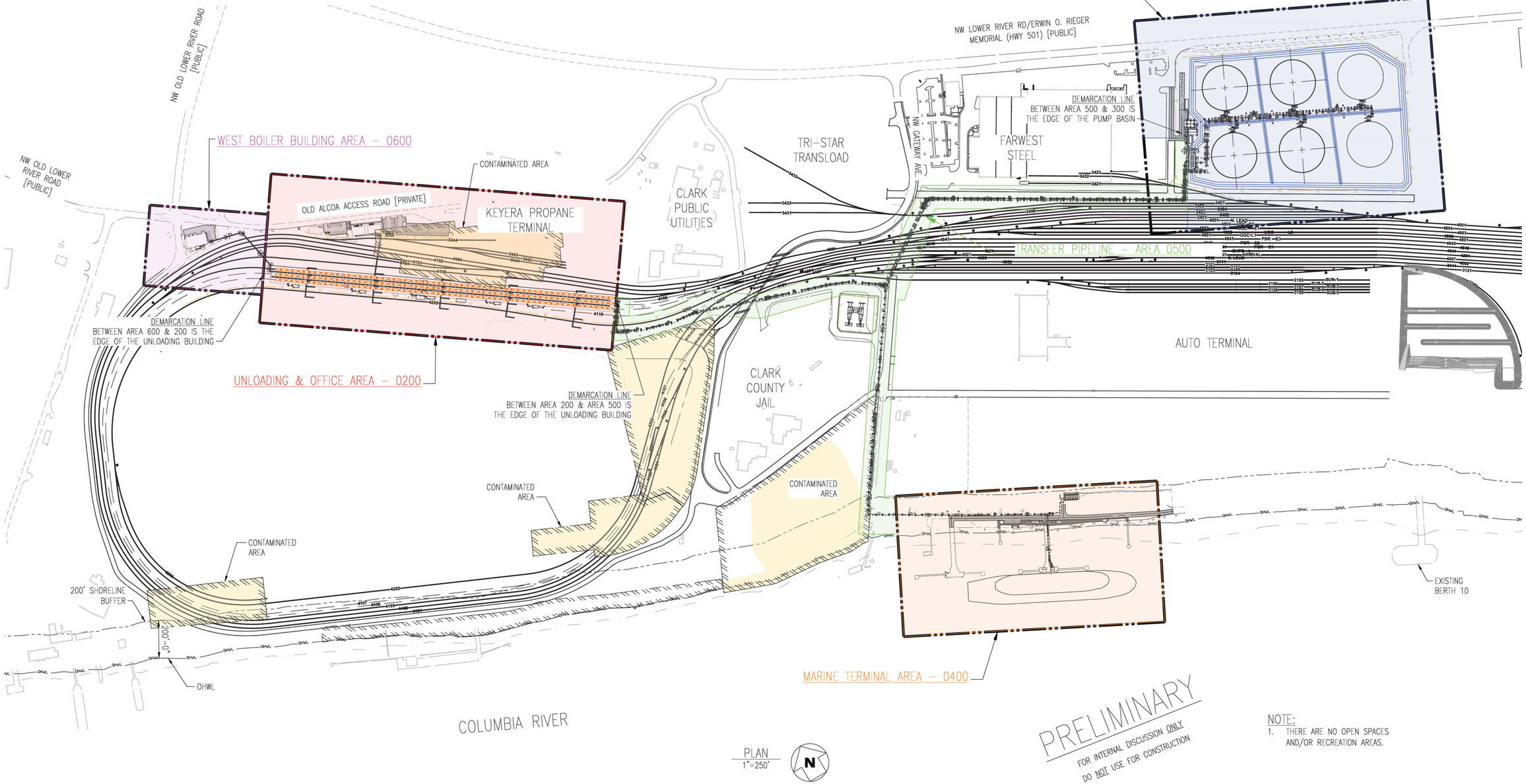

PLAN
1"=250'

N

PRELIMINARY
FOR INTERNAL DISCUSSION ONLY
DO NOT USE FOR CONSTRUCTION

NOTE:
1. THERE ARE NO OPEN SPACES AND/OR RECREATION AREAS.

NO.	DATE	REVISION	BY	CK'D	APP

R&M ENGINEERING CONSULTANTS
SALT LAKE CITY, UTAH
(801)263-3419
13014

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: OVERALL SITE PLAN

DESIGN:	START DATE: 05-06-13	SCALE:	1"=250'
DRAWN: JBH	PRINT DATE: 02-26-15	PROJECT MANAGER:	DC
CHECKED:	APPROVED:	SIAAE:	24x36
DRAWING NUMBER		SHEET	REV.
0100-SP-001		1/1	

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EXISTING SURVEY SYMBOLOGY

- SET MONUMENT
- FOUND MONUMENT
- RECORD/DEED INFO
- SITE BENCHMARK
- BUILDING HATCH
- WALL HATCH
- GRAVEL HATCH
- CONCRETE HATCH
- BUILDING OVERHANG
- RIGHT OF WAY
- PROPERTY LINE
- CURB LINE
- FENCE
- FO — FIBER OPTIC LINE
- TEL — TELEPHONE LINE
- UGE — UNDERGROUND ELECTRICAL LINE
- SD — STORM DRAIN LINE
- SS — SANITARY SEWER LINE
- W — WATER LINE
- G — GAS LINE
- OHU — OVERHEAD UTILITY LINE
- COM — COMMUNICATION LINE
- AIR — AIR LINE
- 20 — EXISTING MAJOR CONTOURS
- 21 — EXISTING MINOR CONTOURS
- EDGE OF BRUSH LINE
- WETLAND LINE
- WETLAND BUFFER
- RAILROAD TRACKS
- OHWL — ORDINARY HIGH WATER LINE
- SURVEY WATER ELEVATION
- ELECTRIC MANHOLE
- EB — ELECTRIC BOX
- ER — ELECTRIC RISER
- E — ELECTRIC METER
- EV — ELECTRIC VAULT
- POWER POLE
- POWER POLE W/ LIGHT
- GUY POLE
- GUY ANCHOR
- 4 HEAD LUMINAIRE
- 8 HEAD LUMINAIRE
- LUMINAIRE
- GV — GAS VALVE

EXISTING SURVEY SYMBOLOGY (CONT'D)

- GROUND/FLOOD LIGHT
- OVERHEAD LIGHT
- GAS MANHOLE
- GLR — GAS LOCATE RISER
- GF — GAS FINK
- G — GAS METER
- GT — GAS VENT
- COMMUNICATION MANHOLE
- TELEPHONE MANHOLE
- TB — TELEPHONE BOX
- TR — TELEPHONE RISER
- FENCE POST
- SINGLE POST SIGN
- DOUBLE POST SIGN
- MB — MAIL BOX
- B — BOLLARD
- FP — FLAG POLE
- SANITARY MANHOLE
- CO — SANITARY CLEANOUT
- STORM MANHOLE
- CURB INLET
- AREA DRAIN
- CATCH BASIN
- STORM CULVERT
- W — WATER METER
- FIRE DEPARTMENT CONNECT
- FIRE HYDRANT
- HB — HOSE BIB
- ICV — IRRIGATION CONTROL VALVE
- PIV — POST INDICATOR VALVE
- WV — WATER VALVE
- WELL
- WVLT — WATER VAULT
- MW — MONITORING WELL
- RRS — RAIL ROAD SWITCH
- YARD AIR
- JUNCTION BOX

SITE PLAN SYMBOLOGY

- 50 — 5FT INTERVAL CONTOUR
- 49 — 1FT INTERVAL CONTOUR
- VEGETATION
- TREE TO BE REMOVED
- CO — CLEAN OUT
- MH — MANHOLE
- MW — MONITORING WELL
- CB — STORM DRAIN CATCH BASIN
- UV — UTILITY VAULT
- PP — POWER POLE
- TP — TELEPHONE POLE
- FH — FIRE HYDRANT
- YH–X — YARD HYDRANT
- 75.5 — EXISTING SPOT ELEVATION
- 75.8 — FINISHED SPOT ELEVATION
- SURVEY CONTROL POINT
- BENCHMARK
- DOWNGUY
- BURIED VALVE
- STATE PLANE COORDINATE ID

NOTES:

1. UTILITIES THAT ARE SUSPENDED ABOVE GRADE ARE DESIGNATED BY THE PREFIX "OH".

- PUBLIC RIGHT–OF–WAY LINE
- LOT — LOT LINE
- BDY — PORT BOUNDARY
- ESMT — RAIL EASEMENT
- CONSTRUCTION EASEMENT
- UTILITY EASEMENT
- W — WATER LINE
- TEL — TELEPHONE LINE
- E — ELECTRIC LINE
- AIR — AIR LINE
- FO — FIBER OPTIC
- COM — COMMUNICATION
- HANDRAIL
- CS — SINGLE LINE PIPELINE
- PIPELINE BENEATH CONCRETE OR STRUCTURE
- DRAINAGE FLOW
- CUT OFF DITCH
- GUARDRAIL
- CHAIN LINK FENCE
- ROAD CENTERLINE
- WETLAND BOUNDARY
- SAWCUT PAVEMENT
- REMOVING ASPHALT CONC. PAVEMENT
- CLEARING AND GRUBBING
- REMOVING TRACK
- REMOVING CHAIN LINK FENCE

SITE PLAN SYMBOLOGY (CONT'D)

- ABANDON EXISTING UTILITY
- REMOVE OR ABANDON EXISTING UTILITY
- SEDIMENT FENCE
- HIGH VISIBILITY FENCE
- SS — SANITARY SEWER LINE
- SD — STORM DRAIN LINE
- FM — FM
- SILT FENCE
- HVF — HIGH VISIBILITY FENCE
- FP — 100 YEAR FLOOD PLAIN
- D — DRAINAGE MH
- S — SANITARY SEWER
- CASINGS / SLEEVES
- CATCH BAISN
- CO — SANITARY CLEANOUT
- FLOOR DRAIN
- IP — INLET PROTECTION
- CS — COMPOST STOCK
- BIO BAGS

PIPING NOMENCLATURE

0300–SD–18–CP

- AREA
- FLUID IDENTIFICATION
- NOMINAL PIPE SIZE
- PIPE MATERIAL SPECIFICATION

FLUID IDENTIFICATION CATEGORIES

- FM – SANITARY SEWER FORCE MAIN
- SD – STORM DRAIN
- SS – SANITARY SEWER
- W – MUNICIPAL WATER

PIPE MATERIAL SPECIFICATION

- CP – CORRUGATED POLYPROPYLENE
- DI – DUCTILE IRON
- SA – HDPE

STRUCTURE NOMENCLATURE

0300–OWS–001

- AREA
- STRUCTURE DESIGNATION
- STRUCTURE NUMBER

STRUCTURE DESIGNATION CATEGORIES

- DIV – DIVERSION MANHOLE
- HPS – HYDRODYNAMIC SEPARATOR
- MHC – MANHOLE W/ REDUCING CONE
- MHT – MANHOLE W/ TOP SLAB
- OWS – OIL/WATER SEPARATOR

WQV – WATER QUALITY VAULT

GENERAL SYMBOLOGY

ARROW INDICATES DIRECTION OF PLAN NORTH

N

PLAN

50 0 50 100

scale feet

SECTION LETTER

FLAG INDICATES DIRECTION OF SECTION CUT

X / XXX

* DRAWING WHERE SECTION VIEW IS LOCATED

SECTION CUT MARKER

SECTION

3/8" = 1'–0"

SECTION LETTER

* DRAWING WHERE SECTION VIEW IS FIRST CUT

DETAIL NUMBER

* DRAWING WHERE DETAIL IS LOCATED

DETAIL MARKER

DETAIL

3" = 1'–0"

DETAIL NUMBER

* DRAWING WHERE DETAIL WAS TAKEN

KEYNOTE OR SPECIFIC NOTE DESIGNATION

X — KEYNOTE NUMBER

RAIL SYMBOLOGY

DESCRIPTION	EXISTING	PROPOSED
RAILROAD TRACK		
SHIFT TRACK		
SURFACE, LINE, & DRESS TRACK		
GRADING LIMITS		

HAND THROW TURNOUT (T.O.)

BEGIN OR END OF CURVE

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS — STATE OF WASHINGTON — 37330 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY

THIS DRAWING CONTAINS PROPRIETARY AND PRIVILEGED INFORMATION AND SUCH INFORMATION MAY NOT BE USED OR DISCLOSED WITHOUT THE PERMISSION OF VANCOUVER ENERGY.

VANCOUVER ENERGY IS A JOINT VENTURE BETWEEN TESORO REFINING & MARKETING COMPANY LLC AND SAVAGE COMPANIES.

FOR MORE INFORMATION CONTACT: KELLY FLINT 801–944–6600
WWW.VANCOUVERENERGY.COM

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
CIVIL DRAWING LEGEND

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	12/29/2014	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100–CD–001 | SHEET: 1/1 | REV.:

Last Saved by: Tony.pritchett on: Oct 16, 2014 9:43 AM File: Q:\Vancouver\2013\A13.0267102\CADD\Dwgs\04_0100-CD-001.dwg

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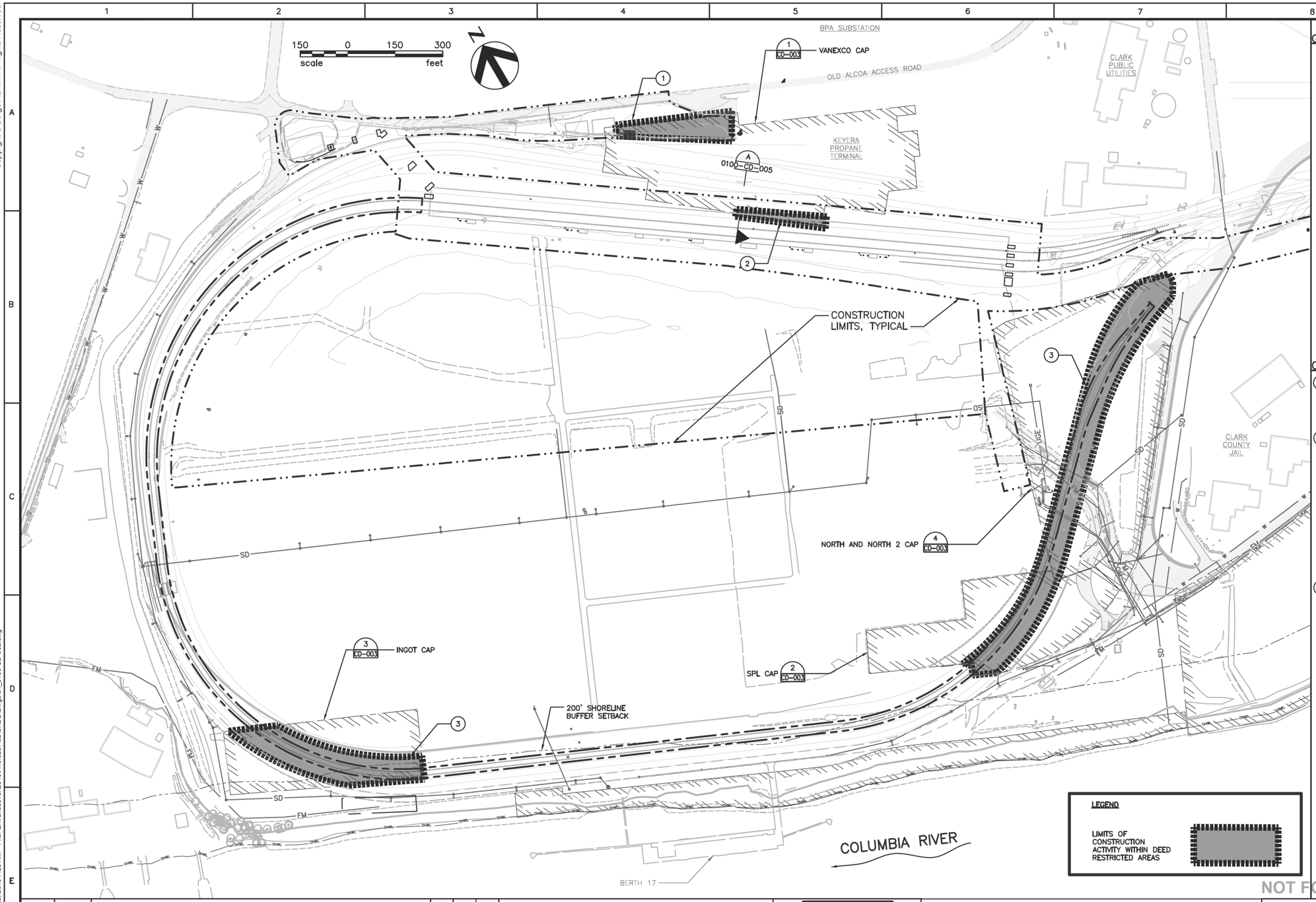

GENERAL NOTES:

1. CONTRACTOR'S ACTIVITY SHALL STRICTLY COMPLY WITH ALL PERMITTED CONDITIONS OF APPROVAL.
2. EXCAVATIONS AND GROUND DISTURBING ACTIVITIES WITHIN DEED RESTRICTED AREAS REQUIRES NOTIFICATION TO THE WASHINGTON STATE ENERGY FACILITY SITE EVALUATION COUNCIL (EFSEC) AND COMPLIANCE WITH THE APPROVED CONTAMINATED MEDIA MANAGEMENT PLAN, APPLICABLE PORT PROTOCOLS AND ADDITIONAL REQUIREMENTS PROVIDED BY EFSEC.
3. SPECIFIC LIMITS FOR THE EAST LANDFILL LIMITS ARE PROVIDED BASED UPON PRIOR SURVEY'S CONDUCTED BY HDJ DESIGN GROUP. WORK LIMIT SHALL ENCROACH UPON THE BOUNDARY OF THE EAST LANDFILL.
4. WHERE KNOWN, ADDITIONAL AREAS OF CONCERN AND POSSIBLE CONTAMINATED MEDIA LOCATIONS HAVE BEEN GENERALLY DEPICTED. CONTRACTOR SHALL COORDINATE FULLY WITH PORT OF VANCOUVER ENVIRONMENTAL STAFF AND INSPECTORS FOR MONITORING AND TESTING OF EXCAVATED MEDIA FOR POSSIBLE CONTAMINATES. PORTIONS OF AREA 200 AND AREA 500 ARE SPECIFICALLY IDENTIFIED WHERE CONTAMINATION IS LIKELY TO BE ENCOUNTERED DURING EXCAVATIONS.
5. IF MEDIA INCLUDING SOILS, OR GROUNDWATER ARE ENCOUNTERED THAT INDICATE POSSIBLE CONTAMINATION, CONTRACTOR SHALL NOTIFY VANCOUVER ENERGY SITE MANAGER, PORT OF VANCOUVER AND EFSEC IMMEDIATELY PRIOR TO PROCEEDING. SIGNS OF CONTAMINATION INCLUDE UNUSUALLY DARK SOIL AND ODORS.
6. IN AREAS OF CONCERN EXCAVATED MATERIAL SHALL BE PLACED IN SEALED WATER-TIGHT CONTAINERS OR LINED STAGING AREAS IMMEDIATELY ADJACENT TO THE WORK AREA FOR TESTING AND CLASSIFICATION OF MATERIAL PRIOR TO HAUL OFF.

CONTAMINATED MEDIA NOTES:

(1) CONSTRUCTION ACTIVITIES WITHIN THIS PORTION OF THE VANEXCO CAP WILL BE LIMITED TO GROUND DISTURBANCES ABOVE THE EXISTING CONCRETE CAP. SOME MINOR EXPOSURE OF THE CONCRETE SURFACE MAY OCCUR IN LOCALIZED AREAS. NO WORK WITHIN THIS AREA WILL REMOVE OR PENETRATE PORTIONS OF THE CAP.

(2) CONSTRUCTION ACTIVITIES WITHIN THIS PORTION OF THE VANEXCO CAP WILL RESULT IN MODIFICATION OF THE UNDERDRAIN SYSTEM AND HDPE LINER. DISCHARGES FROM THE UNDERDRAIN SYSTEM WILL BE RE-ROUTED TO AVOID CONFLICTS WITH THE PROPOSED RAIL UNLOADING BUILDING FOUNDATIONS AND CONTAINMENT TRENCHES, SEE DWG 0100-CD-006 FOR LINER PENETRATION DETAIL, AND SHEET 0100-CD-007 FOR NEW STORMWATER DETAILS. LINER WILL BE EXTENDED TO AND TIED INTO THE GRADE BEAMS OF THE RAIL UNLOADING BUILDING FOUNDATION SEE DWG 0100-CD-006 FOR DETAILS. FOUNDATIONS OF THE RAIL UNLOADING BUILDING WITHIN THE EXISTING CAP AREA WILL BE LIMITED TO SHALLOW SPREAD FOOTINGS TO LIMIT EXCAVATION ACTIVITIES. CONSTRUCTION OF RAIL UNLOADING BUILDING CONSISTS OF FULLY IMPERVIOUS ROOF WITH CAST-IN-PLACE CONCRETE SURFACING WITH FLOOR DRAINS. ALL RAINWATER WILL BE COLLECTED AND DIVERTED, THEREBY EXCLUDING SURFACE WATER FROM ENTERING CAP AREA.

(3) CONSTRUCTION WITHIN THE INGOT CAP, SPL CAP, AND NORTH AND NORTH 2 CAP AREAS ARE LIMITED TO RAIL IMPROVEMENTS ONLY. RAIL LINES TO BE UNDER TSJV CONTROL ARE PERMITTED UNDER EFSEC APPLICATION. CONSTRUCTION DRAWINGS, DETAILS, AND CONSTRUCTION ADMINISTRATION FOR ADDITIONAL 2 RAIL LOOPS WILL BE COMPLETED BY THE PORT OF VANCOUVER AS DISCUSSED IN THE LEASE AGREEMENT.

LEGEND

LIMITS OF CONSTRUCTION ACTIVITY WITHIN DEED RESTRICTED AREAS

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: CONTAMINATED MEDIA LOCATIONS – 1

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100-CD-002 | SHEET: 1/1 | REV.:

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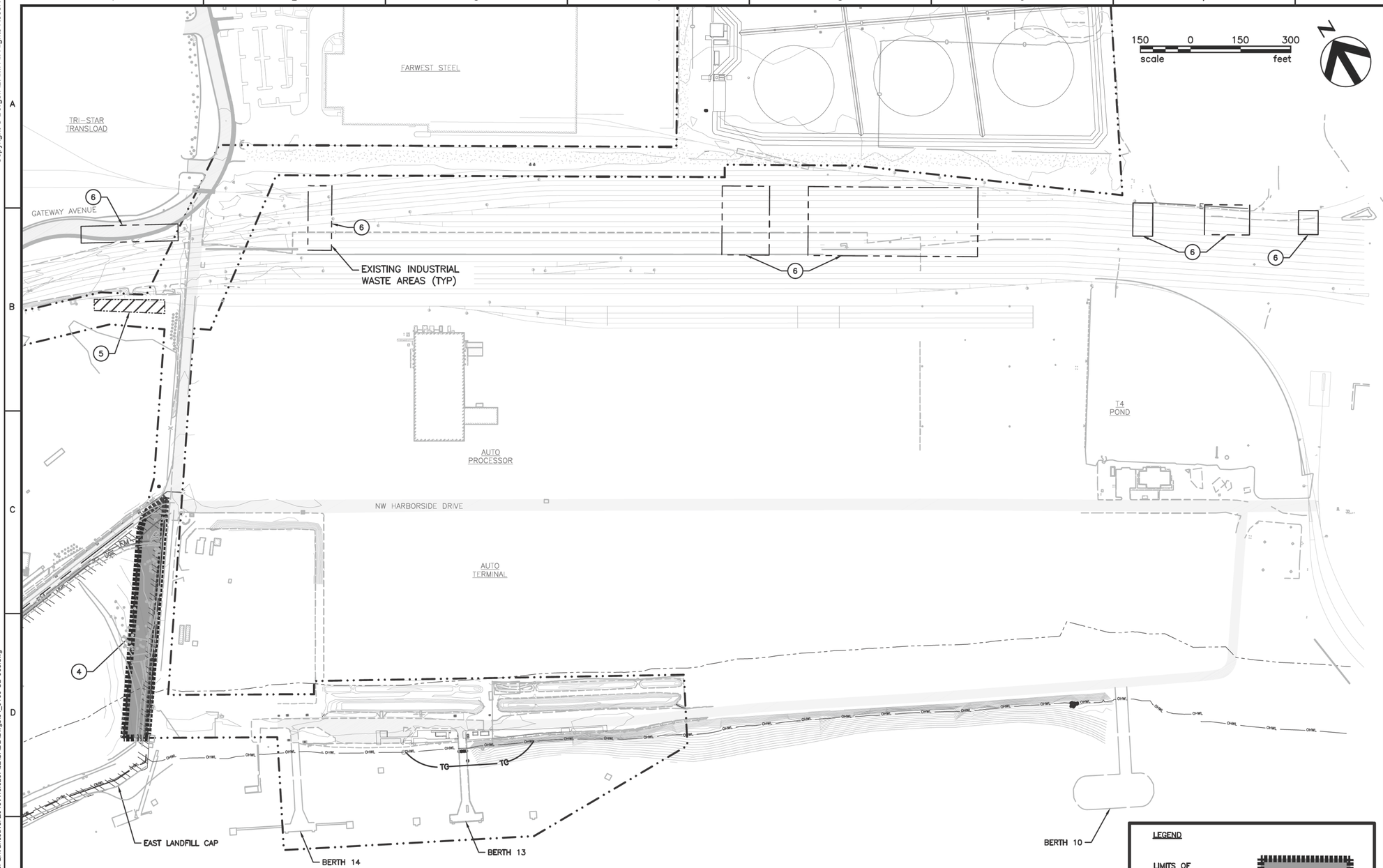

GENERAL NOTES:

1. CONTRACTOR'S ACTIVITY SHALL STRICTLY COMPLY WITH ALL PERMITTED CONDITIONS OF APPROVAL.
2. EXCAVATIONS AND GROUND DISTURBING ACTIVITIES WITHIN DEED RESTRICTED AREAS REQUIRES NOTIFICATION TO THE WASHINGTON STATE ENERGY FACILITY SITE EVALUATION COUNCIL (EFSEC) AND COMPLIANCE WITH THE APPROVED CONTAMINATED MEDIA MANAGEMENT PLAN, APPLICABLE PORT PROTOCOLS AND ADDITIONAL REQUIREMENTS PROVIDED BY EFSEC.
3. SPECIFIC LIMITS FOR THE EAST LANDFILL LIMITS ARE PROVIDED BASED UPON PRIOR SURVEY'S CONDUCTED BY HDJ DESIGN GROUP. WORK LIMIT SHALL ENCROACH UPON THE BOUNDARY OF THE EAST LANDFILL.
4. WHERE KNOWN, ADDITIONAL AREAS OF CONCERN AND POSSIBLE CONTAMINATED MEDIA LOCATIONS HAVE BEEN GENERALLY DEPICTED. CONTRACTOR SHALL COORDINATE FULLY WITH PORT OF VANCOUVER ENVIRONMENTAL STAFF AND INSPECTORS FOR MONITORING AND TESTING OF EXCAVATED MEDIA FOR POSSIBLE CONTAMINATES. PORTIONS OF AREA 200 AND AREA 500 ARE SPECIFICALLY IDENTIFIED WHERE CONTAMINATION IS LIKELY TO BE ENCOUNTERED DURING EXCAVATIONS.
5. IF MEDIA INCLUDING SOILS, OR GROUNDWATER ARE ENCOUNTERED THAT INDICATE POSSIBLE CONTAMINATION, CONTRACTOR SHALL NOTIFY VANCOUVER ENERGY SITE MANAGER, PORT OF VANCOUVER AND EFSEC IMMEDIATELY PRIOR TO PROCEEDING. SIGNS OF CONTAMINATION INCLUDE UNUSUALLY DARK SOIL AND ODORS.
6. IN AREAS OF CONCERN EXCAVATED MATERIAL SHALL BE PLACED IN SEALED WATER-TIGHT CONTAINERS OR LINED STAGING AREAS IMMEDIATELY ADJACENT TO THE WORK AREA FOR TESTING AND CLASSIFICATION OF MATERIAL PRIOR TO HAUL OFF.

CONTAMINATED MEDIA NOTES:

(4) CONSTRUCTION WITHIN THE EAST LANDFILL CAP AREA CONSISTS OF GRADING A SUITABLE LEVEL BENCH WITHIN THE DEED RESTRICTED AREA TO CONSTRUCT FOUNDATIONS FOR THE CRUDE OIL PIPELINE. CONSTRUCTION ACTIVITIES SHALL NOT ENCROACH UPON THE LANDFILL AREA ITSELF AND SHALL REMAIN EAST OF THE HIGH VISIBILITY FENCING DELINEATED ON THE EROSION CONTROL PLANS.

(5) PORT OF VANCOUVER IDENTIFIED POCKETS OF CONTAMINATED GROUNDWATER AND SOIL WITHIN THIS AREA. CONTRACTOR SHALL BE ADVISED THAT WORK ADJACENT TO THIS AREA WILL REQUIRE TESTING OF EXCAVATED MATERIAL PRIOR TO DISPOSAL.

(6) NO CONSTRUCTION ACTIVITY IS PROPOSED IN THESE AREAS OF INDUSTRIAL WASTE. PORT HAS COMPLETED CLEANUP OF THESE SITES DURING RAIL CONSTRUCTION WHERE FEASIBLE.

LEGEND

LIMITS OF CONSTRUCTION ACTIVITY WITHIN DEED RESTRICTED AREAS

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: CONTAMINATED MEDIA LOCATIONS – 2

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-003	1 / 1	

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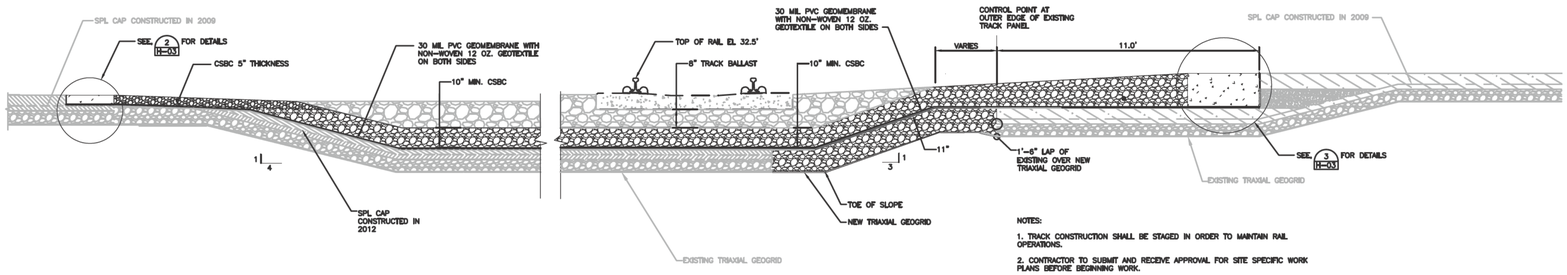


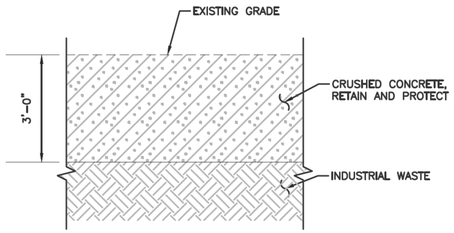
NOTES:

1. TRACK CONSTRUCTION SHALL BE STAGED IN ORDER TO MAINTAIN RAIL OPERATIONS.
2. CONTRACTOR TO SUBMIT AND RECEIVE APPROVAL FOR SITE SPECIFIC WORK PLANS BEFORE BEGINNING WORK.

SPL CAP SECTION

NTS

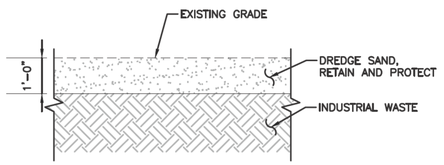
1 / 0100-CD-002



TYPICAL INGOT CAP SECTION

NTS

2 / 0100-CD-002



TYPICAL NORTH/NORTH 2 LANDFILL CAP SECTION

NTS

3 / 0100-CD-002

PRELIMINARY

PERMIT SET
NOT FOR CONSTRUCTION

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Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: EXISTING CAP SECTIONS

DESIGN:	DRS	START DATE:	2/3/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/3/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100-CD-004 | SHEET: 1/1 | REV.

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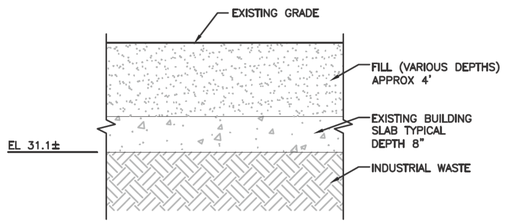
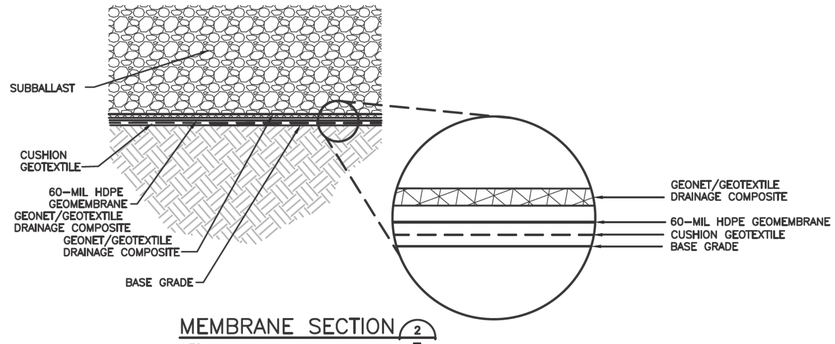
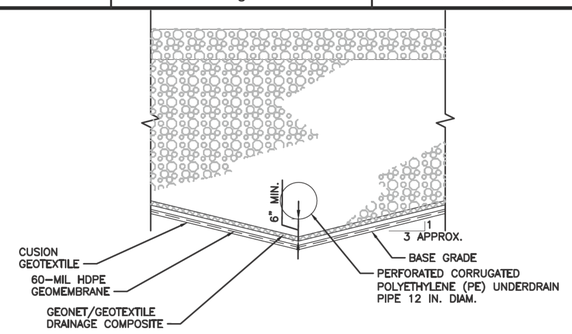


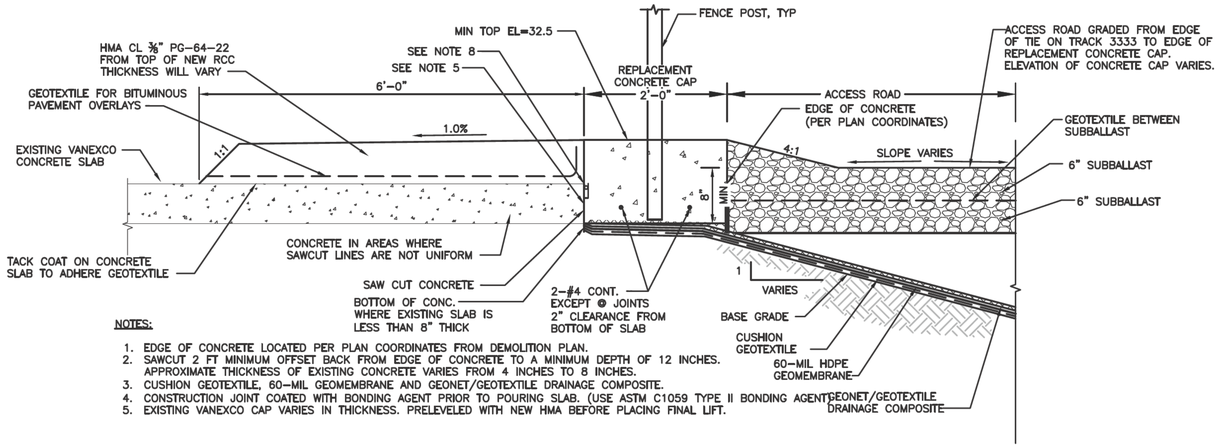
VANEXCO/ ROD MILL CONCRETE SECTION 1
NTS



MEMBRANE SECTION 2
NTS

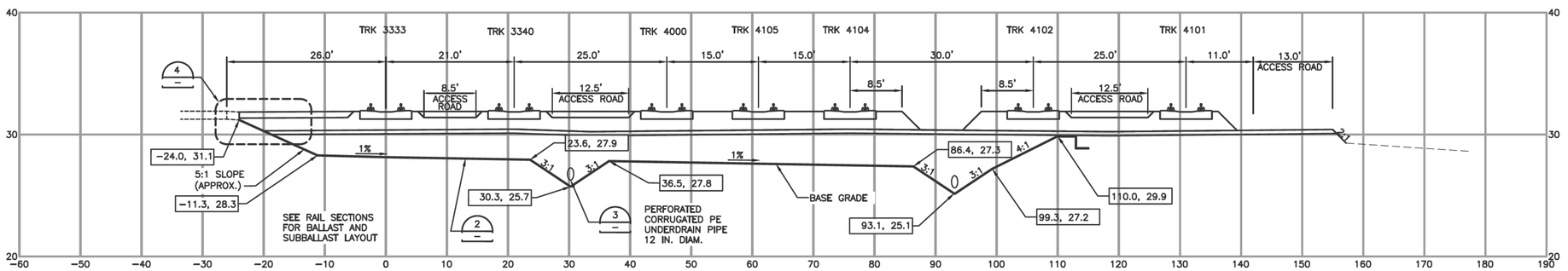


UNDERDRAIN PIPE SECTION 3
NTS



NOTES:
1. EDGE OF CONCRETE LOCATED PER PLAN COORDINATES FROM DEMOLITION PLAN.
2. SAWCUT 2 FT MINIMUM OFFSET BACK FROM EDGE OF CONCRETE TO A MINIMUM DEPTH OF 12 INCHES. APPROXIMATE THICKNESS OF EXISTING CONCRETE VARIES FROM 4 INCHES TO 8 INCHES.
3. CUSHION GEOTEXTILE, 60-MIL GEOMEMBRANE AND GEONET/GEOTEXTILE DRAINAGE COMPOSITE.
4. CONSTRUCTION JOINT COATED WITH BONDING AGENT PRIOR TO POURING SLAB. (USE ASTM C1059 TYPE II BONDING AGENT)
5. EXISTING VANEXCO CAP VARIES IN THICKNESS. PRELEVELED WITH NEW HMA BEFORE PLACING FINAL LIFT.

CONCRETE CAP CONNECTION DETAIL 4
NTS



VANEXCO LINER SECTION
SCALE: 1"=10' HORIZ
1"=5' VERT

PERMIT SET
NOT FOR CONSTRUCTION

PRELIMINARY

NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
EXISTING VANEXCO SECTIONS

DESIGN:	DRS	START DATE:	2/9/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/9/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-005	1/1	

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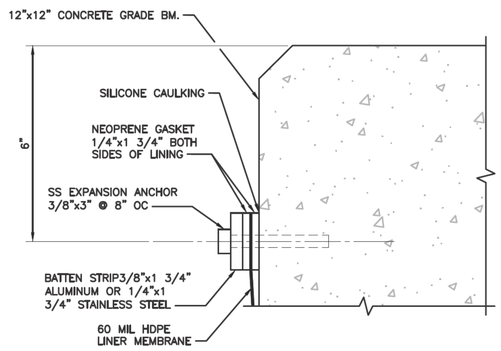
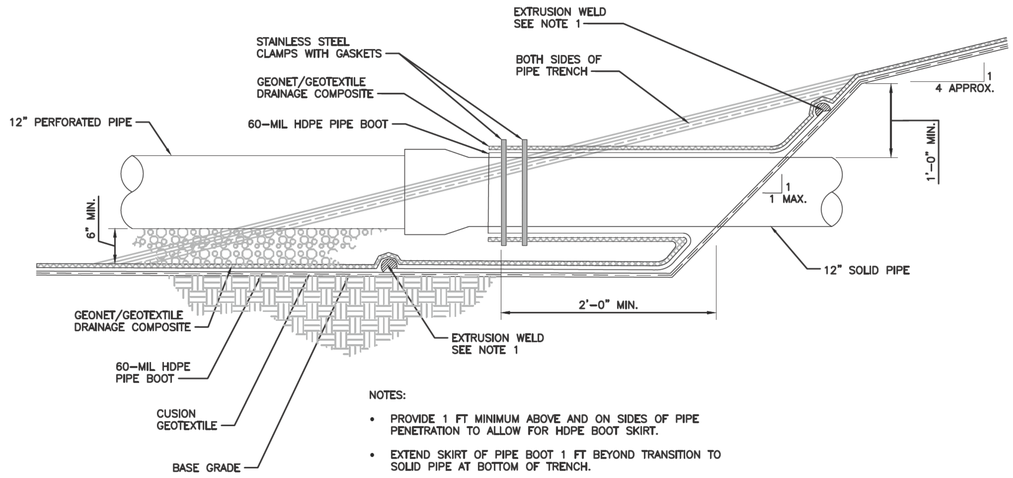


MEMBRANE/GRADE BEAM CONNECTION (1)
NTS



NOTES:

- PROVIDE 1 FT MINIMUM ABOVE AND ON SIDES OF PIPE PENETRATION TO ALLOW FOR HDPE BOOT SKIRT.
- EXTEND SKIRT OF PIPE BOOT 1 FT BEYOND TRANSITION TO SOLID PIPE AT BOTTOM OF TRENCH.

MEMBRANE PIPE PENETRATION BOOT (2)
NTS

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER — PRELIMINARY

NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: VANEXCO RESTORATION DETAILS

DESIGN:	DRS	START DATE:	2/2/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/3/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-006	1/1	

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STORM & SANITARY SEWER ITEMS:

CATCH BASINS/INLETS:

1. AREA INLETS SHALL BE PRECAST CONCRETE.
2. PRECAST CONCRETE CATCH BASINS SHALL BE PRODUCED WITH A MINIMUM AMOUNT OF STEEL REINFORCEMENT USED TO REINFORCE THE AREA AROUND THE KNOCKOUTS. STEEL REINFORCING SHALL CONSIST OF A NO. 3 HORIZONTAL HOOP REINFORCING BAR LOCATED ABOVE THE KNOCKOUTS AND NO. 3 VERTICAL REINFORCING BAR IN EACH CORNER, EXTENDING A MINIMUM OF 18 INCHES BELOW THE TOP SURFACE OF EACH CATCH BASIN.
3. CATCH BASIN TYPE I SHALL CONTAIN ONE HOOP OF NO. 3 REINFORCING BAR AROUND THE TOP PERIMETER.
4. KNOCKOUTS OR CUTOUTS MAY BE PLACED ON ALL FOUR SIDES AND MAY BE ROUND OR D-SHAPED.
5. CASTINGS FOR METAL FRAMES FOR CATCH BASINS AND INLETS SHALL BE CAST STEEL, GRAY IRON, OR DUCTILE IRON, AND AS SHOWN IN THE PLANS. CASTINGS FOR GRATES AND SOLID METAL COVERS FOR CATCH BASINS AND INLETS SHALL BE CAST STEEL OR DUCTILE IRON AND AS SHOWN IN THE PLANS.
6. LEVELING PADS ARE ALLOWED ON GRATES AND SOLID METAL COVERS WITH A HEIGHT NOT TO EXCEED 1/8 INCH. THE PRODUCING FOUNDRY'S NAME AND MATERIAL DESIGNATION SHALL BE EMBOSSED ON THE TOP OF THE GRATE. THE MATERIAL SHALL BE IDENTIFIED BY THE FOLLOWING: "CS" FOR CAST STEEL OR "DUC" OR "DI" FOR DUCTILE IRON AND SHALL BE LOCATED NEAR THE PRODUCING FOUNDRY'S NAME.
7. GRATES AND COVERS SHALL BE SEATED PROPERLY TO PREVENT ROCKING. AFTER SEATING, THE FRAME AND GRATE OR FRAME AND COVER SHALL BE MAINTAINED AS A UNIT.

MANHOLES:

1. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF AASHTO M 199. JOINTS MAY BE TONGUE AND GROOVE TYPE OR SHIPLAP TYPE, SUFFICIENTLY DEEP TO PREVENT LATERAL DISPLACEMENT.
2. CASTINGS FOR MANHOLE RINGS SHALL BE GRAY IRON OR DUCTILE IRON AND COVERS SHALL BE DUCTILE IRON. ALL COVERS SHALL BE INTERCHANGEABLE WITHIN THE DIMENSIONS SHOWN ON THE PLANS. ALL MATING SURFACES SHALL BE MACHINE FINISHED TO ENSURE NON-ROCKING FIT.
3. THE INSIDE VERTICAL RECESSED FACE OF THE RING AND THE VERTICAL OUTSIDE EDGE OF THE COVER SHALL BE MACHINED OR MANUFACTURED TO A TOLERANCE OF ±3/32 INCH.
4. ALL MANHOLE RINGS AND COVERS SHALL BE IDENTIFIED BY THE NAME OR SYMBOL OF THE PRODUCING FOUNDRY AND COUNTRY OF ORIGIN. THIS IDENTIFICATION SHALL BE IN A PLAINLY VISIBLE LOCATION WHEN THE RING AND COVER ARE INSTALLED. DUCTILE IRON SHALL BE IDENTIFIED BY THE FOLLOWING, "DUC" OR "DI". THE PRODUCING FOUNDRY AND MATERIAL IDENTIFICATION SHALL BE ADJACENT TO EACH OTHER AND SHALL BE A MINIMUM 1/2 INCH TO 1 INCH HIGH LETTERS, RECESSED TO BE FLUSH WITH THE ADJACENT SURFACES.

STORM SEWER PIPE:

1. STORM SEWER PIPE SHALL BE EITHER DUCTILE IRON PIPE OR DOUBLE WALLED POLYPROPYLENE PIPE.
2. POLYPROPYLENE PIPE SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
   A. FOR PIPE SIZES UP TO 30 INCHES: ASTM F 2736.
   B. FOR PIPE SIZES FROM 30 TO 60 INCHES: ASTM F 2764.
   C. FITTINGS SHALL BE FACTORY WELDED, INJECTION MOLDED, OR PVC.
3. ALL JOINTS FOR CORRUGATED POLYPROPYLENE PIPE SHALL BE MADE WITH A BELL/BELL OR BELL AND SPIGOT COUPLING AND SHALL CONFORM TO ASTM D 3212 USING ELASTOMERIC GASKETS CONFORMING TO ASTM F 477. ALL GASKETS SHALL BE FACTORY INSTALLED ON THE PIPE IN ACCORDANCE WITH THE PRODUCER'S RECOMMENDATIONS. A MANUFACTURER'S CERTIFICATE OF COMPLIANCE SHALL BE REQUIRED AND SHALL ACCOMPANY THE MATERIALS DELIVERED TO THE SITE. THE CERTIFICATE SHALL CLEARLY IDENTIFY PRODUCTION LOTS FOR ALL MATERIALS REPRESENTED.

SANITARY SEWER PIPE:

SANITARY SEWER PIPE SHALL BE PVC, DUCTILE IRON, OR HDPE PIPE.

1. SOLID WALL PVC PIPE AND FITTINGS SHALL BE SOLID WALL CONSTRUCTION AND SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
   A. FOR PIPE SIZES UP TO 15 INCHES: ASTM 3034 SDR 35.
   B. JOINTS FOR SOLID WALL PVC PIPE SHALL CONFORM TO ASTM D 3212 USING ELASTORMERIC GASKETS CONFORMING TO ASTM F 477.
   C. FITTINGS FOR SOLID WALL PVC PIPE SHALL BE INJECTION MOLDED, FACTORY WELDED, OR FACTORY SOLVENT CEMENTED.
2. DUCTILE IRON PIPE SHALL CONFORM TO ANSI A 21.51 OR AWWA C151 AND SHALL BE CEMENT MORTAR LINED AND HAVE 1-MIL SEAL COAT PER AWWA C104 OR A CERAMIC-FILLED, AMINE-CURED NOVALAC EPOXY LINING AS INDICATED ON THE PLANS. THE DUCTILE IRON PIPE SHALL BE SPECIAL THICKNESS CLASS 50, MINIMUM PRESSURE CLASS 350, OR THE CLASS INDICATED ON THE PLANS. NON-RESTRAINED JOINTS SHALL BE RUBBER GASKET TYPE, PUSH ON TYPE, OR MECHANICAL TYPE, AND SHALL MEET THE REQUIREMENTS OF AWWA C111.
3. CAST IRON FITTINGS MAY BE USED WITH DUCTILE IRON PIPE. SADDLES FASTENED TO PIPE WITH EXTERNAL BANDS WILL NOT BE ACCEPTABLE ON ANY NEW SYSTEM. NORMALLY, ALL FITTINGS SHALL BE THE SAME MATERIAL AS THE PIPE BEING CONNECTED, EXCEPT THAT FITTINGS USING OTHER MATERIALS OR CONSTRUCTED WITH MORE THAN ONE MATERIAL MAY BE USED SUBJECT TO THE APPROVAL OF THE ENGINEER. FITTINGS SHALL HAVE SUFFICIENT STRENGTH TO WITHSTAND HANDLING AND LOAD STRESSES NORMALLY ENCOUNTERED.

STORMWATER TREATMENT UNITS:

STORMWATER FILTER VAULTS FOR ENHANCED TREATMENT SHALL BE CONTECH STORM FILTER WITH METAL RX MEDIA.

1. STORMWATER FILTER VAULTS FOR BASIC TREATMENT SHALL BE ZPG.
2. OIL/WATER SEPARATORS SHALL BE COALESCING PLATE TYPE.
3. FLOOR DRAINS SHALL BE ZURN Z1726 OR APPROVED EQUAL.

STORM & SANITARY SEWER ITEMS (CONTINUED:

CASING NOTES:

1. ALL CASINGS AND INSTALLATION SHALL MEET THE MINIMUM REQUIREMENTS FOR THE PORT OF VANCOUVER, AND BNSF UTILITY ACCOMMODATION POLICY MANUAL.
2. ALL CASINGS UNDER RAIL SHALL EXTEND A MINIMUM 12-FEET FROM TRACK CENTERLINE AND SHALL EXTEND 10-FEET FROM THE EDGE OF ALL PROPOSED STRUCTURES.
3. CASINGS SHALL BE EXTERNALLY COATED WITH A MINIMUM TWO COATS OF EPOXY AS RECOMMENDED BY THE COATING SUPPLIER.
4. UTILITIES SHALL BE SLEAVED WITHIN CASING USING CASING SPACERS OR SKIDS AT RECOMMENDED SPACINGS FOR THE UTILITY MATERIAL TYPE AND AS RECOMMENDED BY THE SPACER MANUFACTURER.
5. CASING ENDS SHALL BE SEALED AND WATER-TIGHT WITH CASING END SEALS.
6. MINIMUM CASING THICKNESSES ARE AS FOLLOWS:

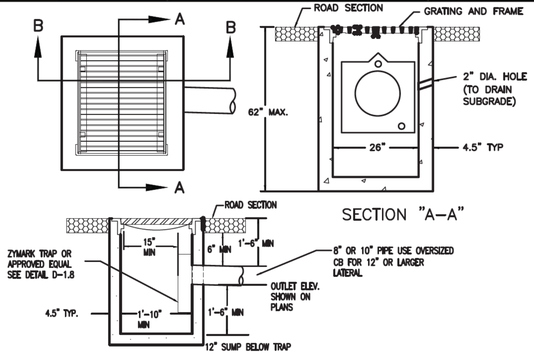
CASING DIAMETER	WALL THICKNESS
14" AND SMALLER	0.375"
16"-32"	0.625"
36"-48"	0.625"

7. FOR WATER MAIN CASINGS FILL ANNULAR SPACE WITH BLOWN IN SAND.

CONSTRUCTION NOTES FOR STORM SEWERS

GENERAL STORM WATER CONSTRUCTION NOTES

1. ALL MATERIALS AND INSTALLATION OF STORM SEWERS AND DRAINAGE SYSTEMS SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS IN THE CITY OF VANCOUVER'S LATEST VERSION OF "GENERAL REQUIREMENTS AND STANDARD DETAILS MANUAL" AND THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION (APWA) AND THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, WHERE THE CITY OF VANCOUVER GENERAL REQUIREMENTS SHALL TAKE PRECEDENCE. WHEREVER THE STANDARD SPECIFICATIONS REFER TO THE OWNER AS EITHER THE "STATE" OR "SECRETARY" OR WHEN REFERENCE IS MADE TO THE DEPARTMENT OF TRANSPORTATION IT SHALL BE UNDERSTOOD THAT THE STANDARD SPECIFICATIONS SHOULD READ THE "CITY".
2. ALL PUBLIC STORM SEWER AND DRAINAGE SYSTEM CONSTRUCTION IS SUBJECT TO INSPECTION AND APPROVAL BY THE ENERGY FACILITY SITE EVALUATION COUNCIL OR ITS DESIGNEE IN ACCORDANCE WITH THE CONDITIONS OF THE APPROVED SITE CERTIFICATION AGREEMENT. THE CONTRACTOR SHALL NOTIFY EFSEC OR ITS DESIGNEE PRIOR TO THE START OF ANY CONSTRUCTION.
3. THE CONTRACTOR IS REQUIRED TO NOTIFY ALL UTILITIES 48 HOURS PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR MAY CONTACT THE NORTHWEST UTILITY NOTIFICATION CENTER AT 1-800-424-5555 IN LIEU OF CONTACTING INDIVIDUAL UTILITIES.
4. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER AND/OR CONTRACTOR TO PROCURE AND COMPLY WITH THE PROVISIONS OF ALL APPLICABLE PERMITS, EASEMENTS, LICENSES AND CERTIFICATES IN CONJUNCTION WITH THE CONSTRUCTION OF STORM SEWERS AND DRAINAGE SYSTEMS. COMPLIANCE SHALL BE AT ALL LEVELS; FEDERAL, STATE, AND CITY, RELATING TO THE PERFORMANCE OF THIS WORK. WORK WITHIN THE PUBLIC RIGHT OF WAY WILL BE CONDUCTED IN ACCORDANCE WITH THE APPROVED SITE CERTIFICATION AGREEMENT.
5. THE CONTRACTOR SHALL OBTAIN AND SUBMIT AN APPROVED TRAFFIC CONTROL PLAN PRIOR TO BEGINNING CONSTRUCTION. THE PLAN WILL BE PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF THE APPROVED SITE CERTIFICATION AGREEMENT.
6. ALL EROSION CONTROL BEST MANAGEMENT PRACTICES (BMPs) SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE EROSION CONTROL PLAN AND EROSION CONTROL DETAILS, PRIOR TO START OF ANY CONSTRUCTION OR LAND DISTURBING ACTIVITY.
7. THE CONTRACTOR SHALL OBTAIN ALL OFFSITE CONSTRUCTION EASEMENTS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL VERIFY THAT ALL OFFSITE UTILITIES EASEMENTS HAVE BEEN OBTAINED BY THE OWNER PRIOR TO THE COMMENCEMENT OF ANY OFFSITE CONSTRUCTION.
8. THE CONTRACTOR IS TO VERIFY AND REPORT ANY DISCREPANCIES IMMEDIATELY TO THE ENGINEER. ITEMS TO VERIFY INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
   -INVERT AND TOP ELEVATIONS OF EXISTING STORM SEWERS
   -CENTERLINE AND TOP OF CURB ELEVATIONS
9. WATER QUALITY DEVICES WILL BE INSTALLED AND FUNCTIONING PRIOR TO COMMENCING WITH INSTALLATION OF PAVEMENT FOR ALL AREAS DRAINING INTO THE WATER QUALITY SYSTEM. VEGETATION IN BIO-FILTRATION SWALE AND POND SYSTEMS SHALL BE ESTABLISHED AND MECHANICAL DEVICES AND FILTER MEDIA SHALL BE INSTALLED. SWALES AND FILTER STRIPS WILL BE SEEDED WITH AN APPROVED SEED MIX, PER THE WESTERN WASHINGTON MANUAL. TURF IS ALLOWED FOR VEGETATED FILTERS PROVIDED THE TURF AREA IS OVERSEEDED WITH THE EQUIVALENT GRASS SEED MIX.
10. ALL NEW CATCH BASINS SHALL BE STENCILED WITH APPROPRIATE STENCIL DEPENDING ON STORMWATER DISCHARGE FROM SITE. CONTACT (360) 487-7130 TO DETERMINE THE PROPER STENCIL FOR YOUR SITE. CONTACT (360) 487-7800 TO PURCHASE STENCIL KITS.
11. ROOF DOWNSPOUT RUNOFF MUST BE RETAINED ON EACH SPECIFIC SITE. DOWNSPOUTS SHALL NOT DRAIN TO THE STREET OR ANY ADJACENT PROPERTIES UNLESS SPECIFIC APPROVAL HAS BEEN OBTAINED.
12. THE CONTRACTOR SHALL PROVIDE A TELEVISION REPORT, TAPE, AND TABULAR AS-BUILT OF ALL PUBLIC STORM MAINS AND LATERALS PRIOR TO PAVING. THIS TV INFORMATION SHALL BE SUBMITTED TO EFSEC OR ITS DESIGNEE FOR REVIEW. TV INSPECTION SHALL DEMONSTRATE NO MANUFACTURING OR INSTALLATION DEFECTS, OR ANY DEBRIS IN THE LINES, FOR APPROVAL AND ACCEPTANCE BY EFSEC.

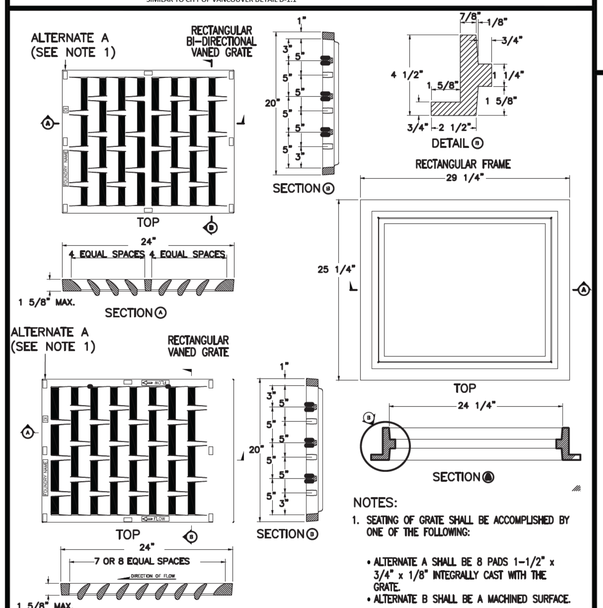


NOTES:

1. LATERALS WILL BE CONSTRUCTED TO ENTER THE BASIN PERPENDICULAR TO THE BASIN WALL. THE LATERAL WILL ENTER ONLY AT THE FRONT OR SIDE OF THE BASIN WITH NO LATERALS ALLOWED TO ENTER THE CATCH BASIN AT THE CORNERS. IF NEEDED, A BEND MAY BE USED AS THE FIRST SECTION OF PIPE OUTSIDE THE BASIN WALL. THE MAXIMUM BEND ALLOWED IS 45 DEGREES.
2. ALL REINFORCED STEEL SHALL HAVE A 1-1/2" CLEAR COVER UNLESS OTHERWISE NOTED, AND SHALL BE GRADE 40 OR GRADE 60 (ASTM A-615).
3. ANY PROTRUDING ENDS OF PIPES SHALL BE TRIMMED FLUSH WITH THE INSIDE WALLS AND GROUTED.
4. THE METAL FRAME AND GRATE SHALL BE SET TO A SLOPE TO CONFORM TO THE PARTICULAR DRAINAGE PROBLEM. SEE DETAIL D-1.7
5. APPLY STENCIL ON PAVEMENT IN FRONT OF CATCH BASIN. STENCIL TO SAY "ONLY RAIN DOWN THE DRAIN" AND REFERENCE PROTECTION OF THE OF THE CREEK, RIVER OR GROUNDWATER. STENCILS ARE AVAILABLE FOR PURCHASE AT THE CITY'S DEVELOPMENT REVIEW SERVICES PERMIT COUNTER.

STANDARD CATCH BASIN DETAIL (1)

SCALE: NTS
SIMILAR TO CITY OF VANCOUVER DETAIL D-1.1

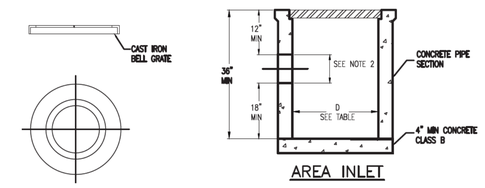


NOTES:

1. SEATING OF GRATE SHALL BE ACCOMPLISHED BY ONE OF THE FOLLOWING:
   - ALTERNATE A SHALL BE 8 PADS 1-1/2" x 3/4" x 1/8" INTEGRALLY CAST WITH THE GRATE.
   - ALTERNATE B SHALL BE A MACHINED SURFACE.

STANDARD RECTANGULAR VANED GRATE & FRAME DETAIL (3)

SCALE: NTS
SIMILAR TO CITY OF VANCOUVER DETAIL D-1.1



AREA INLET

NOTES:

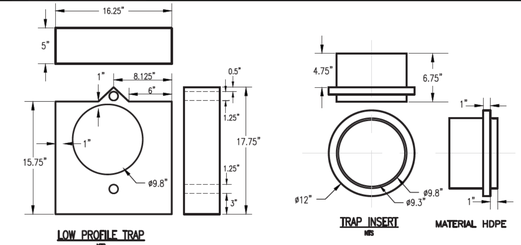
1. AREA INLETS TO BE CONSTRUCTED FROM CONCRETE PIPE, IN ACCORDANCE WITH ASTM C 14 UNLESS OTHERWISE SHOWN ON THE PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
2. CUTOUT HOLE SIZE IS EQUAL TO OUTLET PIPE OUTSIDE DIAMETER PLUS AREA INLET WALL THICKNESS. INSTALL TYPE 60A TRAP OR APPROVED EQUAL.
3. CONNECTION TO OUTLET PIPE TO BE GROUTED AND MADE FLUSH WITH INSIDE OF THE AREA INLET WALL.
4. CAST IRON BELL GRATE SHALL MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-621D. THE GRATE SHALL HAVE SLOTS (HOLES) THAT CONSTITUTE 50% OPEN AREA FOR DRAINAGE. INLET BELL SURFACE SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.

TABLE 1

OUTLET PIPE DIA Ø	INLET DIA (D)
6"	12"
8"	18"
12"	24"

STANDARD AREA INLET DETAIL (2)

SCALE: NTS
SIMILAR TO CITY OF VANCOUVER DETAIL D-1.6



CATCH BASIN TRAP DETAIL (4)

SCALE: NTS
SIMILAR TO CITY OF VANCOUVER DETAIL D-1.8

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NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
CIVIL DETAILS - 3
STORM DETAILS - 1

DESIGN:	DRS	START DATE:	2/24/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/26/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-009	1/1	

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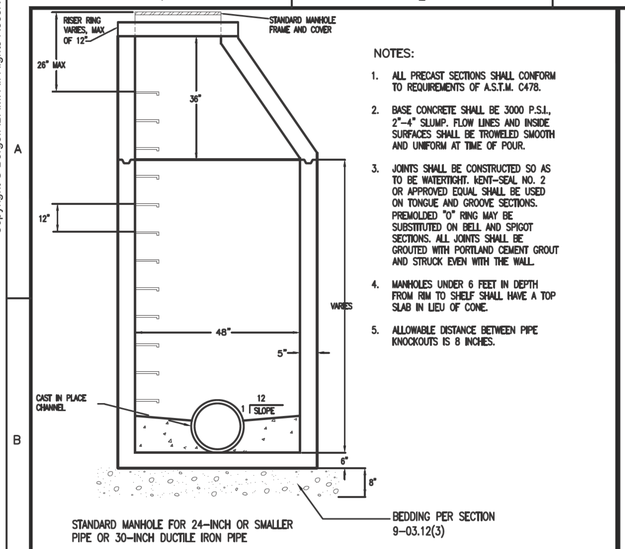


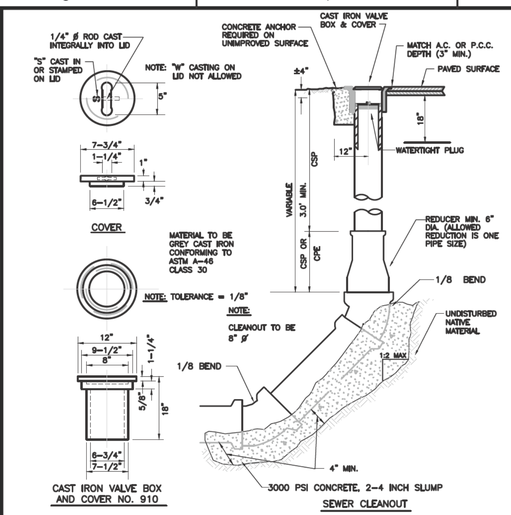
NOTES:

1. ALL PRECAST SECTIONS SHALL CONFORM TO REQUIREMENTS OF A.S.T.M. C478.
2. BASE CONCRETE SHALL BE 3000 P.S.I., 2"–4" SLUMP. FLOW LINES AND INSIDE SURFACES SHALL BE TROWELED SMOOTH AND UNIFORM AT TIME OF POUR.
3. JOINTS SHALL BE CONSTRUCTED SO AS TO BE WATERTIGHT. KENT–SEAL NO. 2 OR APPROVED EQUAL SHALL BE USED ON TONGUE AND GROOVE SECTIONS. PREMOLDED "O" RING MAY BE SUBSTITUTED ON BELL AND SPIGOT SECTIONS. ALL JOINTS SHALL BE GROUTED WITH PORTLAND CEMENT GROUT AND STRUCK EVEN WITH THE WALL.
4. MANHOLES UNDER 6 FEET IN DEPTH FROM RIM TO SHELF SHALL HAVE A TOP SLAB IN LIEU OF CONE.
5. ALLOWABLE DISTANCE BETWEEN PIPE KNOCKOUTS IS 8 INCHES.

STANDARD MANHOLE FOR 24–INCH OR SMALLER PIPE OR 30–INCH DUCTILE IRON PIPE

STANDARD MANHOLE DETAIL 1

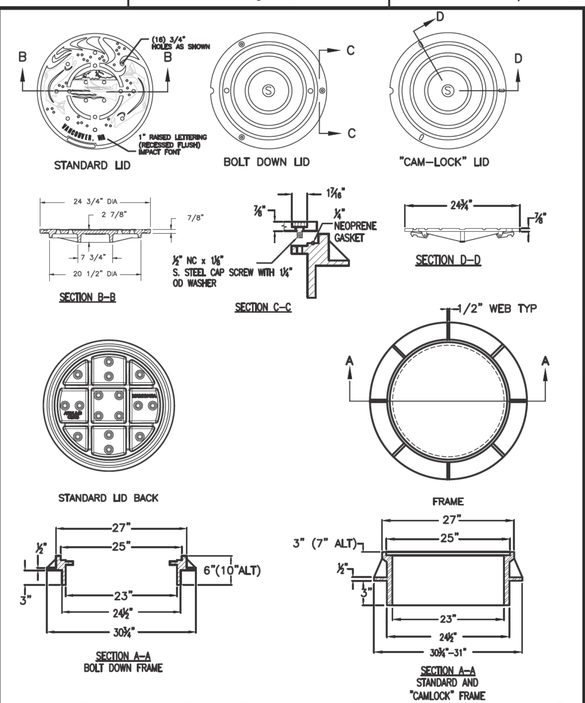
SCALE: NTS
SIMILAR TO CITY OF VANCOUVER DETAIL D-2.0



VALVE BOX SHALL BE FORT VANCOUVER
PATTERN NO. 910 CAST IRON OR APPROVED EQUAL

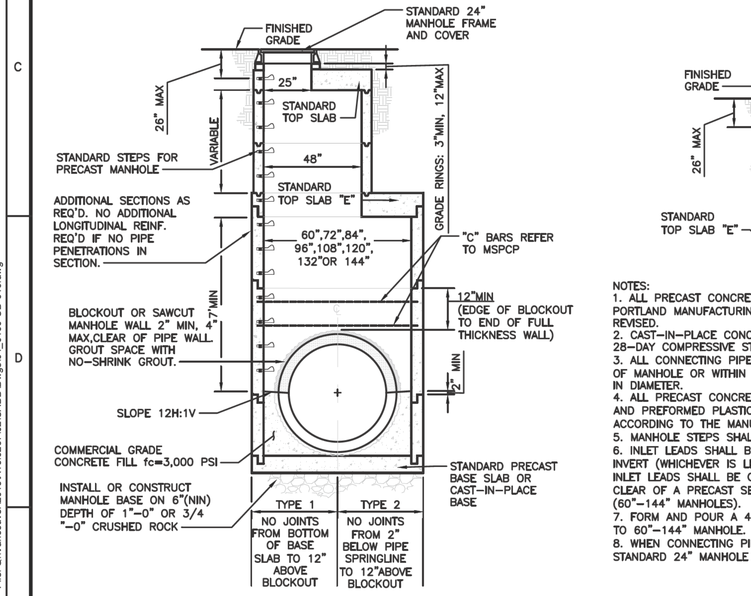
STANDARD SEWER CLEANOUT DETAIL 2

SCALE: NTS
SIMILAR TO CITY OF VANCOUVER DETAIL D-2.3



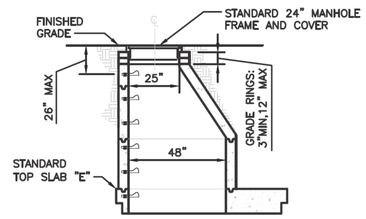
MANHOLE COVER AND FRAME STANDARD DETAIL 3

SCALE: NTS
SIMILAR TO CITY OF VANCOUVER DETAIL D-2.4



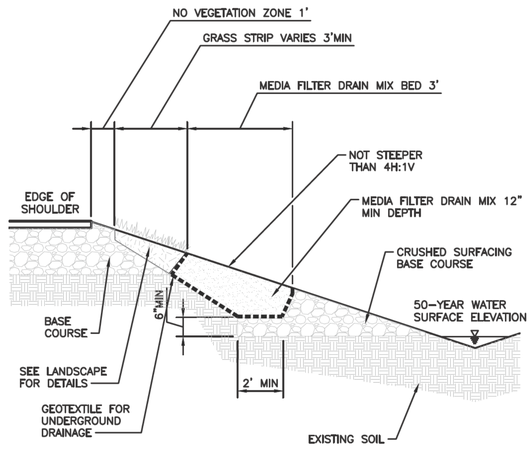
60"–144" MANHOLE 5

NTS



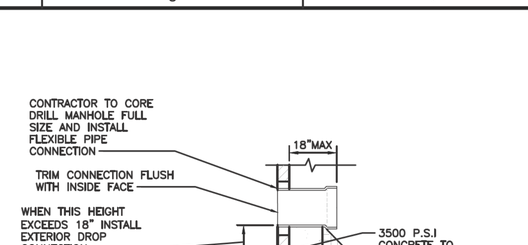
NOTES:
1. ALL PRECAST CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE CITY OF PORTLAND MANUFACTURING STANDARDS FOR PRECAST CONCRETE PRODUCTS (MSPCP),AS REVISED.
2. CAST–IN–PLACE CONCRETE SHALL BE STRUCTURAL CONCRETE HAVING A MINIMUM 28–DAY COMPRESSIVE STRENGTH OF 4,00PSI.
3. ALL CONNECTING PIPE SHALL HAVE A FLEXIBLE JOINT WITHIN 18" OF OUTSIDE WALL OF MANHOLE OR WITHIN ONE HALF THE DIAMETER IN LENGTH IF THE PIPE IS OVER 36" IN DIAMETER.
4. ALL PRECAST CONCRETE SECTIONS SHALL HAVE KEYED OR BELL & SPIGOT JOINTS AND PREFORMED PLASTIC SEALS (MASTIC) OR PREFORMED RUBBER GASKET SEALS ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.
5. MANHOLE STEPS SHALL BE PLACED A MINIMUM OF 5" FROM PRECAST SECTION JOINT.
6. INLET LEADS SHALL BE CONNECTED 8' BELOW RIM OR 14"ABOVE LOWEST PIPE INVERT (WHICHEVER IS LESS), UNLESS SHOWN OTHERWISE ON THE PLANS. IN ALL CASES INLET LEADS SHALL BE CONNECTED BELOW THE CONE SECTION, A MINIMUM OF 8" CLEAR OF A PRECAST SECTION JOINT AND 12" CLEAR OF JOINT IN BASE SECTION (60"–144" MANHOLES).
7. FORM AND POUR A 4"X4" EXTERIOR CONCRETE COLLAR AROUND PIPE CONNECTIONS TO 60"–144" MANHOLE.
8. WHEN CONNECTING PIPE OR THROUGH PIPE IS LES THAN 48" DIAMETER. USE STANDARD 24" MANHOLE FRAME AND COVER.

(SIDE SLOPE APPLICATION WITHOUT UNDERDRAIN)



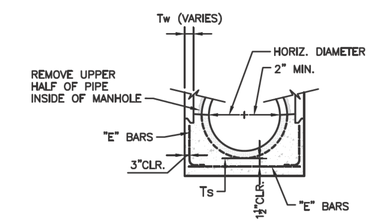
MEDIA FILTER DRAIN 6

NTS



CONNECTION TO EXISTING MANHOLE 4

NTS
SIMILAR TO CITY OF VANCOUVER DETAIL D-2.4



CAST–IN PLACE BASE FOR 60"–144" MANHOLES
1. CONCRETE SHALL BE STRUCTURAL 28–DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
2. REINFORCING STEEL SHALL HAVE A YIELD STRENGTH OF 60,000 PSI
3. PROVIDE GROUT OR PREFORMED PLASTIC SEAL (MASTIC) AT JOINT WITH PRECAST MANHOLE SECTION. GROUT OR SEAL NOT REQUIRED WHEN WHEN BASE CAST IN CONTACT WITH PRECAST SECTION.

MH SIZE	DEPTH (INVERT TO STREET)	MH SIZE	MH SIZE	MH SIZE
60"	0–15'	7"	#4@ 10"	#4@ 10"
	15'–30'	9"	#4@ 9"	#4@ 9"
72"	0–15'	7"	#4@ 7"	#4@ 7"
	15'–30'	9"	#4@ 6"	#4@ 6"
84"	0–15'	8"	#4@ 6"	#4@ 6"
	15'–30'	10"	#5@ 9"	#5@ 9"
96"	0–15'	9"	#4@ 6"	#4@ 6"
	15'–30'	11"	#5@ 7"	#5@ 7"
108"	0–15'	10"	#5@ 9"	#5@ 9"
	15'–30'	12"	#6@ 9"	#6@ 9"
120"	0–15'	11"	#5@ 8"	#5@ 8"
	15'–30'	13"	#6@ 8"	#6@ 8"
132"	0–15'	12"	#5@ 8"	#5@ 8"
	15'–30'	14"	#6@ 7"	#6@ 7"
144"	0–15'	13"	#5@ 7"	#5@ 7"
	15'–30'	16"	#6@ 7"	#6@ 7"

MANHOLE OVER EXISTING SEWER 7

NTS

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
CIVIL DETAILS – 4
STORM DETAILS – 2

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100–CD–010	1/1	

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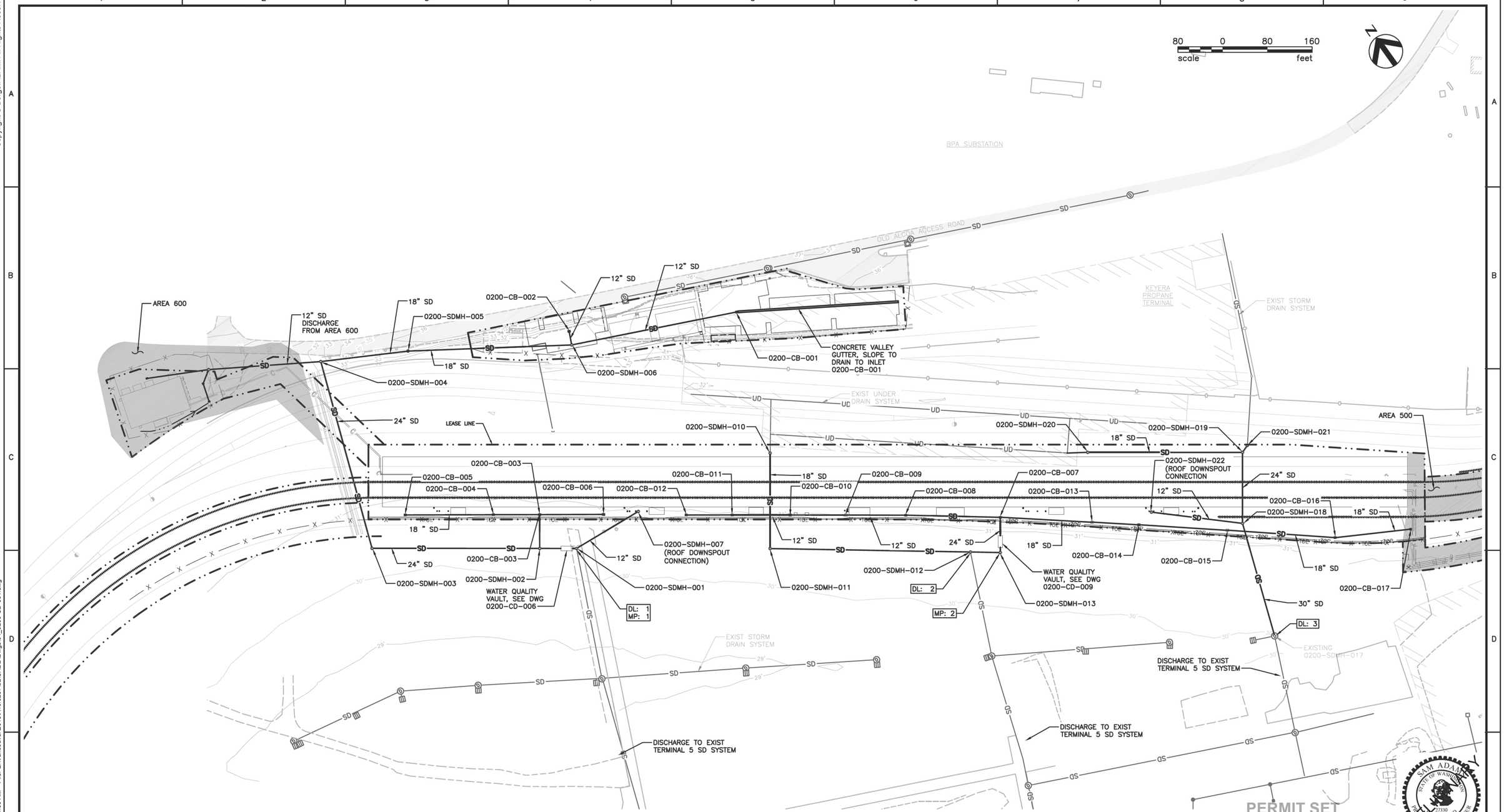

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Portland, Oregon 97232-4189
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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
GRADING & DRAINAGE OVERVIEW

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-001	1/1	

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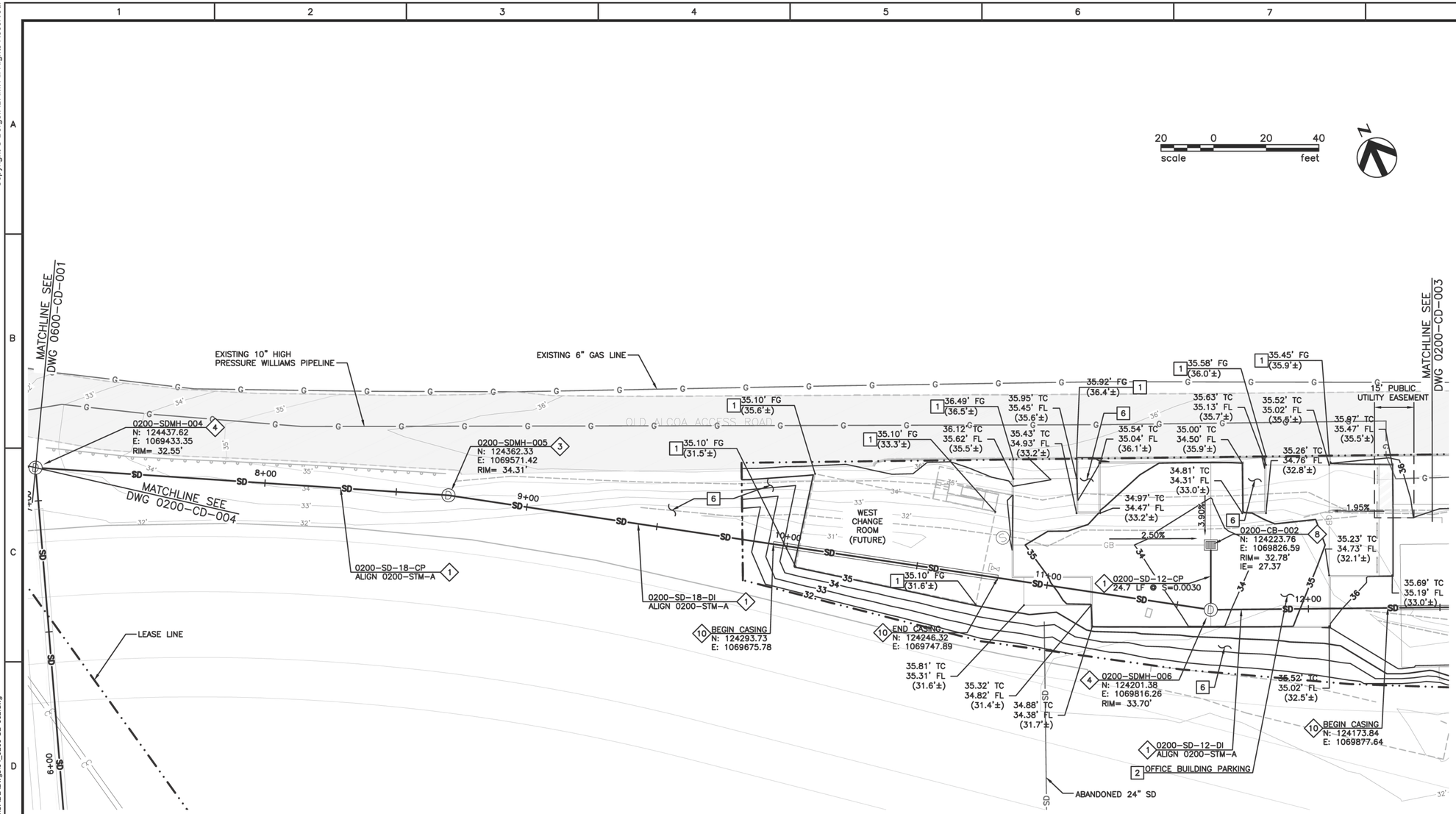


GRADING NOTES:

1. SEE SITE PLAN 0200-SP-001 FOR SITE LAYOUT INFORMATION.

[1] MATCH EXISTING SURFRACE. CONSTRUCT SUBRGRADE TO GRADUALLY TIE INTO EXISTING SURFACE. APPROXIMATE ELEVATIONS ARE SHOWN. WHERE MATCHING INTO EXISTING ASPHALT, SAWCUT MINIMUM 1' OF EXISTING ASPHALT AND MATCH EXISTING ASPHALT THICKNESSES AND APPLY ASPHALT JOINT SEALER.

[2] GRADE ASPHALT CONCRETE PARKING, DRIVE AISLE, AND DRIVEWAY AREAS TO THE ELEVATIONS AND GRADES SHOWN. GRADE TO ALLOW DRAINAGE TO SHEET FLOW TO CONSTRUCTED DRAINAGE CONVEYANCES AND INLETS.

[6] PERMANENT LANDSCAPING AREA – SEE LANDSCAPE PLANS FOR CONSTRUCTION DETAILS.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0200-CD-011 FOR ALIGNMENT A200-STM-A

◇1 CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

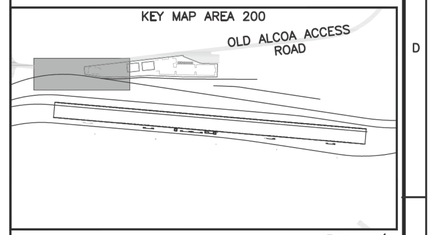
◇3 CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.

◇4 CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

◇8 CONSTRUCT AREA INLET IN ACCORDANCE WITH DETAIL 2 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

◇10 CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.

KEY MAP AREA 200



SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

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Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
GRADING & DRAINAGE PLAN – 1

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-002	1/1	

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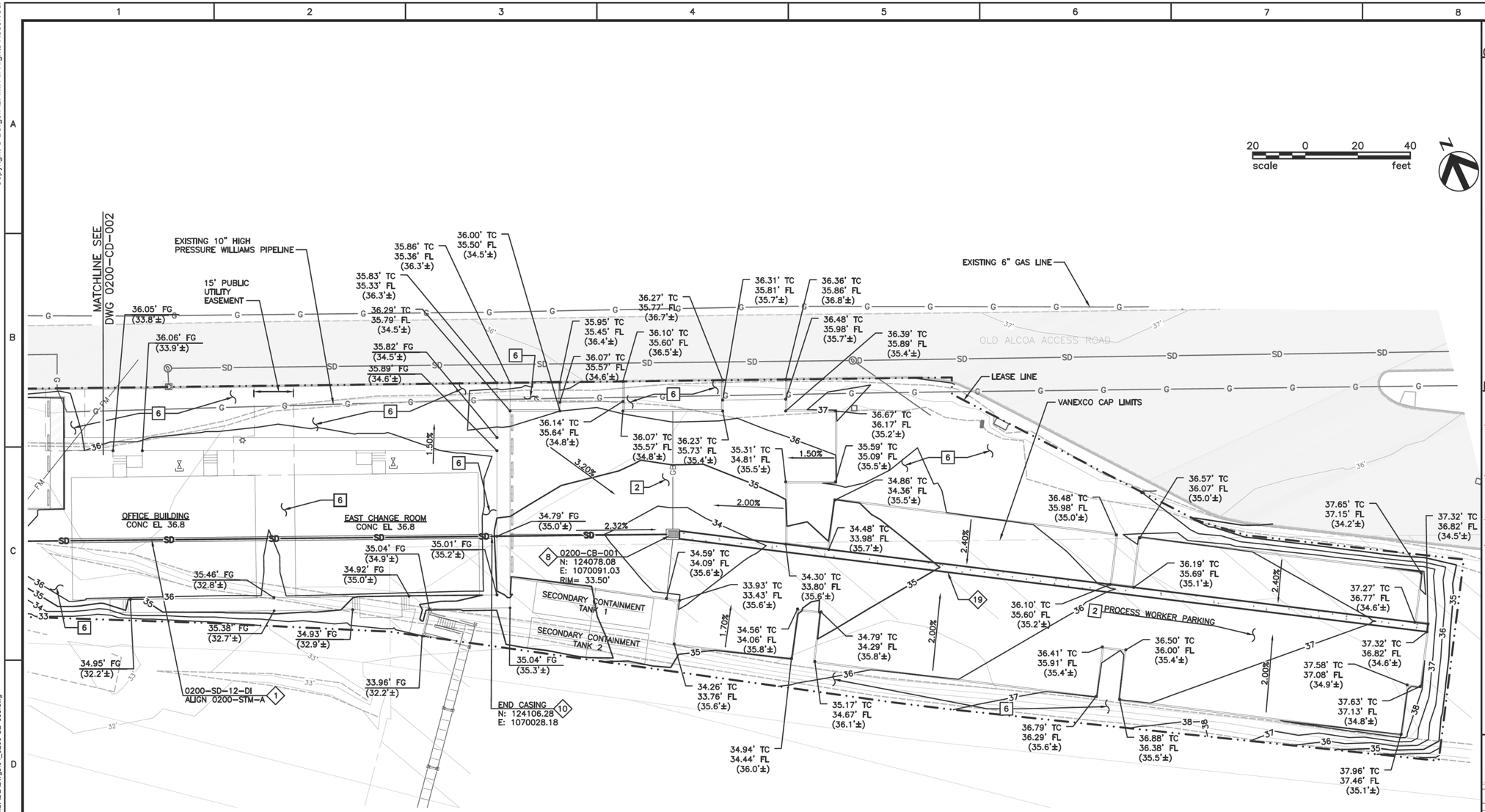


GRADING NOTES:

1. SEE SITE PLAN 0200-SP-001 FOR SITE LAYOUT INFORMATION.

[1] MATCH EXISTING SURFRACE. CONSTRUCT SUBGRADE TO GRADUALLY TIE INTO EXISTING SURFACE. APPROXIMATE ELEVATIONS ARE SHOWN. WHERE MATCHING INTO EXISTING ASPHALT, SAWCUT MINIMUM 1' OF EXISTING ASPHALT AND MATCH EXISTING ASPHALT THICKNESSES AND APPLY ASPHALT JOINT SEALER.

[2] GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS. PLACE IMPORT GRANULAR ROCK FOR YARD SURFACING. 2" MINIMUM DEPTH, COMPACTED WITH 300 LB ROLLER.

[6] PERMANENT LANDSCAPING AREA – SEE LANDSCAPE PLANS FOR CONSTRUCTION DETAILS.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0200-CD-011 FOR ALIGNMENT 0200-STM-A.

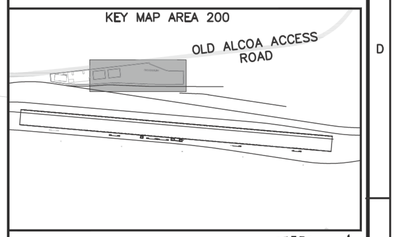
[1] CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

[8] CONSTRUCT AREA INLET IN ACCORDANCE WITH DETAIL 2 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

[10] CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.

[19] CONSTRUCT CONCRETE VALLEY GUTTER IN ACCORDANCE WITH DETAIL 7 ON DRAWING 0100-CD-007.

KEY MAP AREA 200



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SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
GRADING & DRAINAGE PLAN – 2

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-003	1/1	

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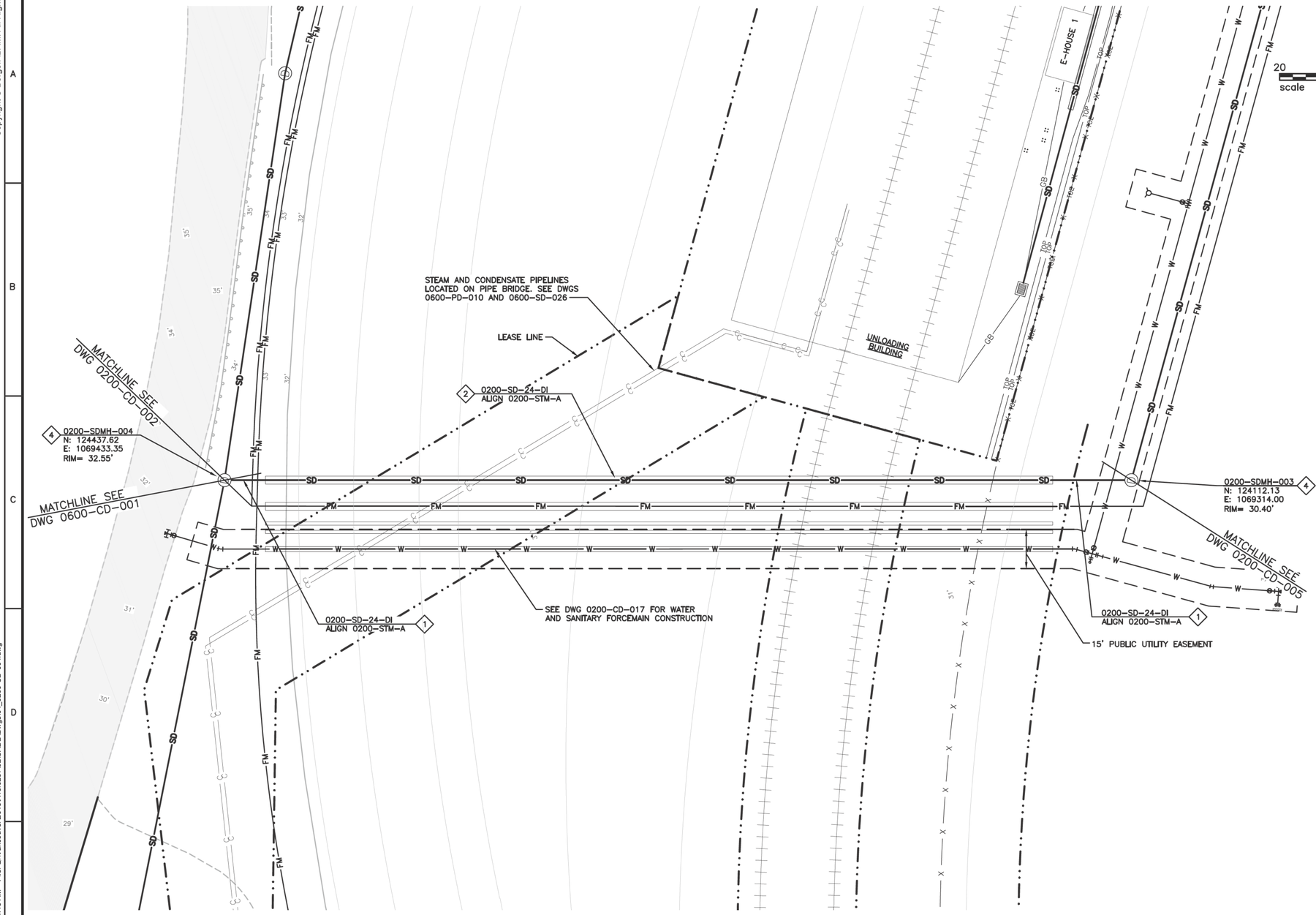


GRADING NOTES:

1. SEE SITE PLAN 0200-SP-001 FOR SITE LAYOUT INFORMATION
2. MATCH EXISTING GRADES.

DRAINAGE NOTES:

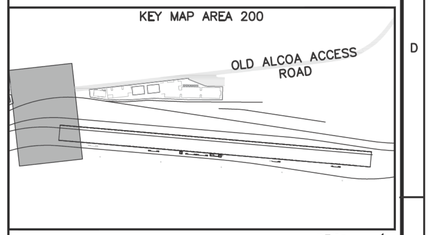
1. SEE PROFILE DWG 0200-CD-010 FOR ALIGNMENT 0200-STM-A

1 CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

2 INSTALL PROPOSED 24" DI STORM DRAIN WITHIN CASING (BY OTHERS). INSTALL WITH CASING SPACERS, @ 3 PER STICK AND END SEALS AS SPECIFIED.

4 CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

KEY MAP AREA 200



PRELIMINARY

SAM ADAMEY STATE OF WASHINGTON 17330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

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Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
GRADING & DRAINAGE PLAN – 3

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-004	1 / 1	

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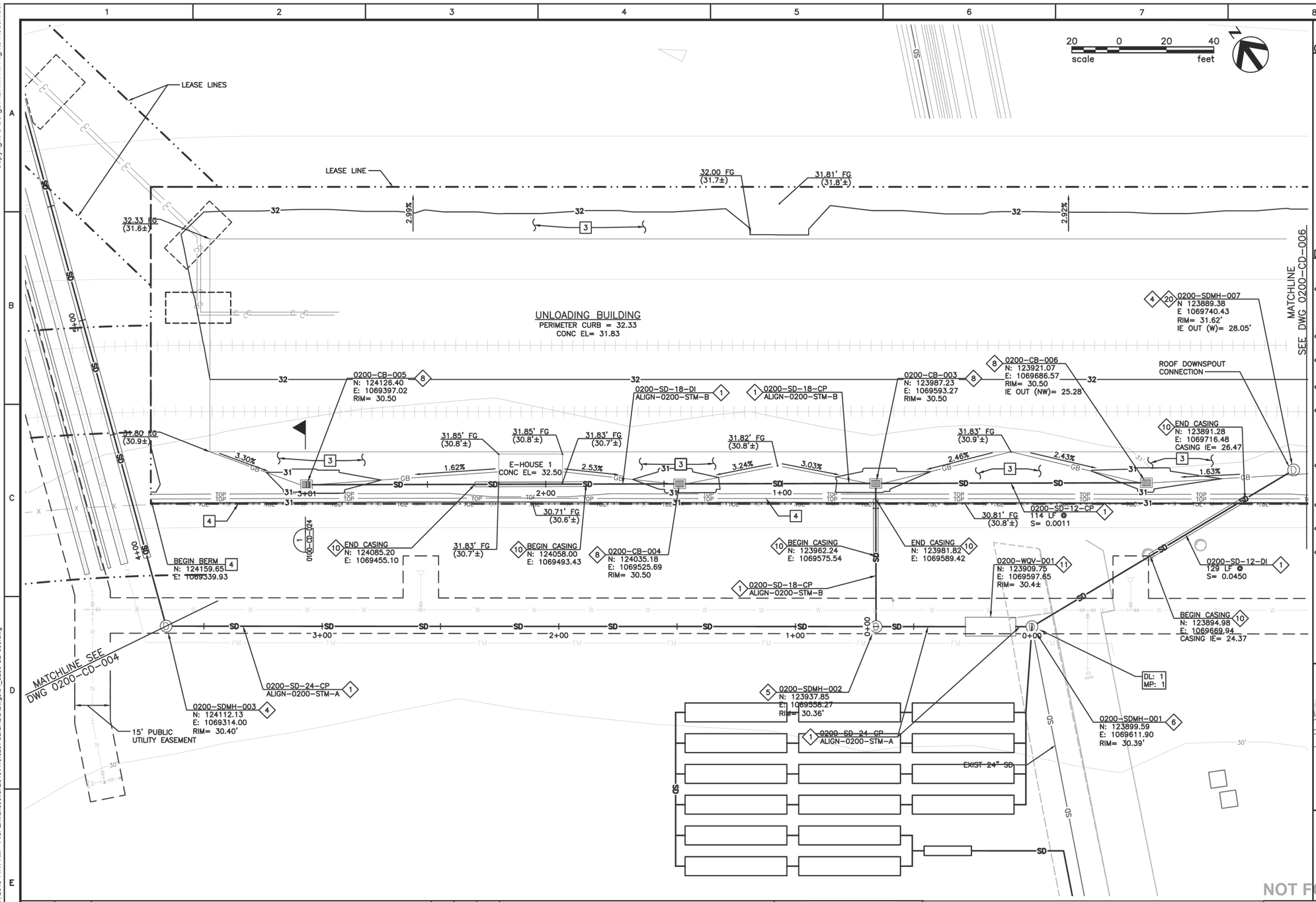


GRADING NOTES:

1. SEE SITE PLAN ON DWG 0200-SP-001 FOR SITE LAYOUT INFORMATION

[3] GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS. PLACE IMPORT GRANULAR ROCK FOR YARD SURFACING. 2" MINIMUM DEPTH, COMPACTED WITH 300 LB ROLLER.

[4] CONSTRUCTED GRADED BERM ALONG PROPOSED FENCE LINE TO ISOLATE STORMWATER FROM ENTERING PROJECT SITE. SEE SECTIONS ON DRAWING 0200-CD-024.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0200-CD-010 FOR ALIGNMENT 0200-A.
2. SEE PROFILE DWG 0200-CD-012 FOR ALIGNMENT 0200-B.

[1] CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

[4] CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

[5] CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

[6] CONSTRUCT 84" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

[7] CONSTRUCT MANHOLE OVER EXISTING STORM DRAIN PIPE IN ACCORDANCE WITH DETAIL 7 ON DRAWING 0100-CD-007. CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

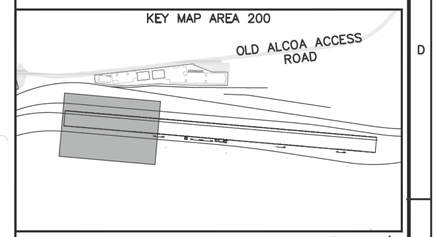
[8] CONSTRUCT AREA INLET IN ACCORDANCE WITH DETAIL 2 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

[10] CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.

[11] CONSTRUCT WATER QUALITY VAULT 0200-WQV-001 PER DETAIL 1 ON DRAWING 0200-CD-023.

[20] CONNECTION TO BUILDING GUTTER. CONSTRUCT IN ACCORDANCE WITH DETAIL 8 ON DRAWING 0100-CD-005.

KEY MAP AREA 200



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Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
GRADING & DRAINAGE PLAN – 4

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-005	1/1	

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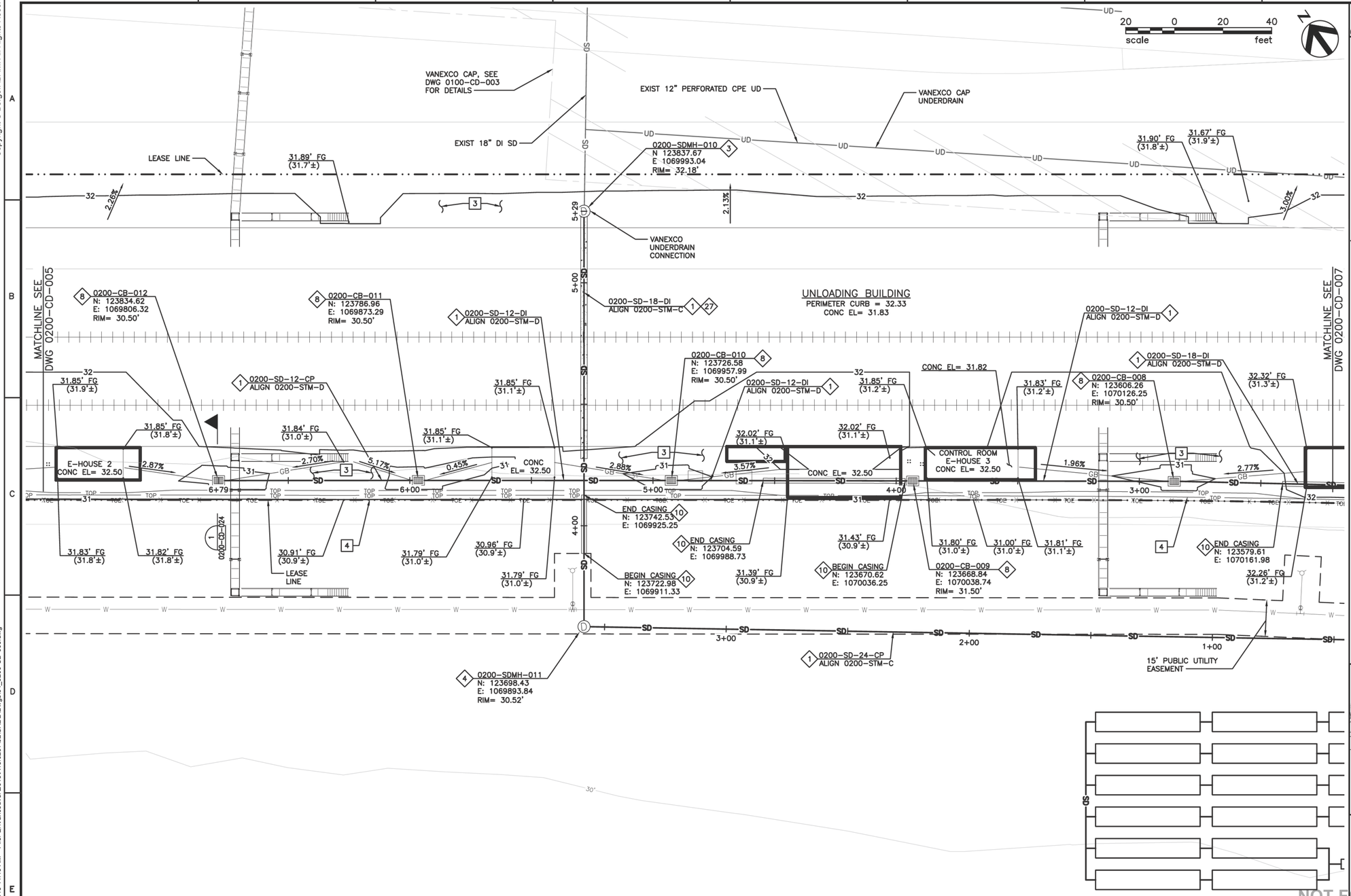


GRADING NOTES:

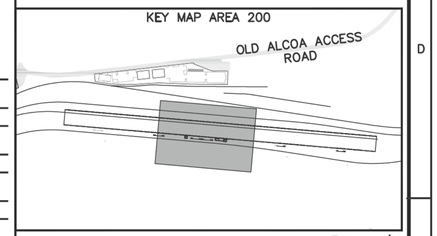
1. SEE SITE PLAN 0200-SP-001 FOR SITE LAYOUT INFORMATION.
3. GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS. PLACE IMPORT GRANULAR ROCK FOR YARD SURFACING. 2" MINIMUM DEPTH, COMPACTED WITH 300 LB ROLLER.
4. CONSTRUCTED GRADED BERM ALONG PROPOSED FENCE LINE TO ISOLATE STORMWATER FROM ENTERING PROJECT SITE. SEE SECTIONS ON DRAWING 0200-CD-024.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0200-CD-013 FOR ALIGNMENT 0200-STM-C.
2. SEE PROFILE DWG 0200-CD-013 FOR ALIGNMENT 0200-STM-D.

1. CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.
3. CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.
4. CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
8. CONSTRUCT AREA INLET IN ACCORDANCE WITH DETAIL 2 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.
10. CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.
27. CONSTRUCT REINFORCED CONCRETE ENCASEMENT TO THE LIMITS SHOWN AND IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-004.

KEY MAP AREA 200



SAM ADAMEY STATE OF WASHINGTON 17330 REGISTERED PROFESSIONAL ENGINEER

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Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
GRADING & DRAINAGE PLAN – 5

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-006	1 / 1	

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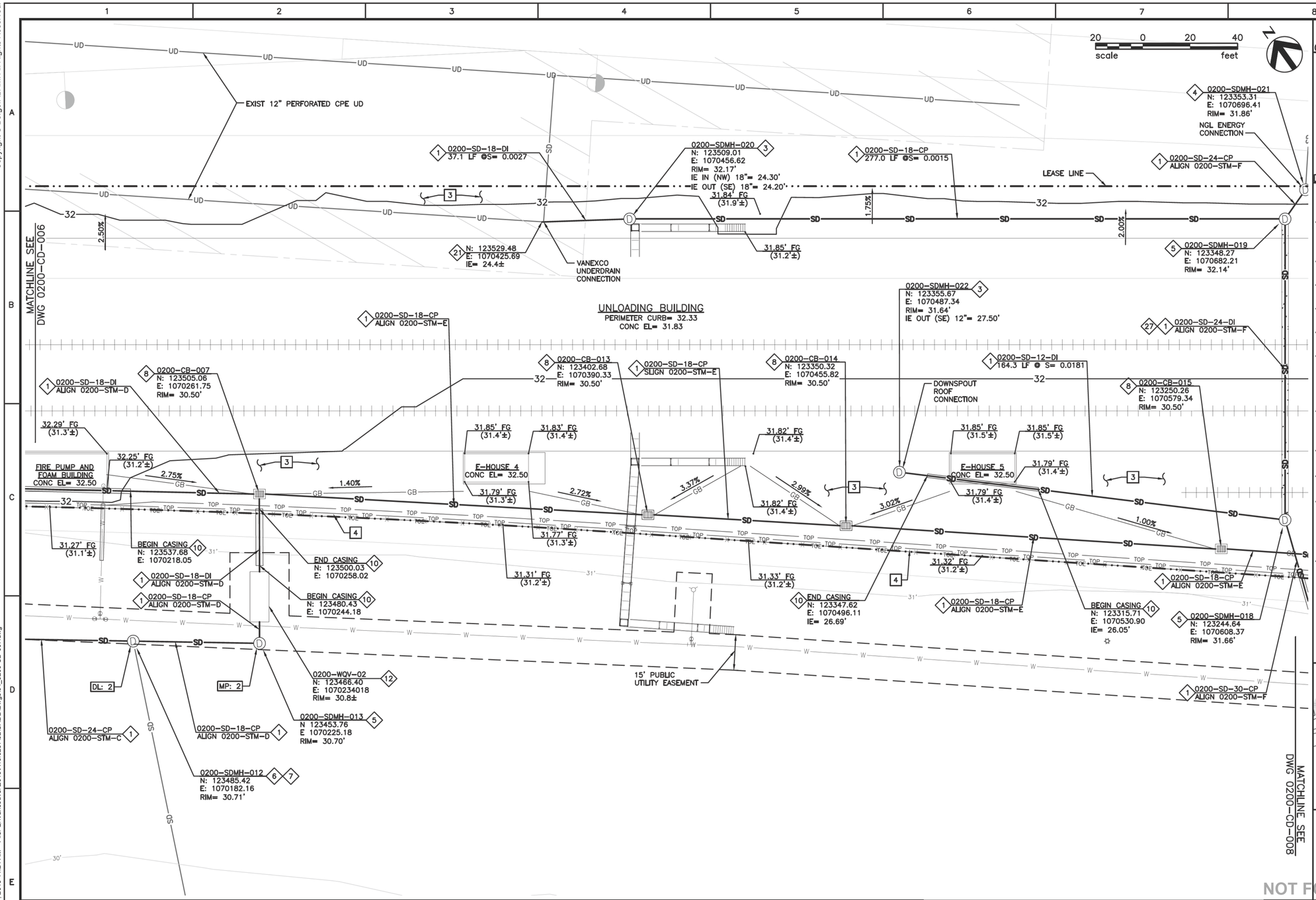


GRADING NOTES:

1. SEE SITE PLAN 0200-SP-001 FOR SITE LAYOUT INFORMATION.

[3] GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS. PLACE IMPORT GRANULAR ROCK FOR YARD SURFACING. 2" MINIMUM DEPTH, COMPACTED WITH 300 LB ROLLER.

[4] CONSTRUCTED GRADED BERM ALONG PROPOSED FENCE LINE TO ISOLATE STORMWATER FROM ENTERING PROJECT SITE. SEE SECTIONS ON DRAWING 0200-CD-024.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0200-CD-013 FOR ALIGNMENT 0200-STM-D.
2. SEE PROFILE DWG 0200-CD-014 FOR ALIGNMENT 0200-STM-E.
3. SEE PROFILE DWG 0200-CD-015 FOR ALIGNMENT 0200-STM-F.

(1) CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

(3) CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.

(4) CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

(5) CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

(6) CONSTRUCT 84" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

(7) CONSTRUCT MANHOLE OVER EXISTING STORM DRAIN PIPE IN ACCORDANCE WITH DETAIL 7 ON DRAWING 0100-CD-007. CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

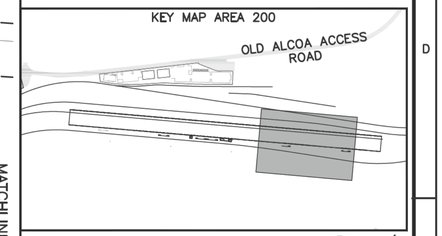
(8) CONSTRUCT AREA INLET IN ACCORDANCE WITH DETAIL 2 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

(10) CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.

(12) CONSTRUCT WATER QUALITY VAULT 0200-WQV-002 PER DETAIL 1 ON DRAWING 0200-CD-024.

(21) CONNECTION TO UNDERDRAIN SYSTEM. CUT AND REMOVE EXIST 12" PERFORATED CPE PIPE, AND 18" DUCTILE IRON PIPE AS NECESSARY TO MAKE CONNECTION. INSTALL TEE TO MATCH UD AND SD PIPELINE DIAMETER AND MATERIAL. IF NECESSARY USE SIMILAR PIPE STUBS AND FERNCO COUPLINGS WITH SHEAR BANDS TO CONNECT TO EXISTING.

(27) CONSTRUCT REINFORCED CONCRETE ENCASEMENT TO THE LIMITS SHOWN AND IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-004.



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SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
GRADING & DRAINAGE PLAN – 6

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0200-CD-007 | SHEET: 1/1 | REV.

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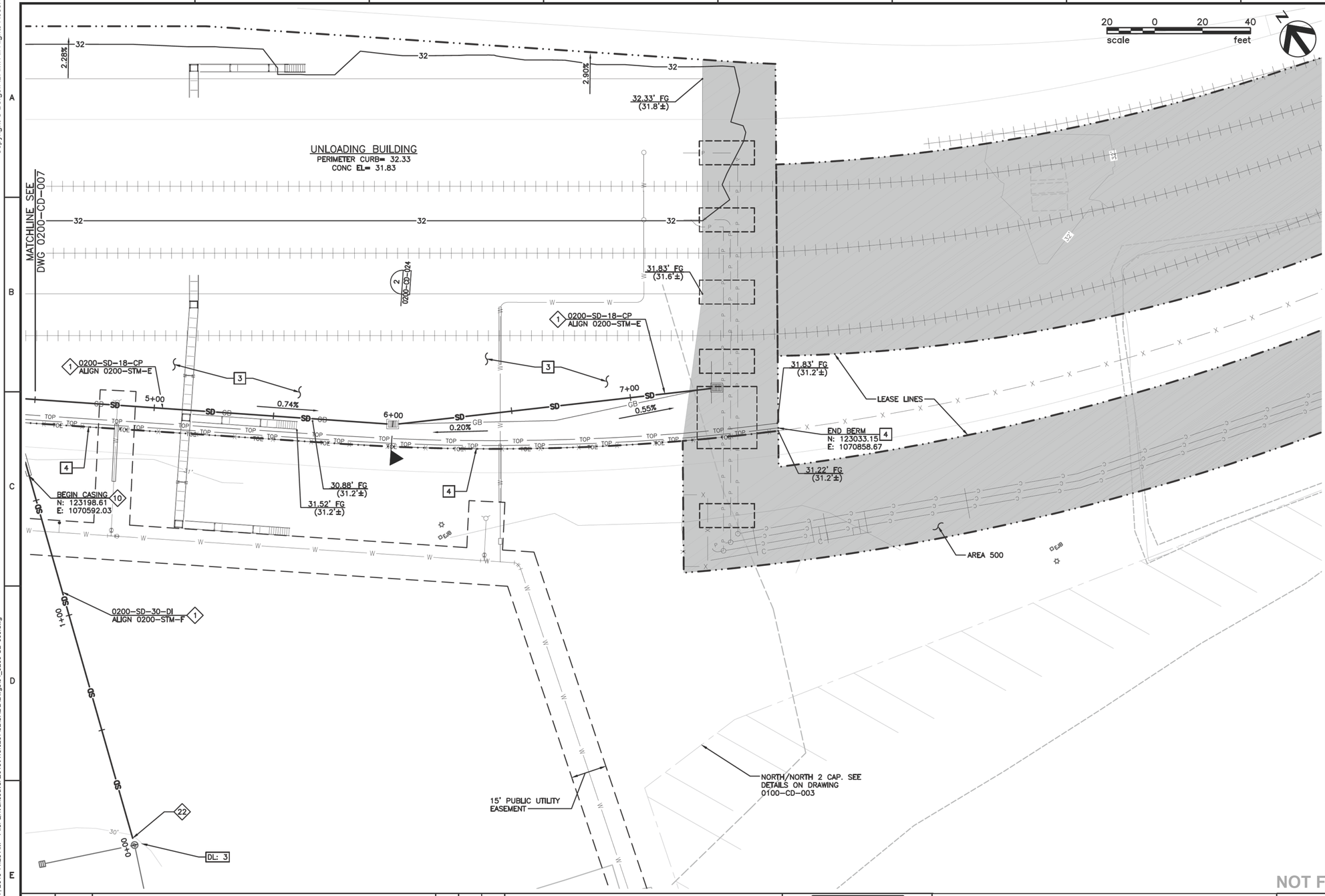


GRADING NOTES:

1. SEE SITE PLAN 0200-SP-001 FOR SITE LAYOUT INFORMATION.

3 GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS. PLACE IMPORT GRANULAR ROCK FOR YARD SURFACING. 2" MINIMUM DEPTH, COMPACTED WITH 300 LB ROLLER.

4 CONSTRUCTED GRADED BERM ALONG PROPOSED FENCE LINE TO ISOLATE STORMWATER FROM ENTERING PROJECT SITE. SEE SECTIONS ON DRAWING 0200-CD-024.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0200-CD-014 FOR ALIGNMENT 0200-STM-E.
2. SEE PROFILE DWG 0200-CD-015 FOR ALIGNMENT 0200-STM-F.

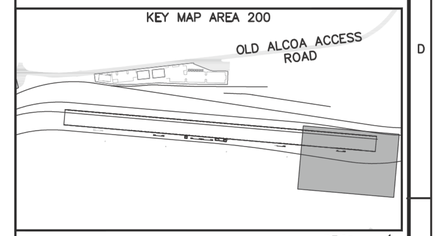
1 CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005

8 CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

10 CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.

22 CONNECTION TO EXISTING STORM DRAIN STRUCTURE. CONSTRUCT PER DETAIL 4 ON DRAWING 0100-CD-007.

KEY MAP AREA 200



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NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
GRADING & DRAINAGE PLAN – 7

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-008	1/1	

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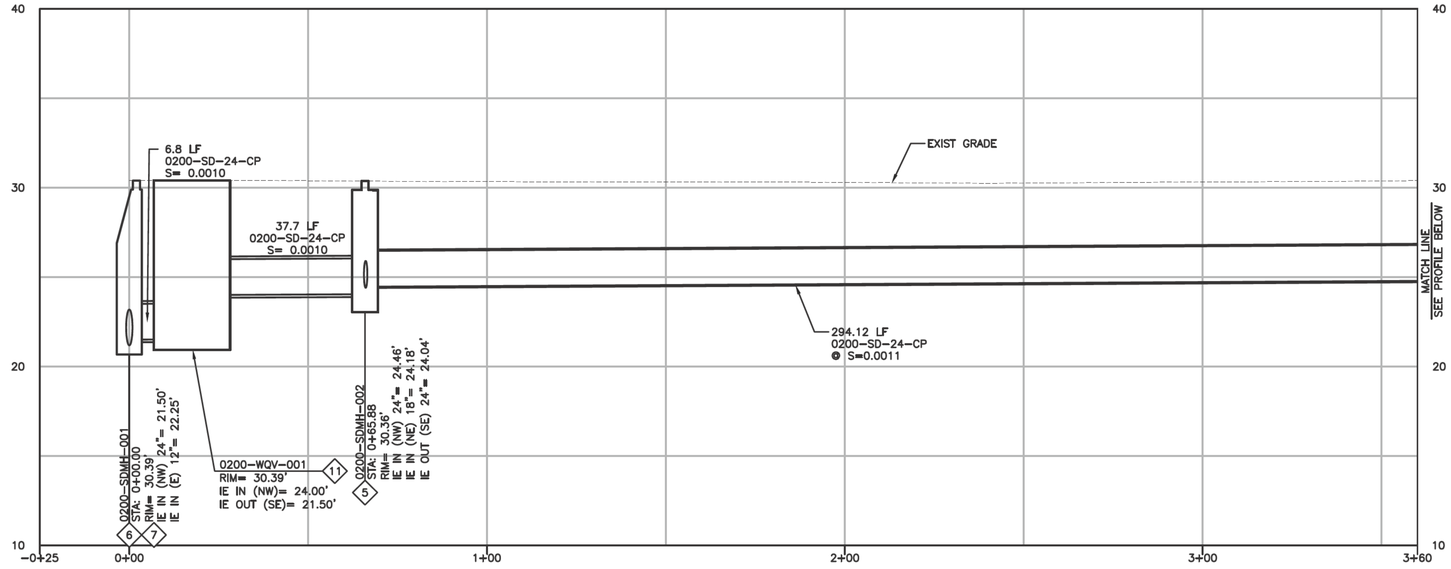
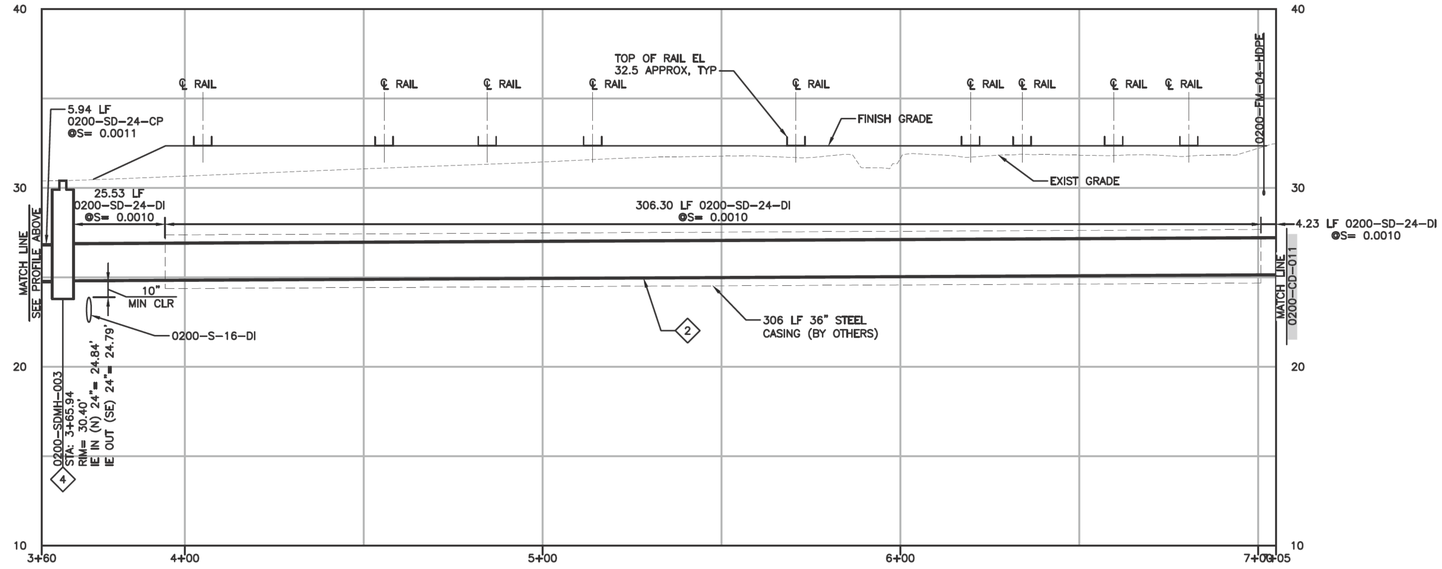


PROFILE 0200-STM-A
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-004 FOR PLAN VIEW



PROFILE 0200-STM-A
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-005 FOR PLAN VIEW

DRAINAGE NOTES:

2. INSTALL PROPOSED 24" DI STORM DRAIN WITHIN CASING (BY OTHERS). INSTALL WITH CASING SPACERS, @ 3 PER STICK AND END SEALS AS SPECIFIED.
4. CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
5. CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
6. CONSTRUCT 84" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
7. CONSTRUCT MANHOLE OVER EXISTING STORM DRAIN PIPE IN ACCORDANCE WITH DETAIL 7 ON DRAWING 0100-CD-007.
11. CONSTRUCT WATER QUALITY VAULT 0200-WQV-001 PER DETAIL 1 ON DRAWING 0200-CD-023.

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
DRAINAGE PROFILES – 1

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/17/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0200-CD-010
SHEET: 1/1
REV.

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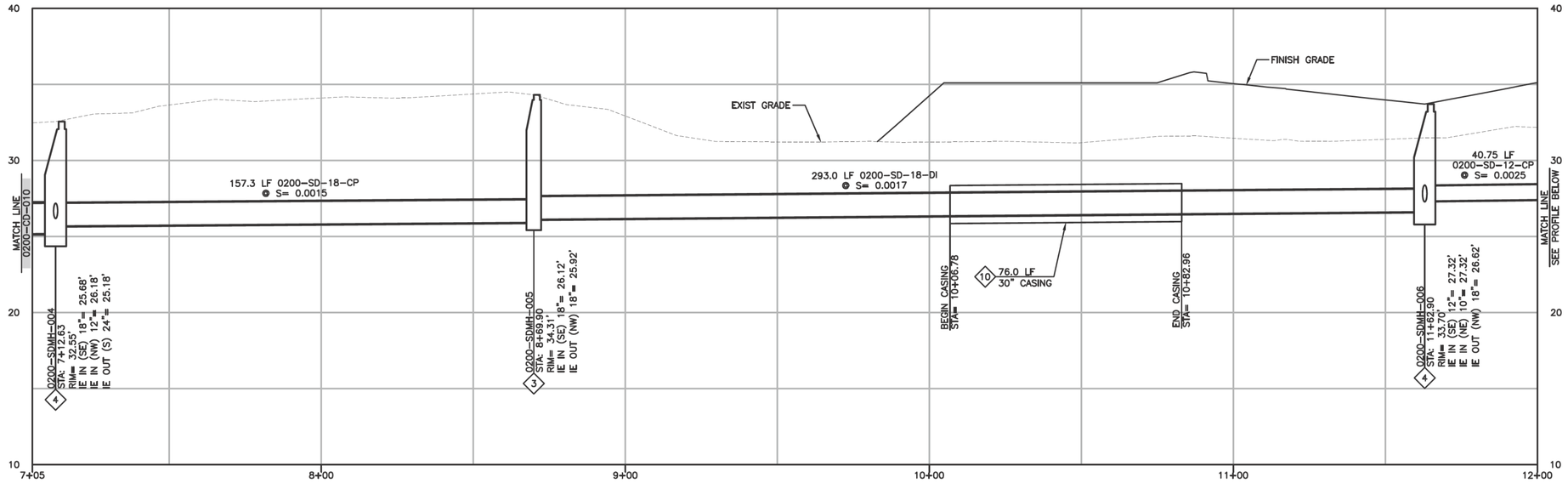
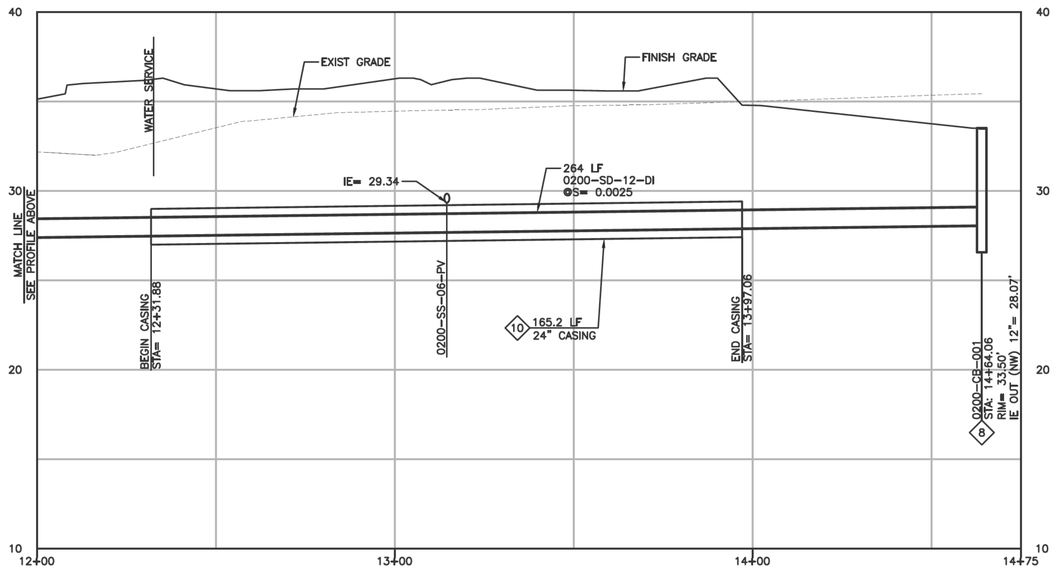
DRAINAGE NOTES:

3. CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.
4. CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
8. CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.
10. CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.



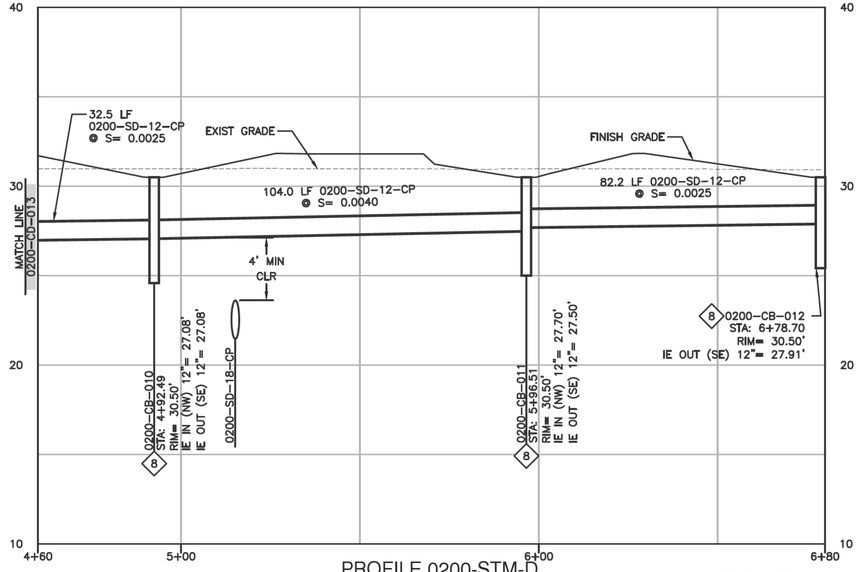
PROFILE 0200-STM-A
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-002 FOR PLAN VIEW



PROFILE 0200-STM-A
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-002 FOR PLAN VIEW



PROFILE 0200-STM-D
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-006 FOR PLAN VIEW

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NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
DRAINAGE PROFILES – 2

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-011	1 / 1	

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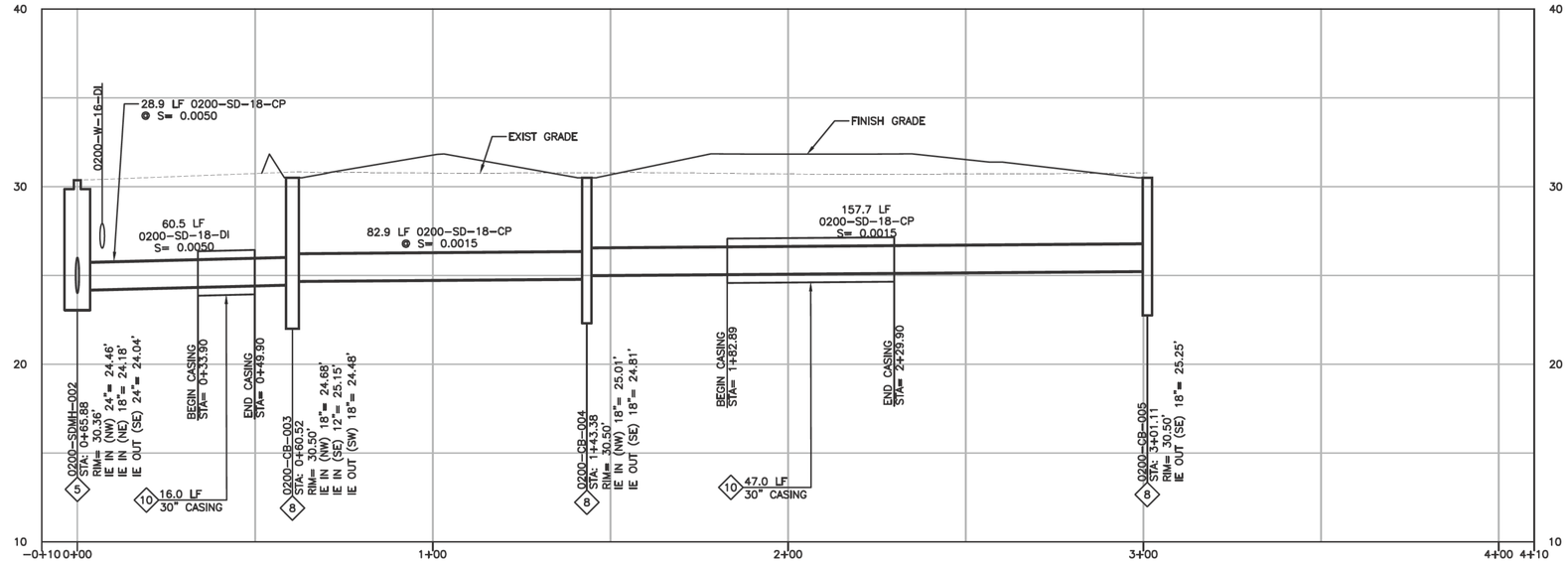

PROFILE 0200-STM-B
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-005 FOR PLAN VIEW

DRAINAGE NOTES:

5. CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
8. CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.
10. CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.

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PRELIMINARY

SAM ADAMS
STATE OF WASHINGTON
27330
REGISTERED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
DRAINAGE PROFILES – 3

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-012	1/1	

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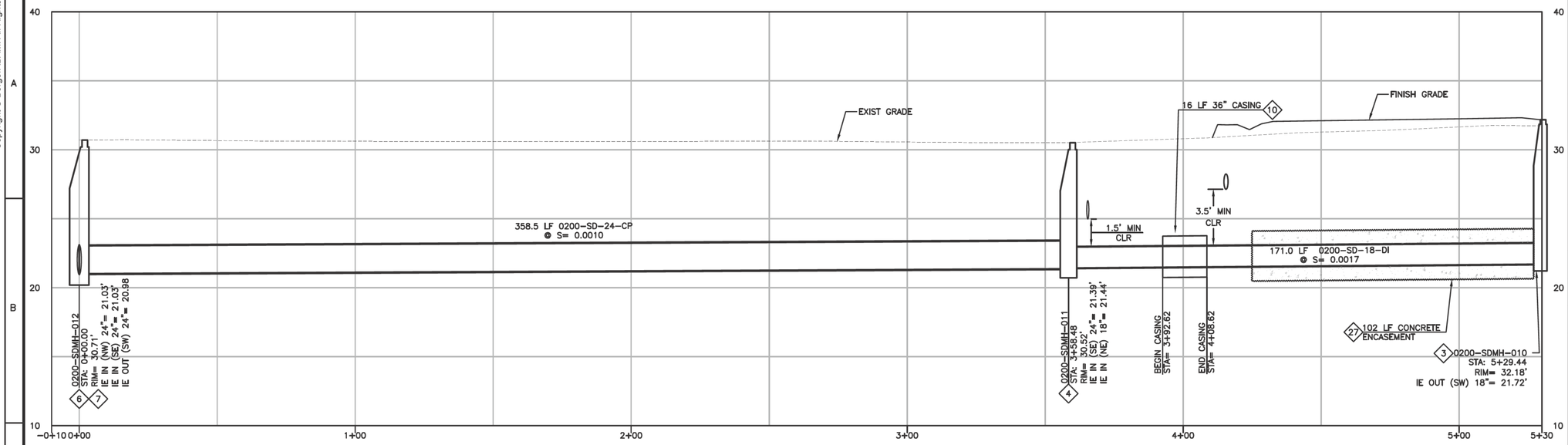
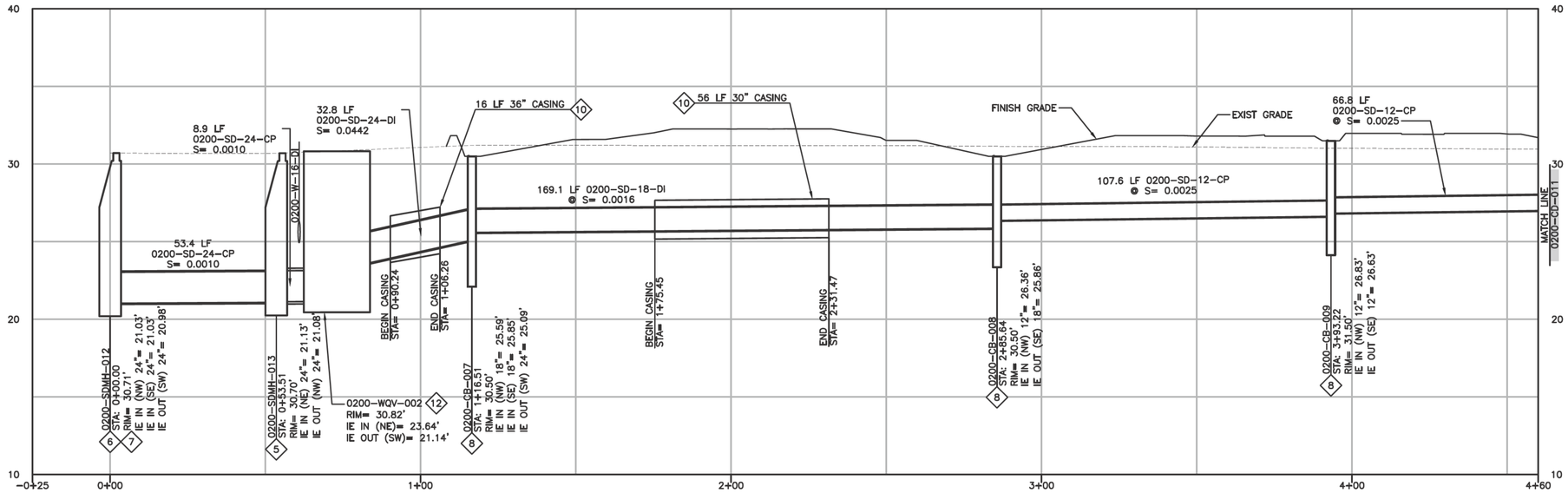


PROFILE 0200-STM-C
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-006 AND 0200-CD-007 FOR PLAN VIEW



PROFILE 0200-STM-D
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-006 AND 0200-CD-007 FOR PLAN VIEW

DRAINAGE NOTES:

3. CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.
4. CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
5. CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
6. CONSTRUCT 84" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
7. CONSTRUCT MANHOLE OVER EXISTING STORM DRAIN PIPE IN ACCORDANCE WITH DETAIL 7 ON DRAWING 0100-CD-007.
8. CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.
10. CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.
12. CONSTRUCT WATER QUALITY VAULT 0200-WQV-002 PER DETAIL 1 ON DRAWING 0200-CD-024.
18. CONSTRUCT CONTROL STRUCTURE PER DETAIL 3 ON DRAWING 0300-CD-014.
27. CONSTRUCT REINFORCED CONCRETE ENCASEMENT TO THE LIMITS SHOWN AND IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-004.

NO.	DATE	REVISION	BY	CK'D	APP

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Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
DRAINAGE PROFILES - 4

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-013	1 / 1	

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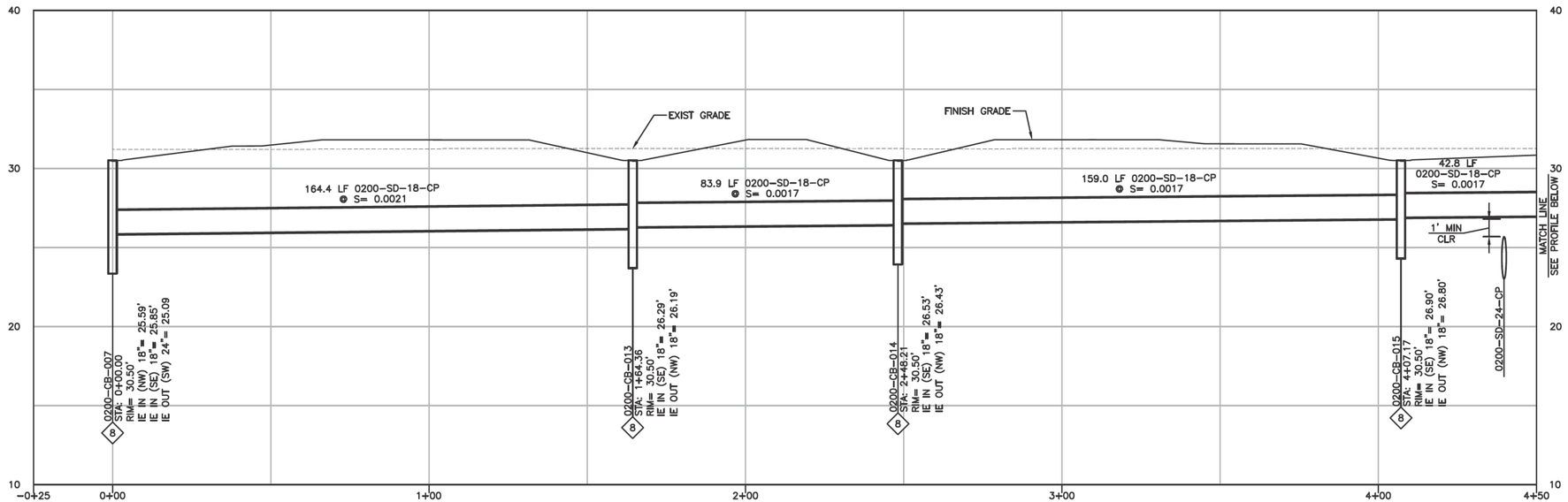
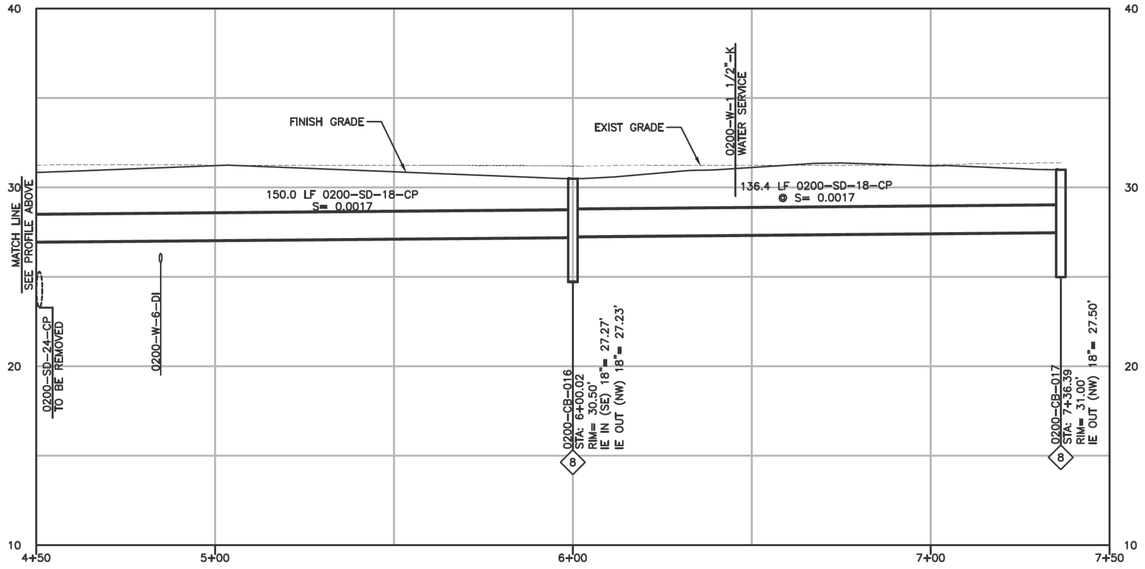


PROFILE 0200-STM-E
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-007 FOR PLAN VIEW



PROFILE 0200-STM-E
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-008 FOR PLAN VIEW

DRAINAGE NOTES:

8 CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

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SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

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Portland, Oregon 97232-4189
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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
DRAINAGE PROFILES – 5

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0200-CD-014
SHEET: 1/1
REV.

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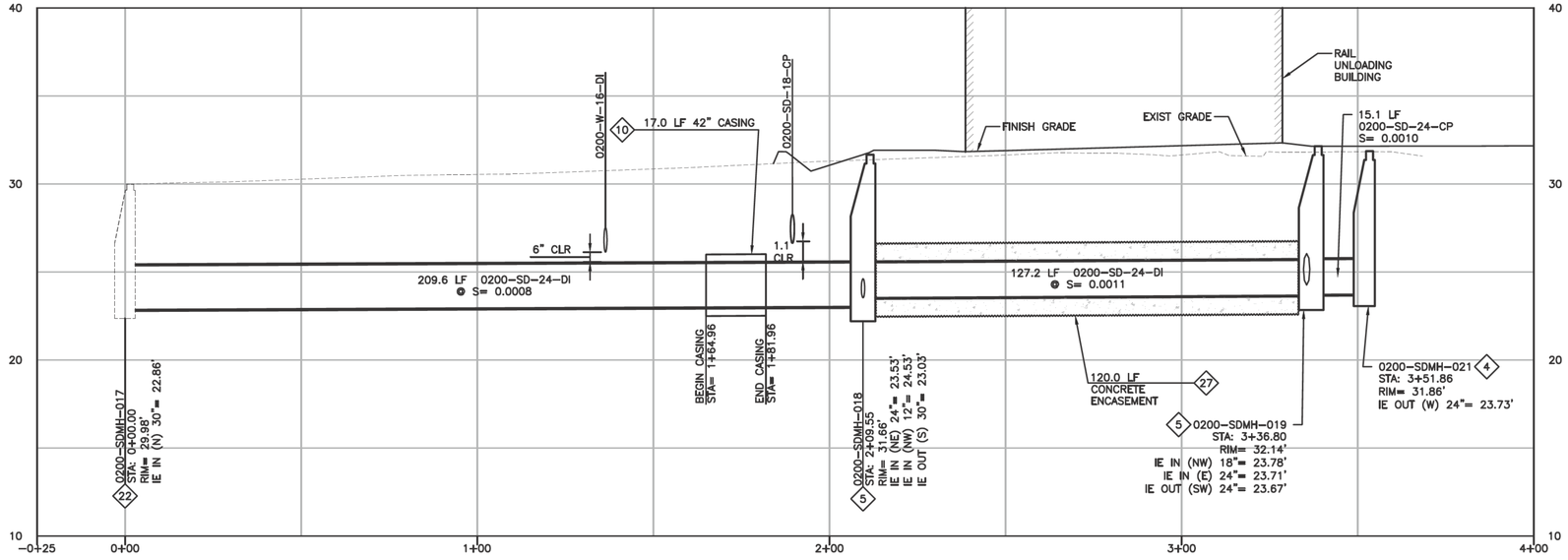

PROFILE 0200-STM-F
SCALE: 1"=20' HORZ AND 1"= 4' VERT

NOTE:
SEE DWG 0200-CD-007 FOR PLAN VIEW

DRAINAGE NOTES:

4 CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

5 CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

10 CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.

22 CONNECTION TO EXISTING STORM DRAIN STRUCTURE. CONSTRUCT PER DETAIL 4 ON DRAWING 0100-CD-007.

27 CONSTRUCT REINFORCED CONCRETE ENCASEMENT TO THE LIMITS SHOWN AND IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-004.

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SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER

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Portland, Oregon 97232-4189
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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
DRAINAGE PROFILES – 6

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-CD-015	1/1	

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AREA 200

Structure Table	
Structure Name	Structure Details
0200–CB–001 N: 124078.08 E: 1070091.03	RIM = 33.50' SUMP = 27.07' IE OUT (12") NW = 28.07'
0200–CB–002 N: 124223.76 E: 1069826.59	RIM = 33.36' SUMP = 27.37' IE OUT (10") SW = 27.37'
0200–CB–003 N: 123987.23 E: 1069593.27	RIM = 30.50' SUMP = 22.48' IE IN (18") NW = 24.68' IE IN (12") SE = 25.15' IE OUT (18") SW = 24.48'
0200–CB–004 N: 124035.18 E: 1069525.69	RIM = 30.50' SUMP = 22.81' IE IN (18") NW = 25.01' IE OUT (18") SE = 24.81'
0200–CB–005 N: 124126.40 E: 1069397.02	RIM = 30.50' SUMP = 23.25' IE OUT (18") SE = 25.25'
0200–CB–006 N: 123921.07 E: 1069686.57	RIM = 30.50' SUMP = 23.28' IE OUT (12") NW = 25.28'
0200–SDMH–001 N: 123899.59 E: 1069611.90	RIM = 30.39' SUMP = 21.50' IE IN (24") NW = 21.50' IE IN (12") E = 22.25'
0200–SDMH–002 N: 123937.85 E: 1069558.27	RIM = 30.36' SUMP = 24.04' IE IN (24") NW = 24.46' IE IN (18") NE = 24.18' IE OUT (24") SE = 24.04'
0200–SDMH–003 N: 124112.13 E: 1069314.00	RIM = 30.40' SUMP = 24.79' IE IN (24") N = 24.84' IE OUT (24") SE = 24.79'
0200–SDMH–004 N: 124437.62 E: 1069433.35	RIM = 32.55' SUMP = 25.18' IE IN (18") SE = 25.68' IE IN (12") NW = 26.18' IE OUT (24") S = 25.18'
0200–SDMH–005 N: 124362.33 E: 1069571.42	RIM = 34.31' SUMP = 25.92' IE IN (18") SE = 26.12' IE OUT (18") NW = 25.92'
0200–SDMH–006 N: 124201.38 E: 1069816.26	RIM = 33.70' SUMP = 26.62' IE IN (12") SE = 27.32' IE IN (10") NE = 27.32' IE OUT (18") NW = 26.62'
0200–SDMH–007 N: 123889.38 E: 1069740.43	RIM = 31.62' SUMP = 28.05' IE OUT (12") W = 28.05'

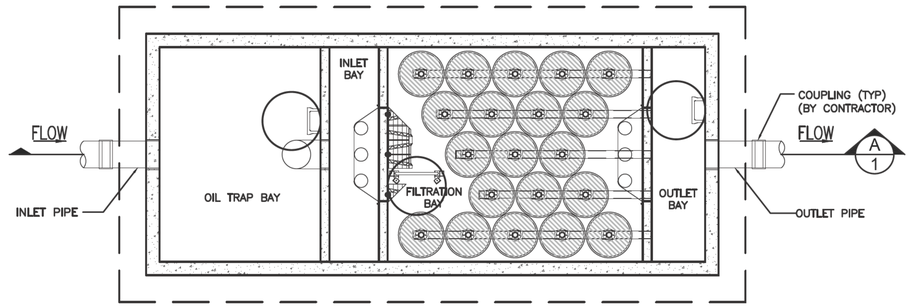
Structure Table	
Structure Name	Structure Details
0200–CB–007 N: 123505.06 E: 1070261.75	RIM = 30.50' SUMP = 22.59' IE IN (18") NW = 25.59' IE OUT (24") SW = 25.09'
0200–CB–007 N: 123505.06 E: 1070261.75	RIM = 30.50' SUMP = 23.85' IE IN (18") SE = 25.85'
0200–CB–008 N: 123606.26 E: 1070126.25	RIM = 30.50' SUMP = 23.86' IE IN (12") NW = 26.36' IE OUT (18") SE = 25.86'
0200–CB–009 N: 123668.84 E: 1070038.74	RIM = 31.50' SUMP = 24.63' IE IN (12") NW = 26.83' IE OUT (12") SE = 26.63'
0200–CB–010 N: 123726.58 E: 1069957.99	RIM = 30.50' SUMP = 25.08' IE IN (12") NW = 27.08' IE OUT (12") SE = 27.08'
0200–CB–011 N: 123786.96 E: 1069873.29	RIM = 30.50' SUMP = 25.50' IE IN (12") NW = 27.70' IE OUT (12") SE = 27.50'
0200–CB–012 N: 123834.62 E: 1069806.32	RIM = 30.50' SUMP = 25.91' IE OUT (12") SE = 27.91'
0200–CB–013 N: 123402.68 E: 1070390.33	RIM = 30.50' SUMP = 24.19' IE IN (18") SE = 26.29' IE OUT (18") NW = 26.19'
0200–CB–014 N: 123350.32 E: 1070455.82	RIM = 30.50' SUMP = 24.43' IE IN (18") SE = 26.53' IE OUT (18") NW = 26.43'
0200–CB–015 N: 123250.26 E: 1070579.34	RIM = 30.50' SUMP = 24.80' IE IN (18") SE = 26.90' IE OUT (18") NW = 26.80'
0200–CB–016 N: 123127.98 E: 1070728.47	RIM = 30.50' SUMP = 25.23' IE IN (18") SE = 27.27' IE OUT (18") NW = 27.23'
0200–CB–017 N: 123061.69 E: 1070847.64	RIM = 31.00' SUMP = 25.50' IE OUT (18") NW = 27.50'
0200–SDMH–010 N: 123837.67 E: 1069993.04	RIM = 32.18' SUMP = 21.72' IE OUT (18") SW = 21.72'
0200–SDMH–011 N: 123698.43 E: 1069893.84	RIM = 30.52' SUMP = 21.39' IE IN (24") SE = 21.39' IE IN (18") NE = 21.44'
0200–SDMH–012 N: 123485.42 E: 1070182.16	RIM = 30.71' SUMP = 21.03' IE IN (24") SE = 21.03'
0200–SDMH–012 N: 123485.42 E: 1070182.16	RIM = 30.71' SUMP = 21.03' IE OUT (24") NW = 21.03'
0200–SDMH–013 N: 123453.76 E: 1070225.18	RIM = 30.70' SUMP = 21.08' IE IN (24") NE = 21.13' IE OUT (24") NW = 21.08'

Structure Table	
Structure Name	Structure Details
0200–SDMH–017 N: 123047.17 E: 1070538.25	RIM = 29.98' SUMP = 22.86' IE IN (30") N = 22.86'
0200–SDMH–018 N: 123244.64 E: 1070608.37	RIM = 31.66' SUMP = 23.03' IE IN (24") NE = 23.53' IE IN (12") NW = 24.53' IE OUT (30") S = 23.03'
0200–SDMH–019 N: 123348.27 E: 1070682.21	RIM = 32.14' SUMP = 23.67' IE IN (18") NW = 23.78' IE IN (24") E = 23.71' IE OUT (24") SW = 23.67'
0200–SDMH–020 N: 123509.01 E: 1070456.62	RIM = 32.17' SUMP = 24.20' IE IN (18") NW = 24.30' IE OUT (18") SE = 24.20'
0200–SDMH–021 N: 123353.31 E: 1070696.41	RIM = 31.86' SUMP = 23.73' IE OUT (24") W = 23.73'
0200–SDMH–022 N: 123355.67 E: 1070487.34	RIM = 31.64' SUMP = 27.50' IE OUT (12") SE = 27.50'

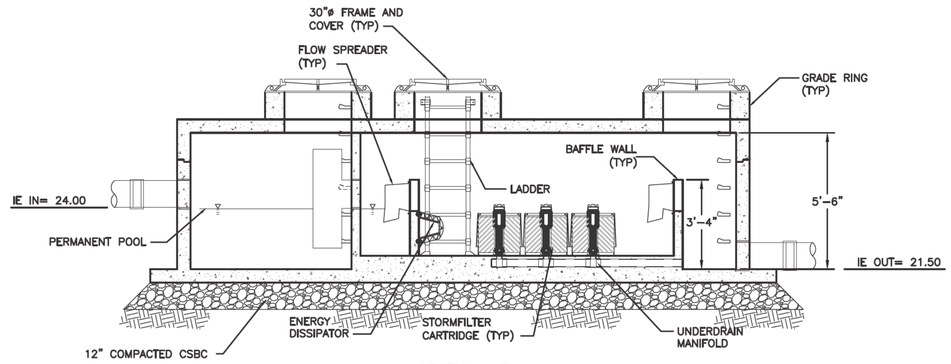
SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			0200–WQV–001
WATER QUALITY FLOW RATE (cfs)			0.21
PEAK FLOW RATE (cfs)			1.27
RETURN PERIOD OF PEAK FLOW (yrs)			100–YR
# OF CARTRIDGES REQUIRED			13
CARTRIDGE FLOW RATE			7.9
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)			METAL RX
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	24.00'	CP	24"
INLET PIPE #2	N/A	N/A	N/A
OUTLET PIPE 21|50'		CP	24"
UPSTREAM RIM ELEVATION			30.39'
DOWNSTREAM RIM ELEVATION			30.39'
ANTI–FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD

NOTES/SPECIAL REQUIREMENTS:



PLAN VIEW



SECTION VIEW

0200-WQV-001 (1) 0200-CD-005
NOT TO SCALE

PRELIMINARY

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NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
STRUCTURE TABLES AND DETAILS

DESIGN:	DVJ	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200–CD–023	1 / 1	

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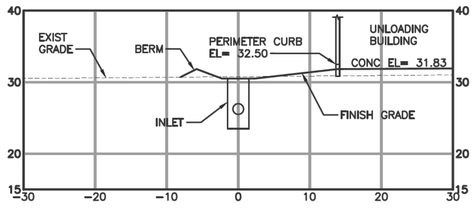
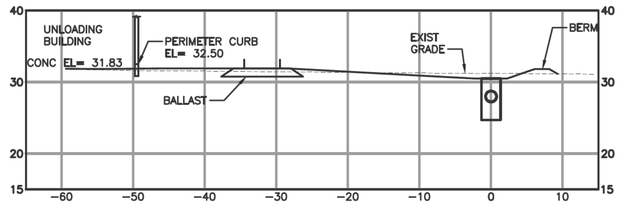
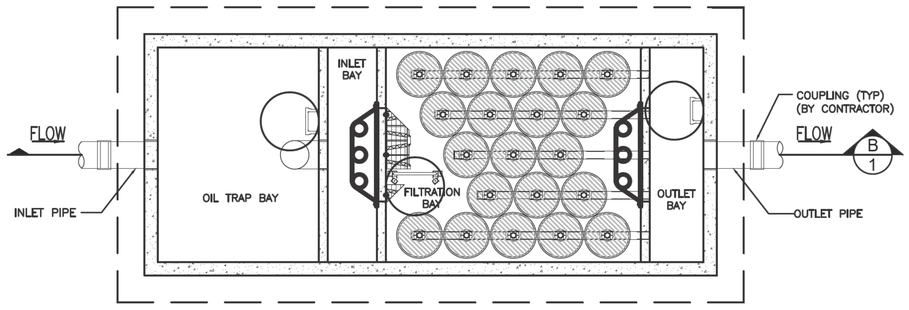


BERM SECTION (1 / 0200-CD-005)
SCALE: 1"=10' HZ 1"=10' VERT

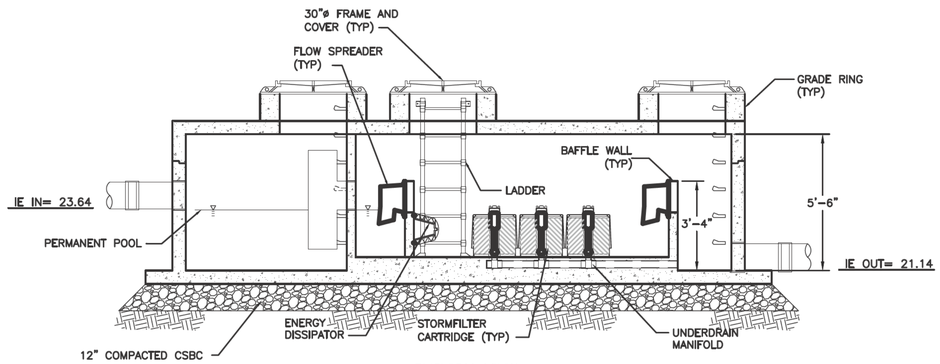


BERM SECTION (2 / 0200-CD-008)
SCALE: 1"=10' HZ 1"=10' VERT

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			0200−WQV−002
WATER QUALITY FLOW RATE (cfs)			0.23
PEAK FLOW RATE (cfs)			1.37
RETURN PERIOD OF PEAK FLOW (yrs)			100−YR
# OF CARTRIDGES REQUIRED			14
CARTRIDGE FLOW RATE			7.5
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)			ZPG
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	23.64'	DI	24"
INLET PIPE #2	N/A	N/A	N/A
OUTLET PIPE 21.14'		CP	24"
UPSTREAM RIM ELEVATION			30.82
DOWNSTREAM RIM ELEVATION			30.82
ANTI−FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			



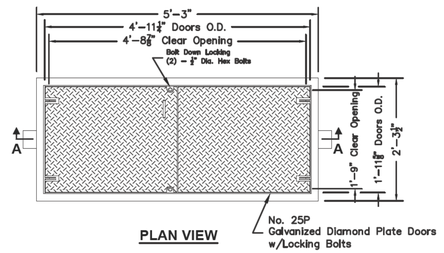
PLAN VIEW



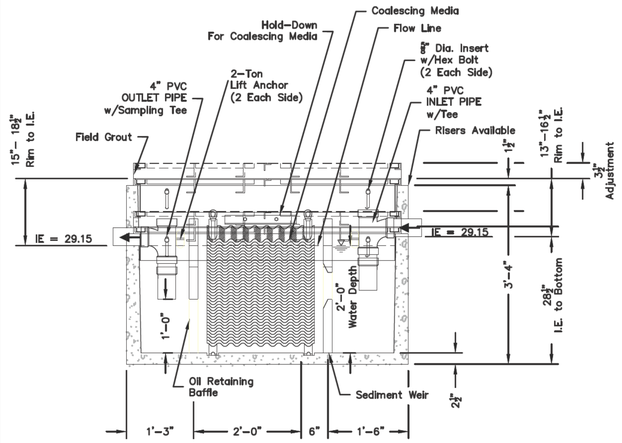
SECTION VIEW

0200-WQV-002 (1 / 0200-CD-007)
NOT TO SCALE

Projected Coalescing Plate Area = 111 Sq.Ft.
*Design Flow Rate = 27 GPM
Maximum Process Flow = 144 GPM



PLAN VIEW



SECTION AA

*DESIGN FLOW RATE	EFFLUENT QUALITY	100% COLLECTED SIZE
27 GPM	10 ppm	60 Micron

Basic Design Information: *
Influent Characterics
- Oil Specific Gravity = 0.88
- Operating Temperature = 50°
- Influent Oil Concentration = 100 ppm
- Mean Oil Droplet Size = 130 Microns
- .033 ft/min. Critical Oil Droplet Predicted Rise Rate

*Basic Design Information per Washington State Department of Ecology; User to Adjust Estimates for Variations in Real Conditions.

Notes:
- Static Water Depth = 2'−0"
- Prior to "Startup" of system, fill with clean water to bottom of outlet pipe. For best results, fill to flow line.
- Follow Regular Inspection, Cleaning, & Maintenance Schedule (See Clean Out & Maintenance).

0200-OWS-001 (2 / 0200-CD-016)
NOT TO SCALE

SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER

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BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
SECTIONS AND DETAILS

DESIGN:	DVJ	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0200−CD−024 | SHEET: 1/1 | REV.

Last Saved by: Tony.pritchett on: Feb 25, 2015 1:26 PM File: Q:\Vancouver\2013\A13.0267\02\CADD\Dwgs\04_0200-CD-024.dwg

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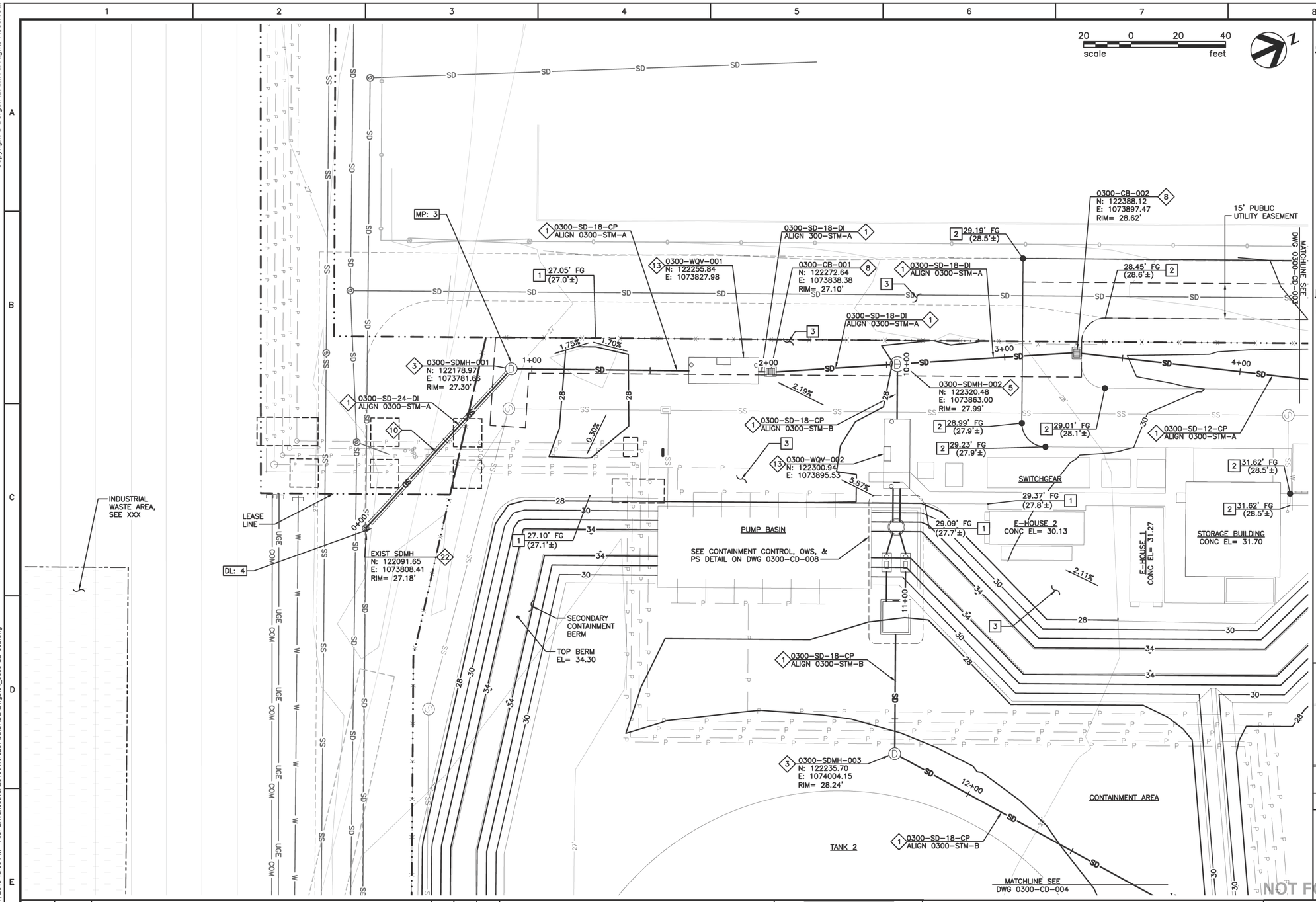


GRADING NOTES:

1. SEE SITE PLAN ON DWG 0300-SP-001 FOR SITE LAYOUT INFORMATION
2. SEE DWG 0300-CD-011 FOR CONTAINMENT AREA GRADING INFORMATION.

[1] MATCH EXISTING SURFACE. CONSTRUCT SUBGRADE TO GRADUALLY TIE INTO EXISTING SURFACE. APPROXIMATE ELEVATIONS ARE SHOWN. WHERE MATCHING INTO EXISTING ASPHALT, SAWCUT MINIMUM 1' OF EXISTING ASPHALT AND MATCH EXISTING ASPHALT THICKNESSES AND APPLY ASPHALT JOINT SEALER.

[2] GRADE ASPHALT CONCRETE PARKING, DRIVE AISLE, AND DRIVEWAY AREAS TO THE ELEVATIONS AND GRADES SHOWN. GRADE TO ALLOW DRAINAGE TO SHEET FLOW TO CONSTRUCTED DRAINAGE CONVEYANCES AND INLETS.

[3] GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS. PLACE IMPORT GRANULAR ROCK FOR YARD SURFACING. 2" MINIMUM DEPTH, COMPACTED WITH 300 LB ROLLER.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0300-CD-008 FOR ALIGNMENT 0300-STM-A
2. SEE PROFILE DWG 0300-CD-008 FOR ALIGNMENT 0300-STM-B

[1] CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

[3] CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.

[5] CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

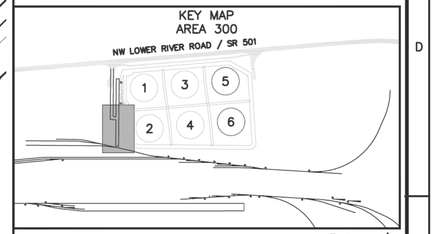
[8] CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

[10] CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.

[13] CONSTRUCT WATER QUALITY VAULTS 0300-WQV-001 AND 0300-WQV-002 PER DETAIL 1 ON DRAWING 0300-CD-013.

[22] CONNECTION TO EXISTING STORM DRAIN STRUCTURE. CONSTRUCT PER DETAIL 4 ON DRAWING 0100-CD-007.

KEY MAP
AREA 300



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Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
GRADING & DRAINAGE PLAN – 1

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0300-CD-002 | SHEET: 1/1 | REV.:

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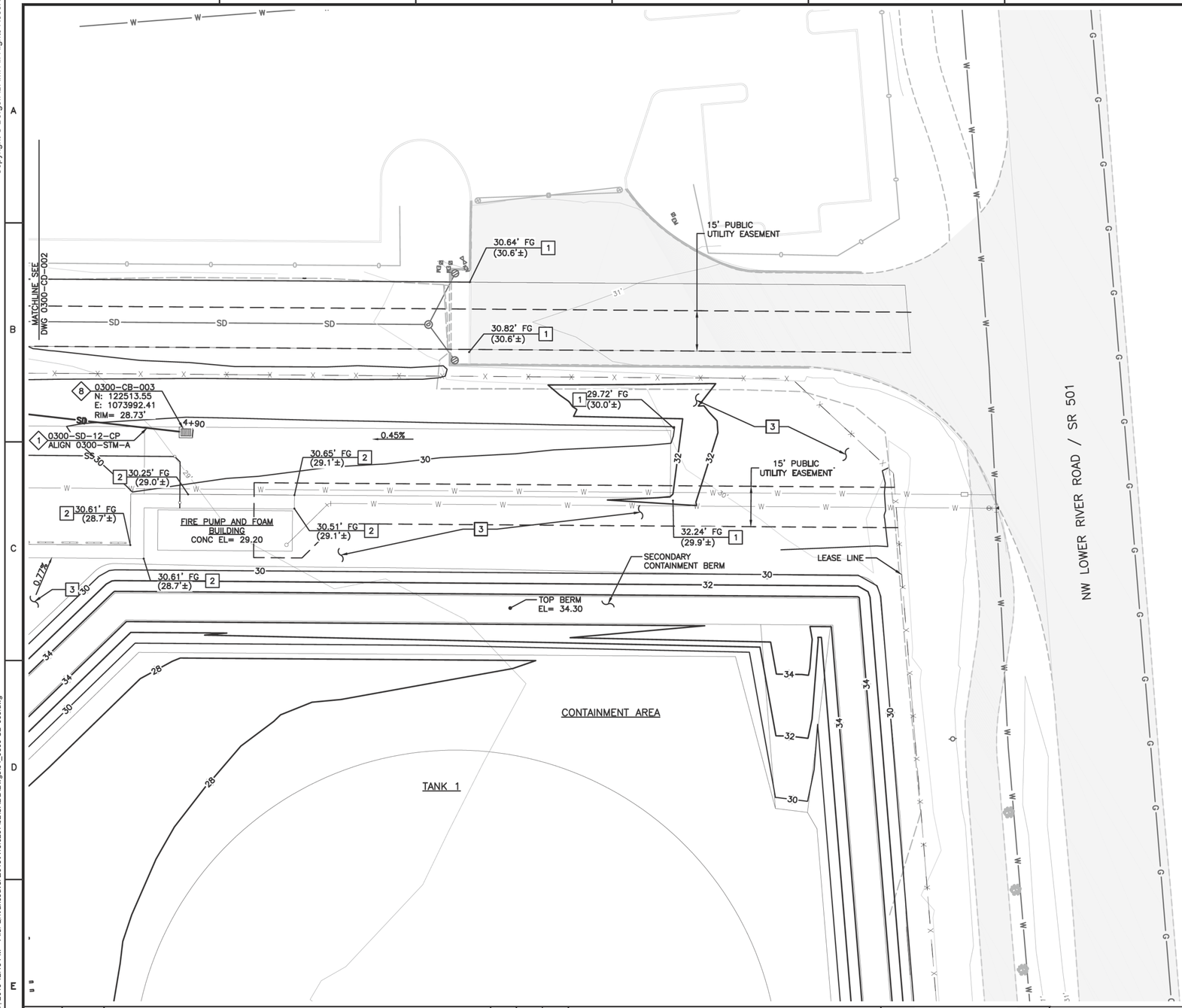


GRADING NOTES:

1. SEE SITE PLAN ON DWG 0300-SP-001 FOR SITE LAYOUT INFORMATION
2. SEE DWG 0300-CD-015 FOR CONTAINMENT AREA GRADING INFORMATION.

[1] MATCH EXISTING SURFACE. CONSTRUCT SUBGRADE TO GRADUALLY TIE INTO EXISTING SURFACE. APPROXIMATE ELEVATIONS ARE SHOWN. WHERE MATCHING INTO EXISTING ASPHALT, SAWCUT MINIMUM 1' OF EXISTING ASPHALT AND MATCH EXISTING ASPHALT THICKNESSES AND APPLY ASPHALT JOINT SEALER.

[2] GRADE ASPHALT CONCRETE PARKING, DRIVE AISLE, AND DRIVEWAY AREAS TO THE ELEVATIONS AND GRADES SHOWN. CONSTRUCT GRADING TO ALLOW DRAINAGE TO SHEET FLOW TO CONSTRUCTED STORMWATER CONVEYANCES AND INLETS.

[3] GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS.

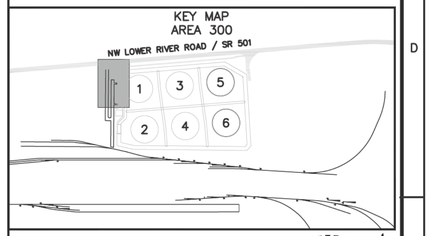
DRAINAGE NOTES:

1. SEE PROFILE DWG 0300-CD-008 FOR ALIGNMENT 0300-STM-A

◇1 CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTROATIONS AS SHOWN ON DRAWING 0100-CD-005.

◇8 CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

KEY MAP
AREA 300



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SAM ADAMEY
STATE OF WASHINGTON
27330
REGISTERED PROFESSIONAL ENGINEER

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Portland, Oregon 97232-4189
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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 300
GRADING & DRAINAGE PLAN – 2

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0300-CD-003	1/1	

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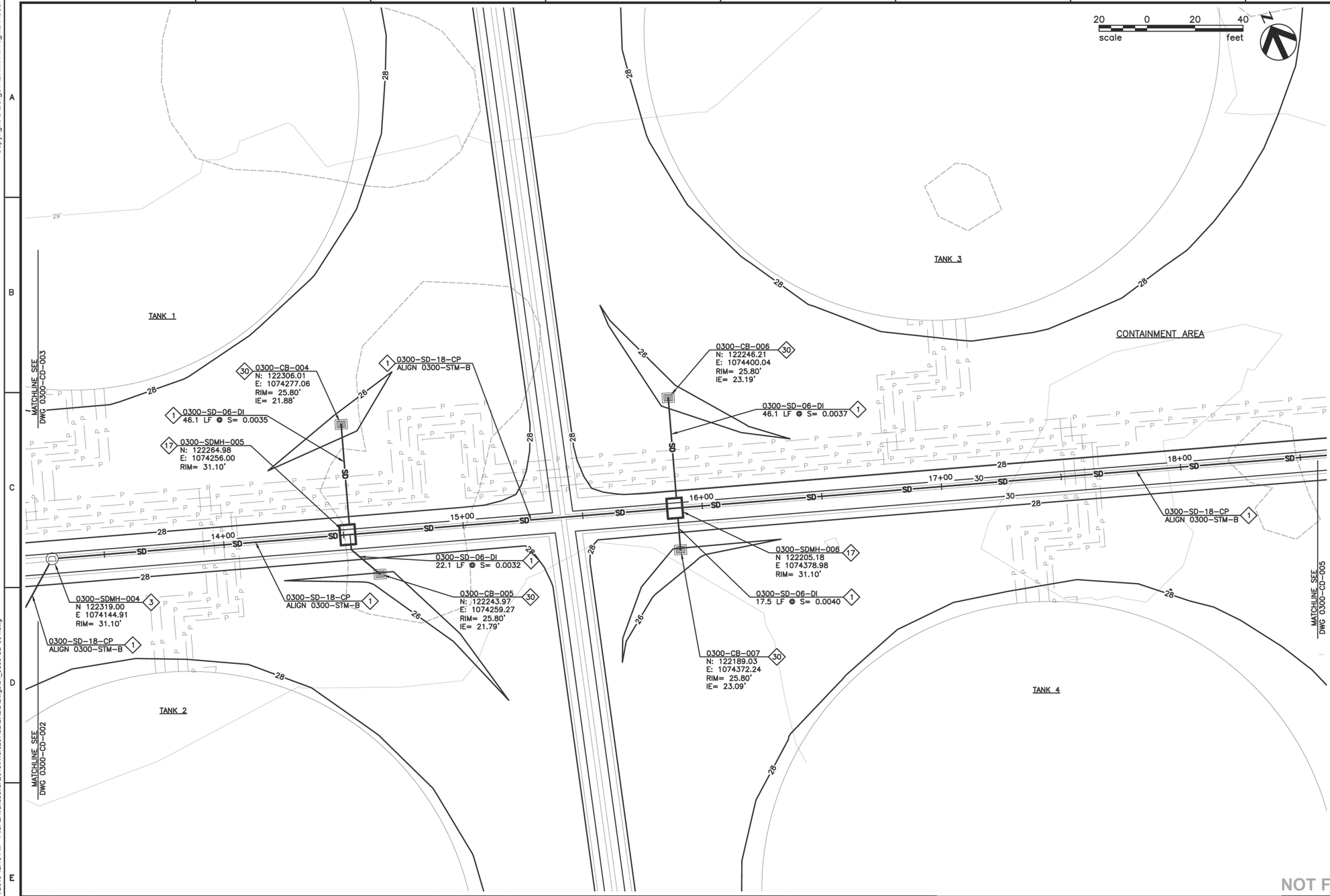


GRADING NOTES:

1. SEE SITE PLAN ON DWG 0300-SP-001 FOR SITE LAYOUT INFORMATION
2. SEE DWG 0300-CD-015 FOR CONTAINMENT AREA GRADING INFORMATION.

DRAINAGE NOTES:

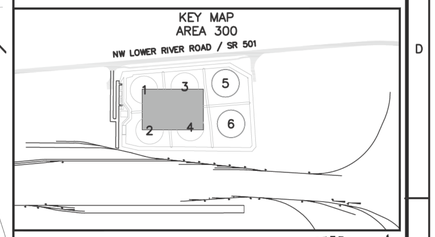
1. SEE PROFILE DWG 0300-CD-009 & 0300-CD-010 FOR ALIGNMENT 0300-STM-B

(1) CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

(3) CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.

(17) CONSTRUCT CONTAINMENT AREA JUNCTION VAULT PER DETAIL 4 ON DRAWING 0300-CD-014.

(30) CONSTRUCT WSDOT TYPE1 CB PER DETAIL 4 ON DRAWING 0300-CD-014.



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SAM ADAMS
STATE OF WASHINGTON
17330
REGISTERED
PROFESSIONAL ENGINEER

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Portland, Oregon 97232-4189
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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
GRADING & DRAINAGE PLAN – 3

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0300-CD-004	1/1	

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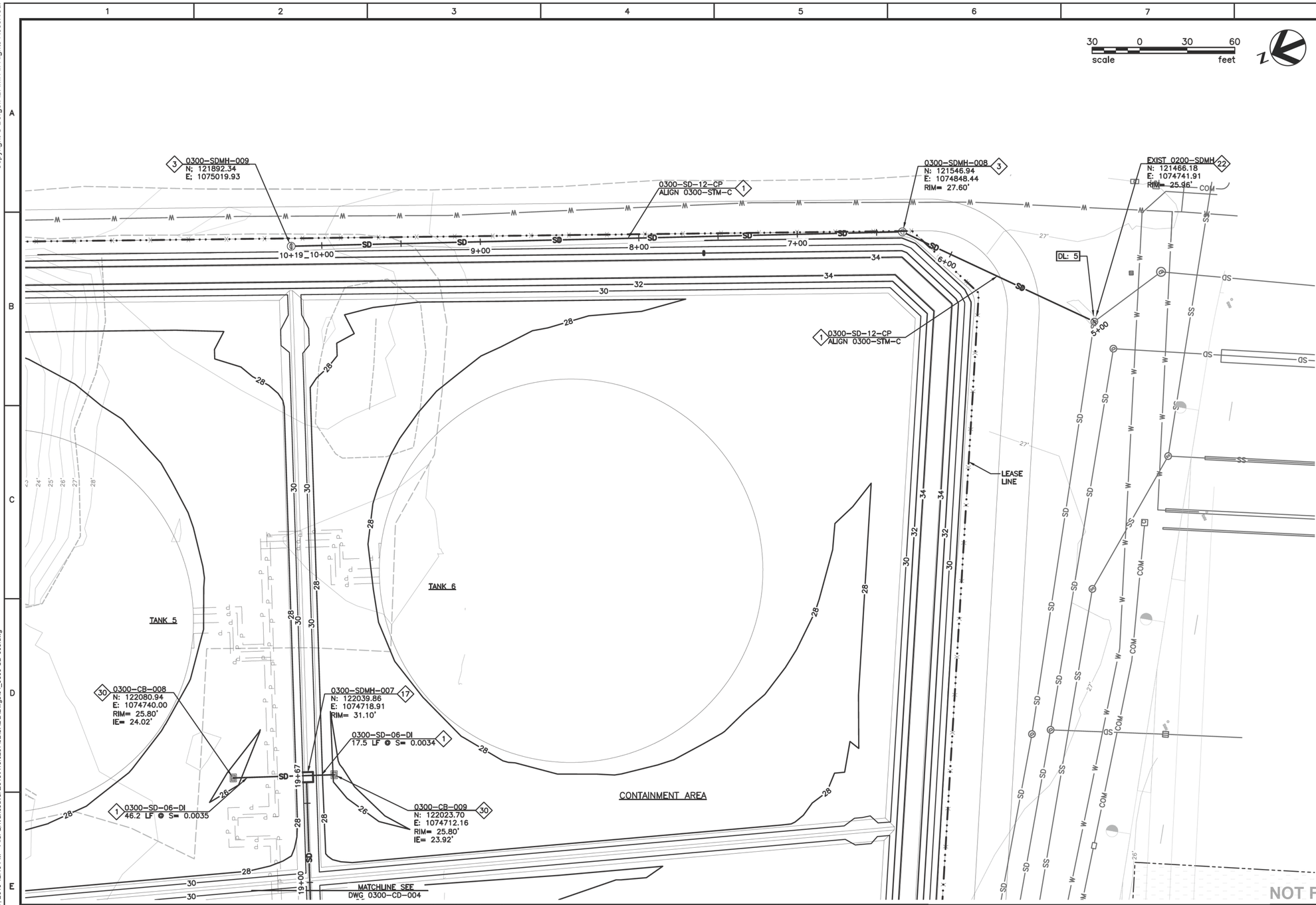


GRADING NOTES:

1. SEE SITE PLAN ON DWG 0300-SP-001 FOR SITE LAYOUT INFORMATION.
2. SEE DWG 0300-CD-015 FOR CONTAINMENT AREA GRADING INFORMATION.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0300-CD-010, FOR ALIGNMENT 0300-STM-B
2. SEE PROFILE DWG 0300-CD-009, FOR ALIGNMENT 0300-STM-C

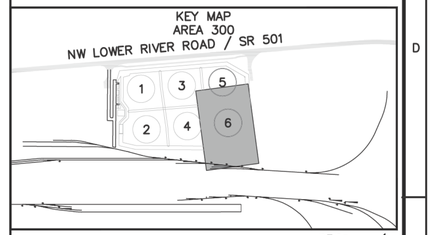
(1) CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

(3) CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.

(17) CONSTRUCT CONTAINMENT AREA JUNCTION VAULT PER DETAIL 4 ON DRAWING 0300-CD-014.

(22) CONNECTION TO EXISTING STORM DRAIN STRUCTURE. CONSTRUCT PER DETAIL 4 ON DRAWING 0100-CD-007.

(30) CONSTRUCT WSDOT TYPE1 CB PER DETAIL 4 ON DRAWING 0300-CD-014.



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SAM ADAMS YOUNG
STATE OF WASHINGTON
17330
REGISTERED
PROFESSIONAL ENGINEER

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Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 300
GRADING & DRAINAGE PLAN – 4

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0300-CD-005	1/1	

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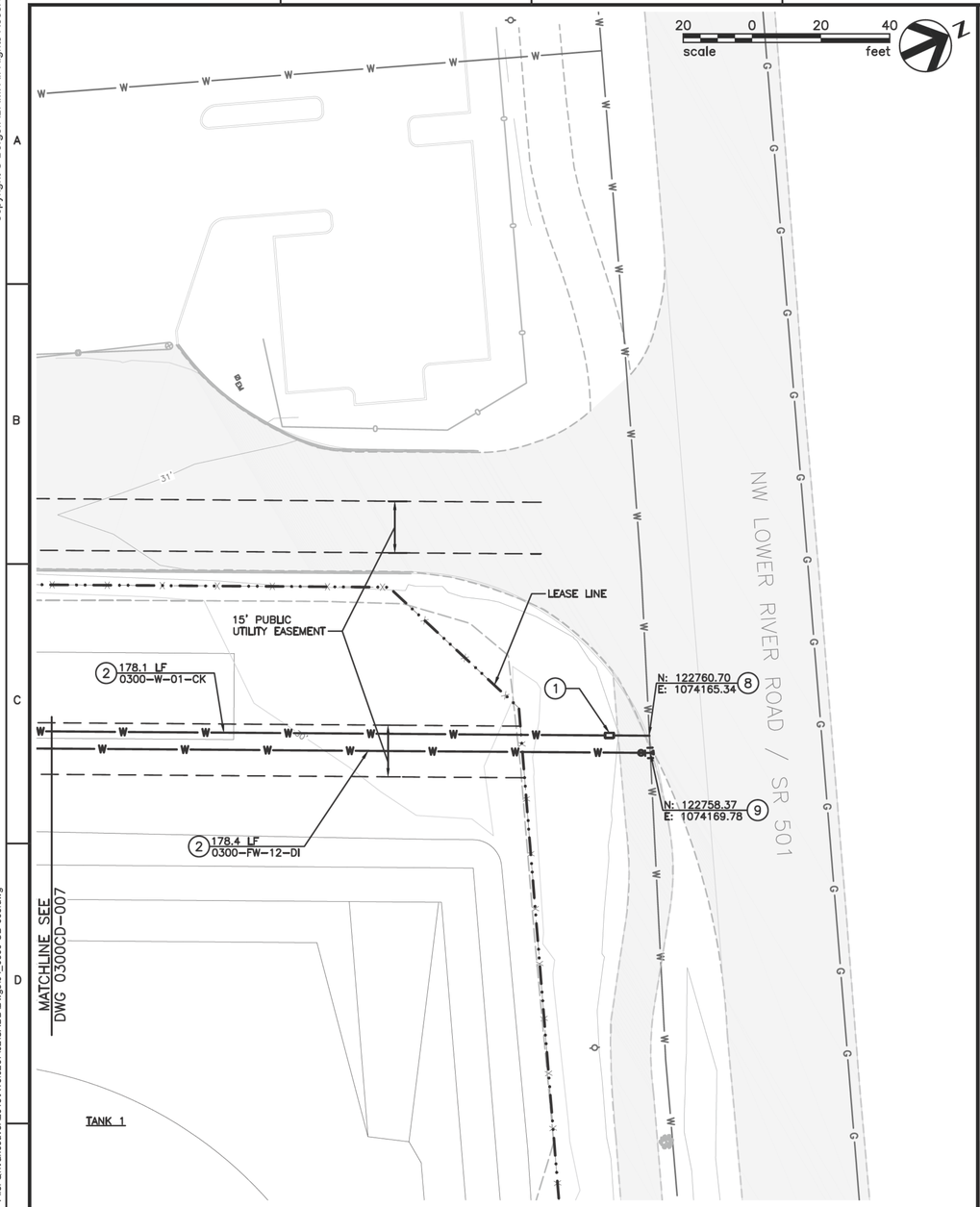
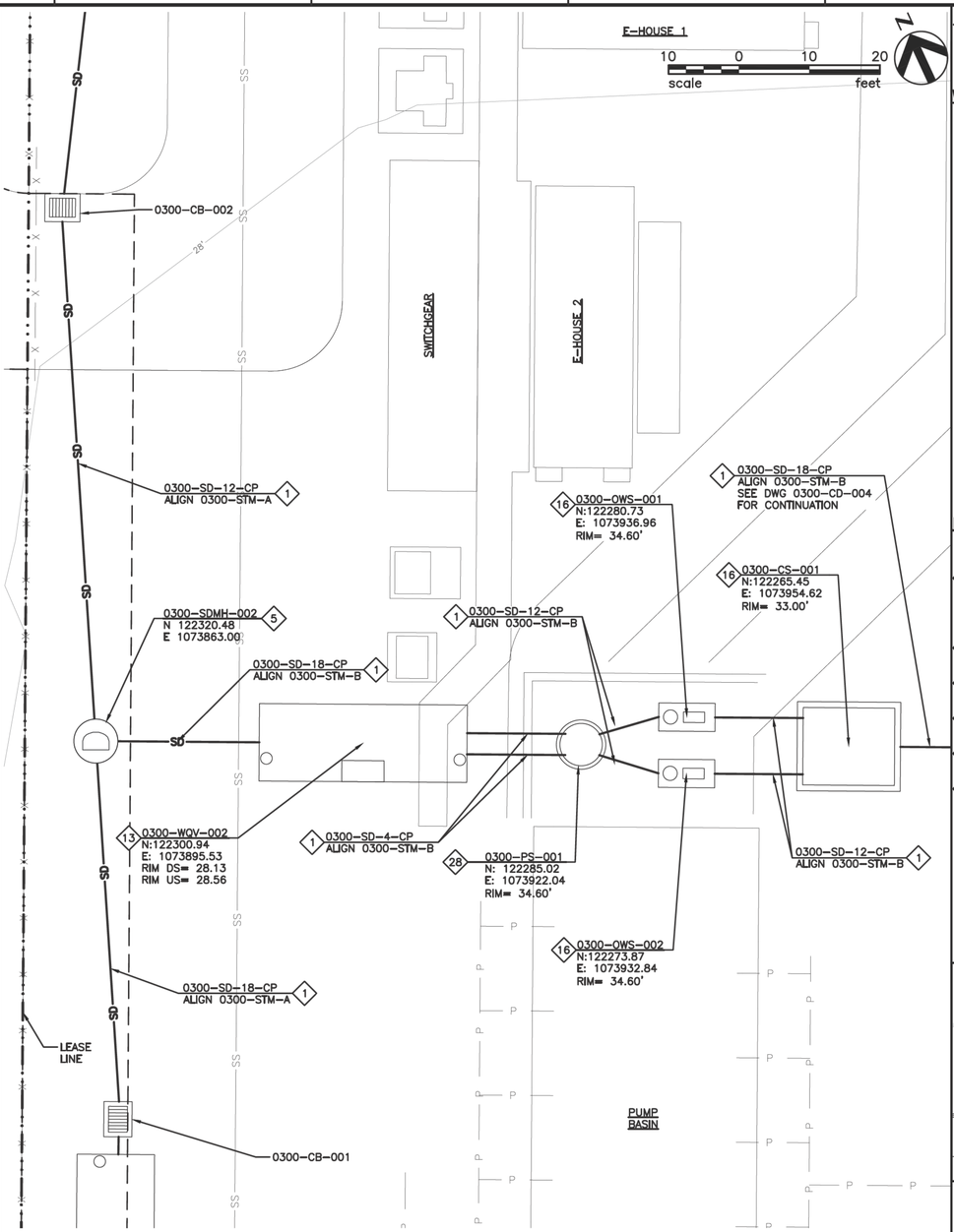


UTILITY PLAN 3



ENLARGED DETAIL 1 / 0300-CD-002

GENERAL NOTES:

1. SEE SITE PLAN 0300-SP-001 FOR SITE LAYOUT INFORMATION.

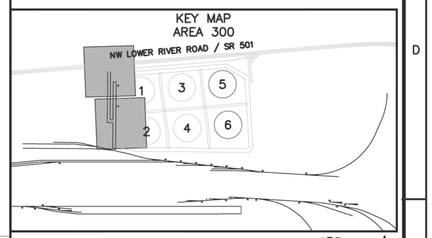
WATER CONSTRUCTION NOTES:

1. INSTALL 1" WATER SERVICE WITH 1" WATER METER PER DETAIL 1 ON DWG 0100-CD-008.
2. INSTALL WATER SERVICE WITH THE PIPE DIAMETER, MATERIAL AND SLOPE AS INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS SHALL BE IN ACCORDANCE WITH TRENCH SECTIONS SHOWN ON DWG 0100-CD-005.
8. CONNECT WATER SERVICE TO EXISTING CITY WATER MAIN IN ACCORDANCE WITH CITY SERVICE CONNECTION DETAILS.
9. CONNECT TO EXIST 16" DIA DI WATER MAIN WITH 16"x12" WET-TAP W/ 350 PSI TAPPING SLEEVE W/ INTEGRAL ISOLATION VALVE.

DRAINAGE NOTES:

1. SEE PROFILE DWG 0300-CD-009 FOR ALIGNMENT 0300-STM-A AND 0300-STM-B.

1. CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.
5. CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007
13. CONSTRUCT WATER QUALITY VAULTS 003-WQV-001 AND 0300-WQV-002 PER DETAIL 1 ON DRAWING 0300-CD-012.
16. CONSTRUCT OIL-WATER SEPARATOR IN ACCORDANCE WITH DETAIL 2 ON DRAWING 0300-CD-014.
18. CONSTRUCT CONTROL STRUCTURE PER DETAIL 3 ON DRAWING 0300-CD-014.
28. INSTALL STORM DRAIN PUMP STATION. SEE DETAILS ON MECHANICAL DRAWINGS.



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SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER

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(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
UTILITY PLAN – 3

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/17/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0300-CD-008	1 / 1	

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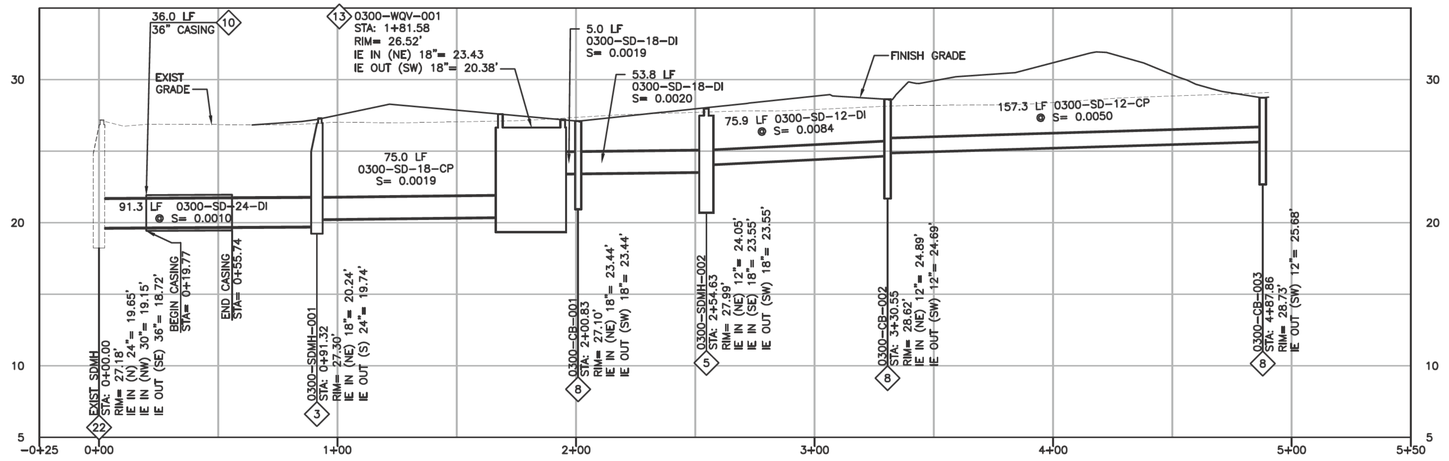
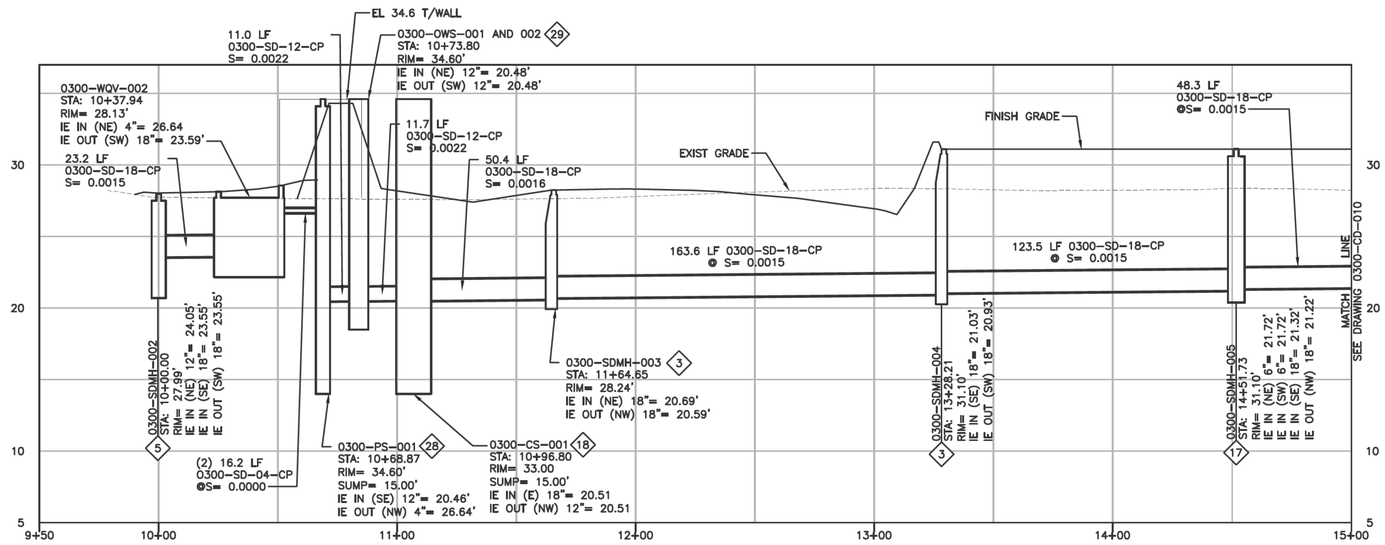


PROFILE 0300-STM-A

SCALE: 1"=30' HORZ AND 1"= 5' VERT

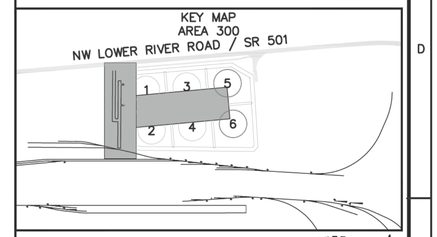


PROFILE 0300-STM-B

SCALE: 1"=30' HORZ AND 1"= 5' VERT

DRAINAGE NOTES:

3. CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.
5. CONSTRUCT 72" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.
8. CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.
10. CONSTRUCT STEEL CASING, SEE CASING NOTES DRAWING 0100-CD-006.
13. CONSTRUCT WATER QUALITY VAULTS 0300-WQV-001 AND 0300-WQV-002 PER DETAIL 1 ON DRAWING 0300-CD-013.
17. CONSTRUCT CONTAINMENT AREA JUNCTION VAULT PER DETAIL 4 ON DRAWING 0300-CD-014.
18. CONSTRUCT CONTROL STRUCTURE PER DETAIL 3 ON DRAWING 0300-CD-014.
22. CONNECTION TO EXISTING STORM DRAIN STRUCTURE. CONSTRUCT PER DETAIL 4 ON DRAWING 0100-CD-007.
28. INSTALL STORM DRAIN PUMP STATION. SEE DETAILS ON MECHANICAL DRAWINGS.
29. INSTALL OWS 0300-OWS-001 AND 0300-OWS-002 PER DETAIL 2 ON DRAWING 0300-CD-014.



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NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
DRAINAGE PROFILE – 1

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/17/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0300-CD-009	1 / 1	

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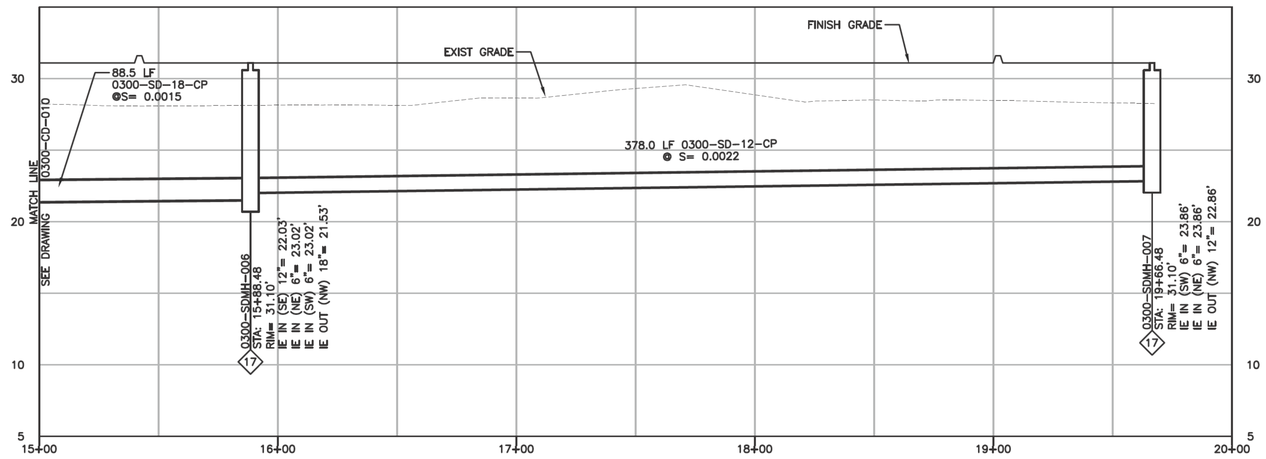
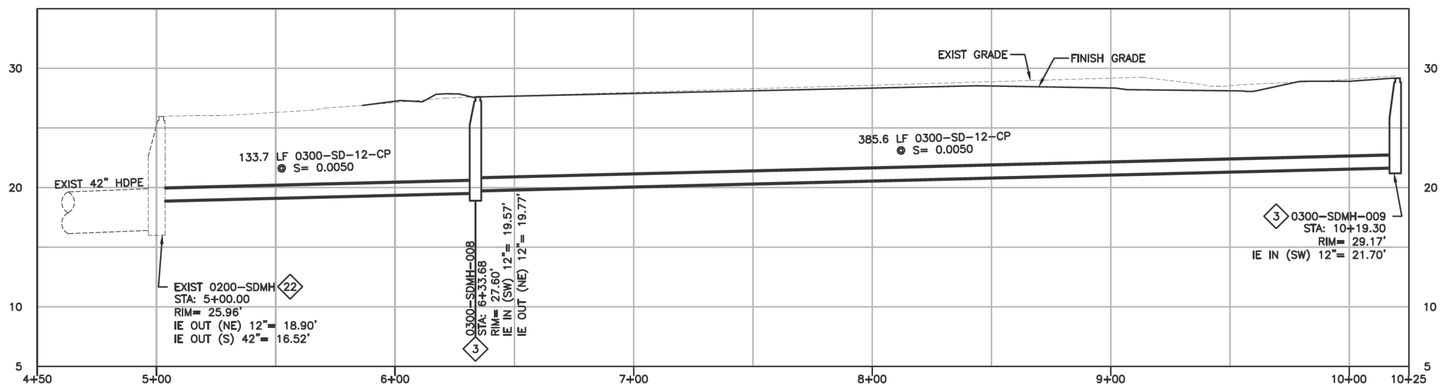


PROFILE 0300-STM-B

SCALE: 1"=30' HORZ AND 1"= 5' VERT

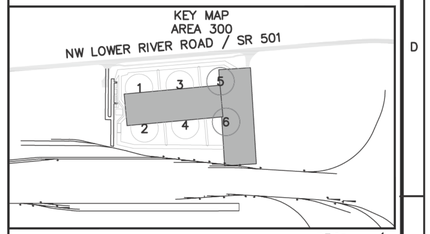


PROFILE 0300-STM-C

SCALE: 1"=30' HORZ AND 1"= 5' VERT

DRAINAGE NOTES:

3. CONSTRUCT 48" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-007.
17. CONSTRUCT CONTAINMENT AREA JUNCTION VAULT PER DETAIL 4 ON DRAWING 0300-CD-014.
22. CONNECTION TO EXISTING STORM DRAIN STRUCTURE. CONSTRUCT PER DETAIL 4 ON DRAWING 0100-CD-007.



PRELIMINARY

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
DRAINAGE PROFILE – 2

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/17/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0300-CD-010	1 / 1	

Last Saved by: Tony pritchett on: Dec 31, 2014 11:31 AM File: Q:\Vancouver\2013\A13.0267\02\CADD\Dwgs\04_0300-CD-010.dwg

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AREA 300 SANITARY

Structure Table	
Structure Name	Structure Details
0300-SSMH-001 N: 121829.56 E: 1074297.29	RIM = 27.35' SUMP = 11.27' IE IN (6") SW = 11.27' IE OUT (6") NW = 11.47'
0300-SSMH-002 N: 122075.69 E: 1073887.71	RIM = 27.08' SUMP = 16.25' IE IN (6") SE = 16.25' IE OUT (6") NW = 16.45'
0300-SSMH-003 N: 122169.44 E: 1073795.70	RIM = 27.30' SUMP = 17.76' IE IN (6") SE = 17.76' IE OUT (6") NE = 17.96'
0300-SSMH-004 N: 122451.65 E: 1073965.64	RIM = 30.89' SUMP = 21.06' IE IN (6") NE = 21.26' IE IN (6") SE = 21.26' IE OUT (6") SW = 21.06'
0300-OWS-003 N: 122226.20 E: 1073829.94	RIM = 27.76' IE IN (6") SE = 18.45' IE OUT (6") NE = 18.45'

AREA 300 STORM

Structure Table	
Structure Name	Structure Details
0300-CB-001 N: 122272.64 E: 1073838.38	RIM = 27.10' SUMP = 21.44' IE IN (18") NE = 23.44' IE OUT (18") SW = 23.44'
0300-CB-002 N: 122388.12 E: 1073897.47	RIM = 28.62' SUMP = 22.19' IE IN (12") NE = 24.89' IE OUT (12") SW = 24.69'
0300-CB-003 N: 122513.55 E: 1073992.41	RIM = 28.73' SUMP = 23.18' IE OUT (12") SW = 25.68'
0300-CB-004 N: 122306.01 E: 1074277.06	RIM = 25.80' SUMP = 19.88' IE OUT (6") SW = 21.88'
0300-CB-005 N: 122243.97 E: 1074259.27	RIM = 25.80' SUMP = 19.79' IE OUT (6") N = 21.79'
0300-CB-006 N: 122246.21 E: 1074400.04	RIM = 25.80' SUMP = 21.19' IE OUT (6") SW = 23.19'
0300-CB-007 N: 122189.03 E: 1074372.24	RIM = 25.80' SUMP = 21.09' IE OUT (6") NE = 23.09'
0300-CB-008 N: 122080.94 E: 1074740.00	RIM = 25.80' SUMP = 22.02' IE OUT (6") SW = 24.02'
0300-CB-009 N: 122023.70 E: 1074712.16	RIM = 25.80' SUMP = 21.92' IE OUT (6") NE = 23.92'
0300-PS-001 N: 122285.02 E: 1073922.04	RIM = 34.60' SUMP = 15.00' IE IN (12") SE = 20.46' IE OUT (4") NW = 26.64'
0300-SDMH-001 N: 122178.97 E: 1073781.66	RIM = 27.30' SUMP = 19.74' IE IN (18") NE = 20.24' IE OUT (24") S = 19.74'
0300-SDMH-002 N: 122320.48 E: 1073863.00	RIM = 27.99' SUMP = 21.52' IE IN (12") NE = 24.05' IE IN (18") SE = 23.55' IE OUT (18") SW = 23.55'
0300-SDMH-003 N: 122235.70 E: 1074004.15	RIM = 28.24' SUMP = 20.59' IE IN (18") NE = 20.69' IE OUT (18") NW = 20.59'
0300-SDMH-004 N: 122319.00 E: 1074144.91	RIM = 31.10' SUMP = 20.93' IE IN (18") SE = 21.03' IE OUT (18") SW = 20.93'
0300-SDMH-005 N: 122264.98 E: 1074256.00	RIM = 31.10' SUMP = 21.22' IE IN (6") NE = 21.72' IE IN (6") SW = 21.72' IE IN (18") SE = 21.32' IE OUT (18") NW = 21.22'
0300-SDMH-006 N: 122205.18 E: 1074378.98	RIM = 31.10' SUMP = 21.53' IE IN (12") SE = 22.03' IE IN (6") NE = 23.02' IE IN (6") SW = 23.02' IE OUT (18") NW = 21.53'
0300-SDMH-007 N: 122039.86 E: 1074718.91	RIM = 31.10' SUMP = 22.86' IE IN (6") SW = 23.86' IE IN (6") NE = 23.86' IE OUT (12") NW = 22.86'

AREA 300 STORM

Structure Table	
Structure Name	Structure Details
0300-OWS-001 N: 122280.73 E: 1073936.96	RIM = 34.60' IE IN (12") NE = 20.48' IE OUT (12") SE = 20.48'
0300-OWS-002 N: 122273.87 E: 1073932.84	RIM = 34.60' IE IN (12") NE = 20.48' IE OUT (12") SE = 20.48'
0300-CS-001 N: 122265.45 E: 1073954.62	RIM = 33.00 SUMP = 15.00' IE IN (18") NE = 20.51' IE OUT (12") SE = 20.51'

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
STRUCTURE TABLES

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/17/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0300-CD-012 | SHEET: 1/1 | REV.

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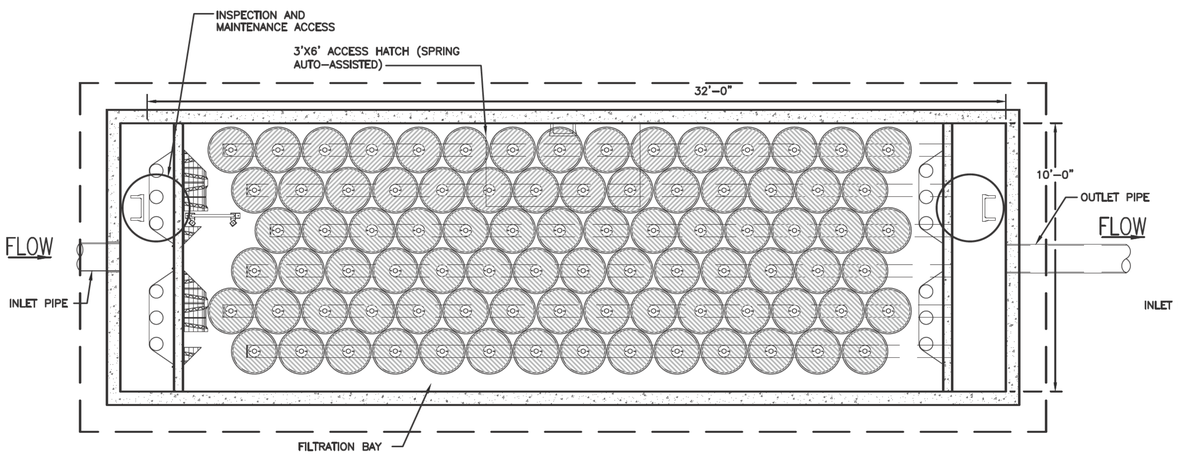
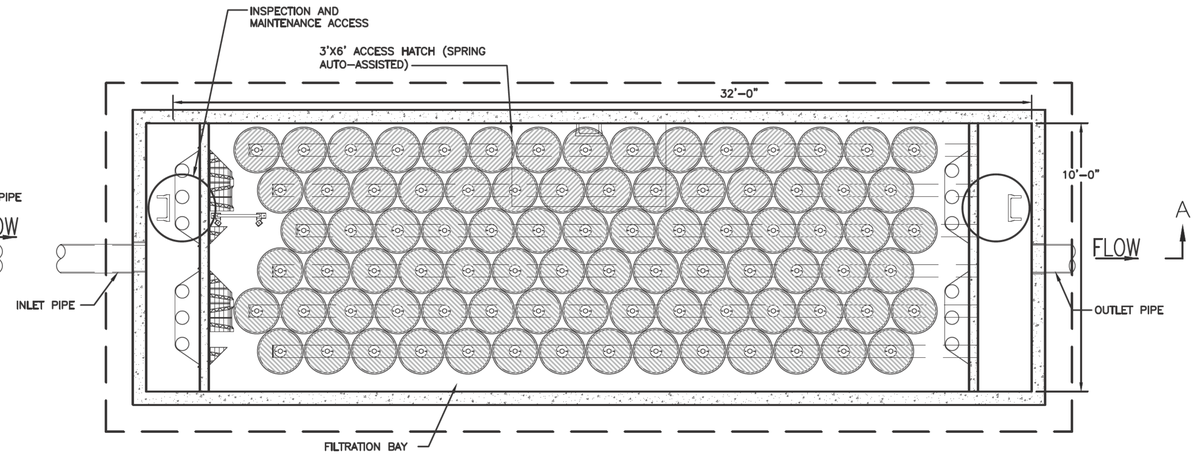
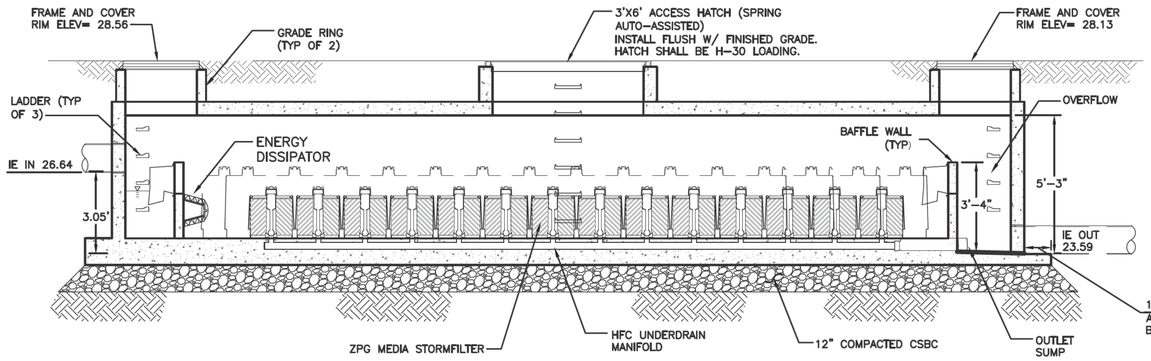
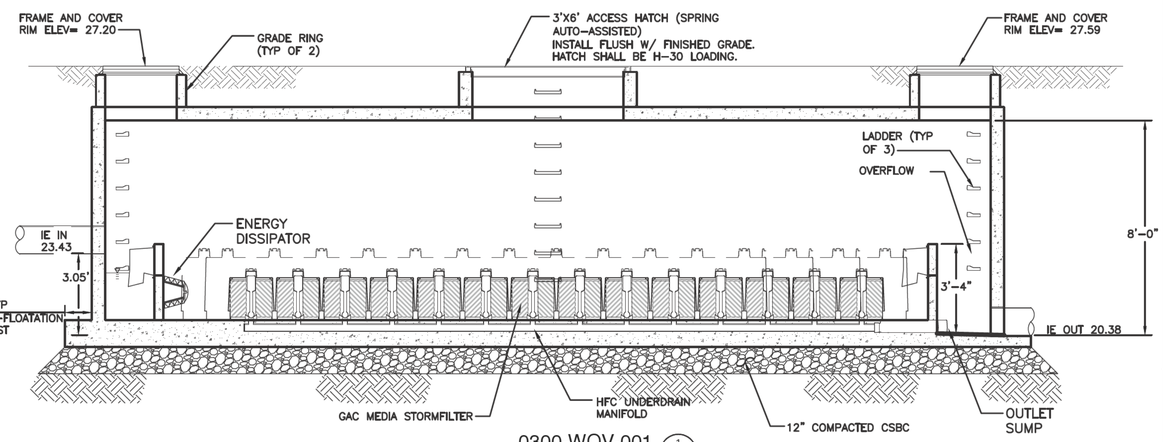






0300-WQV-002 (1 / -) NTS

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			0300-WQV-002
WATER QUALITY FLOW RATE (cfs)			1.96
PEAK FLOW RATE (cfs)			1.96
RETURN PERIOD OF PEAK FLOW (yrs)			N/A
# OF CARTRIDGES REQUIRED			78
CARTRIDGE FLOW RATE			11.25
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)			GAC
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	26.64	CP	4"
INLET PIPE #2	26.64	CP	4"
OUTLET PIPE	23.59	CP	18"
UPSTREAM RIM ELEVATION			28.56
DOWNSTREAM RIM ELEVATION			28.13
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			



0300-WQV-001 (1 / -) NTS

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			0300-WQV-001
WATER QUALITY FLOW RATE (cfs)			2.12
PEAK FLOW RATE (cfs)			13.24
RETURN PERIOD OF PEAK FLOW (yrs)			100-YR
# OF CARTRIDGES REQUIRED			85
CARTRIDGE FLOW RATE			11.25
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)			ZPG
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	23.43	CP	18"
INLET PIPE #2	N/A	N/A	N/A
OUTLET PIPE	20.38	CP	18
UPSTREAM RIM ELEVATION			27.20
DOWNSTREAM RIM ELEVATION			27.59
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

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Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
CIVIL DETAILS – 1

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/23/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0300-CD-013 | SHEET: 1/1 | REV.

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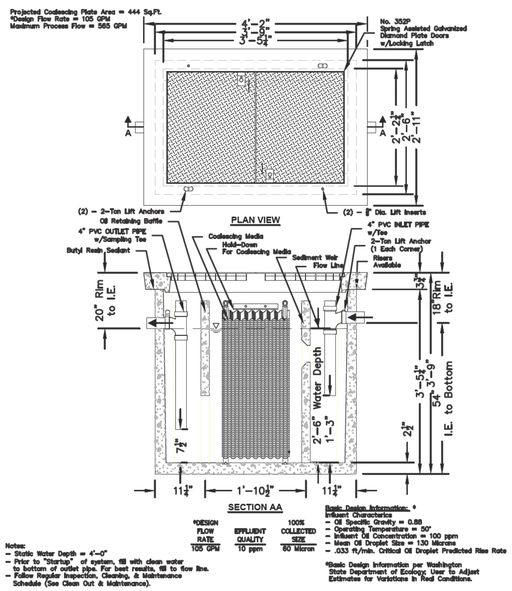
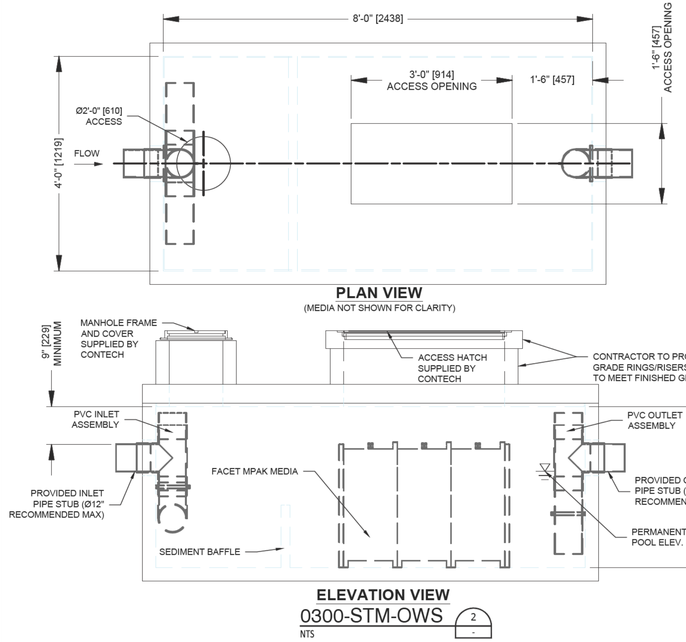
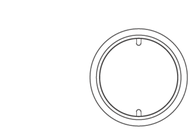


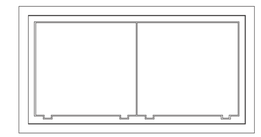
0300-SS-OWS 1
NTS



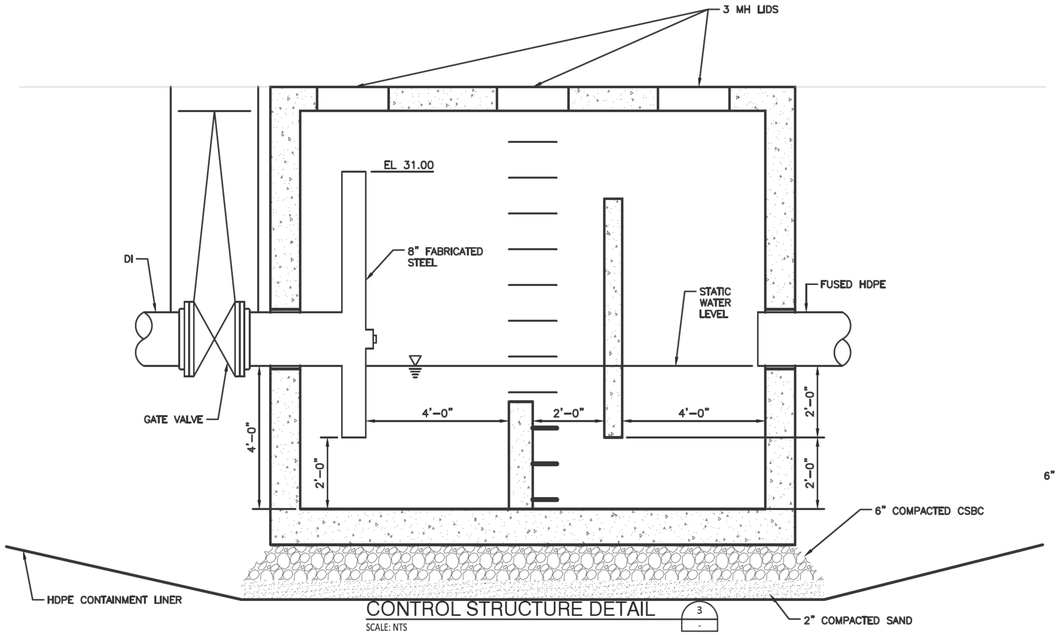
0300-STM-OWS 2
NTS



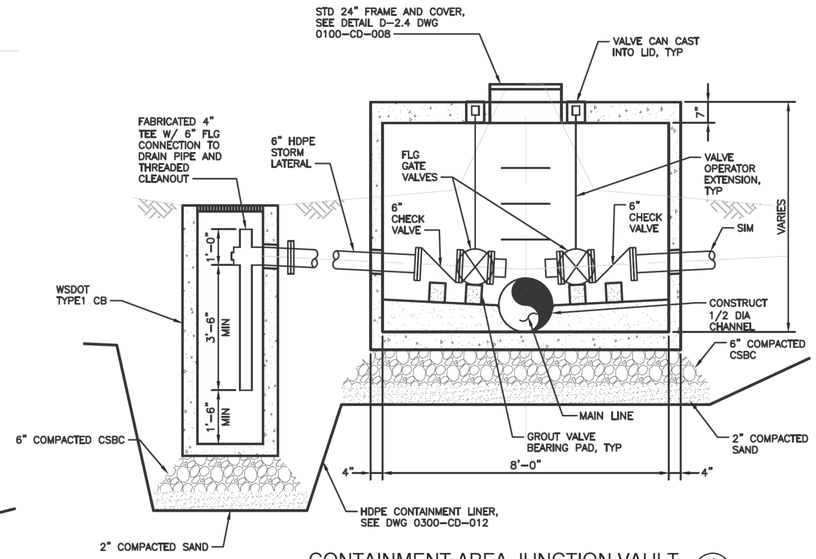
24" [610] FRAME AND COVER
(ACTUAL PRODUCT MAY VARY)
N.T.S.



36" x 72" [914 x 1829] ACCESS HATCH
(ACTUAL PRODUCT MAY VARY)
N.T.S.



CONTROL STRUCTURE DETAIL 3
SCALE: NTS



CONTAINMENT AREA JUNCTION VAULT 4
SCALE: NTS

PERMIT SET
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NO.	DATE	REVISION	BY	CK'D	APP

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Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 300
CIVIL DETAILS – 2

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/17/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0300-CD-014	1/1	

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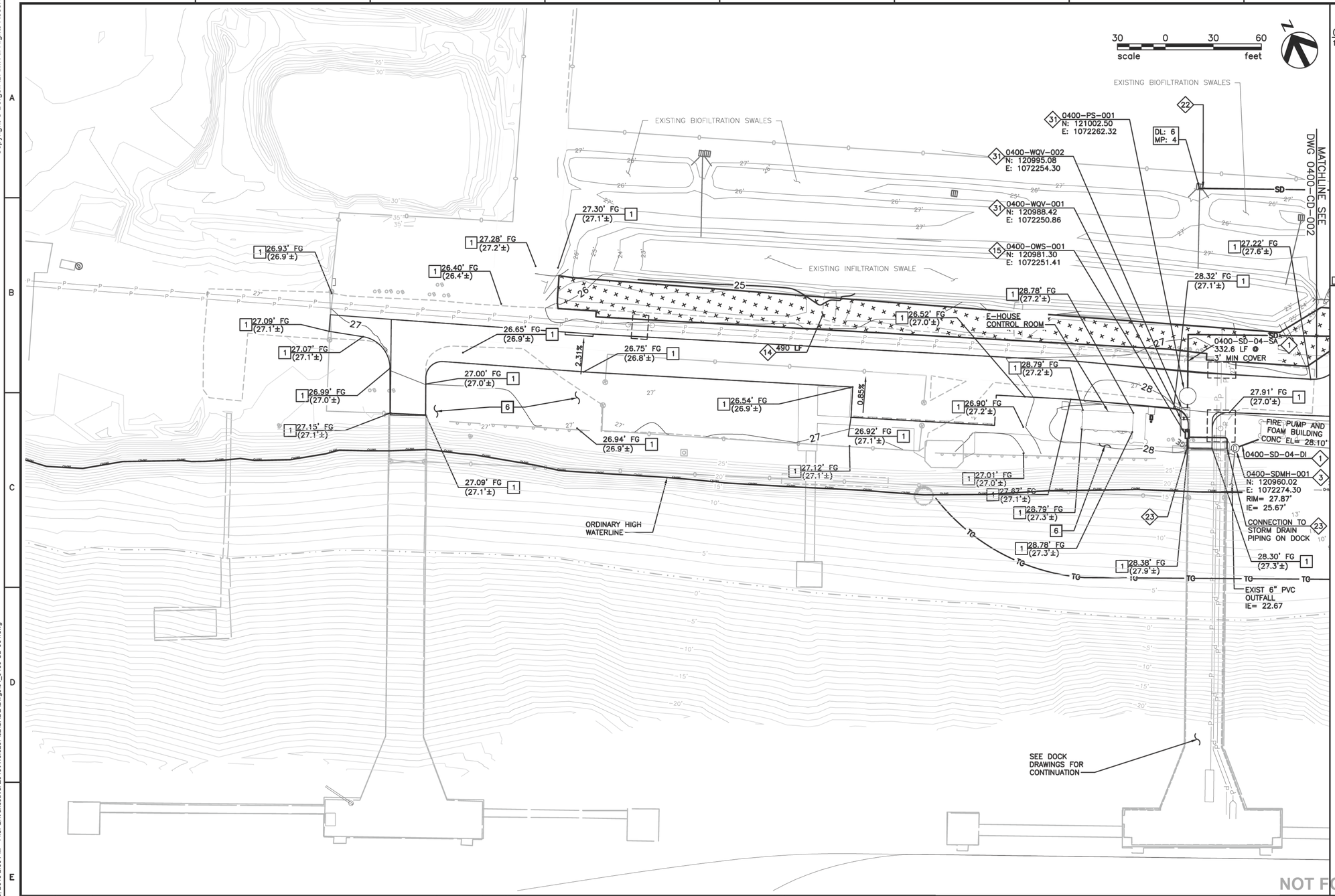

GRADING NOTES:

1. SEE SITE PLAN 0400-SP-001 FOR SITE LAYOUT

[1] MATCH EXISTING SURFRACE. CONSTRUCT SUBGRADE TO GRADUALLY TIE INTO EXISTING SURFACE. APPROXIMATE ELEVATIONS ARE SHOWN. WHERE MATCHING INTO EXISTING ASPHALT, SAWCUT MINIMUM 1' OF EXISTING ASPHALT AND MATCH EXISTING ASPHALT THICKNESSES AND APPLY ASPHALT JOINT SEALER.

[2] GRADE ASPHALT CONCRETE PARKING, DRIVE AISLE, AND DRIVEWAY AREAS TO THE ELEVATIONS AND GRADES SHOWN. GRADE TO ALLOW DRAINAGE TO SHEET FLOW TO CONSTRUCTED DRAINAGE CONVEYANCES AND INLETS.

[3] GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS. PLACE IMPORT GRANULAR ROCK FOR YARD SURFACING. 2" MINIMUM DEPTH, COMPACTED WITH 300 LB ROLLER.

[6] PERMANENT LANDSCAPING AREA – SEE LANDSCAPE PLANS FOR CONSTRUCTION DETAILS.

DRAINAGE NOTES:

[1] CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.

[14] CONSTRUCT STORMWATER FILTER STRIP IN ACCORDANCE WITH DETAIL 6 ON DRAWING 0100-CD-007.

[15] CONSTRUCT OIL-WATER SEPARATOR IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0400-CD-004.

[22] CONNECTION TO EXISTING STORM DRAIN STRUCTURE. CONSTRUCT PER DETAIL 4 ON DRAWING 0100-CD-007.

[23] CONNECTION TO PROPOSED STORM DRAIN. CONNECT WITH FERNCO WITH SS SHEAR BAND.

[31] INSTALL WATER QUALITY VAULTS 0400-WQV-001 AND 0400-WQV-002 IN ACCORDANCE WITH DETAILS ON DRAWING 0400-CD-004.

[32] INSTALL STORM WATER PUMP STATION PER DETAILS ON DRAWING 0400-CD-004.

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 400
GRADING AND DRAINAGE PLAN – 1

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0400-CD-001 | SHEET: 1/1 | REV.

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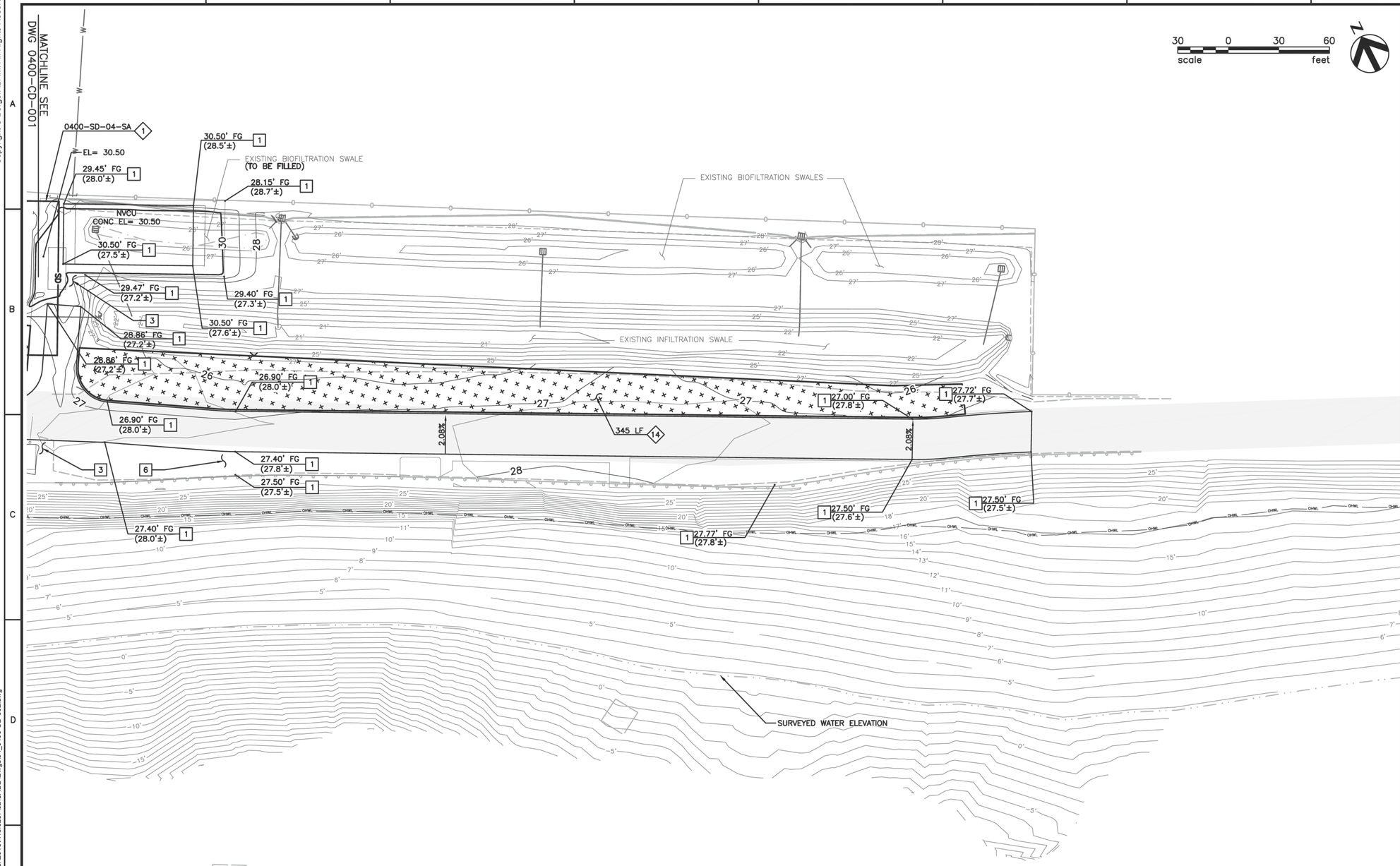

GRADING NOTES:

1. MATCH EXISTING SURFRACE. CONSTRUCT SUBRGRADE TO GRADUALLY TIE INTO EXISTING SURFACE. APPROXIMATE ELEVATIONS ARE SHOWN. WHERE MATCHING INTO EXISTING ASPHALT, SAWCUT MINIMUM 1' OF EXISTING ASPHALT AND MATCH EXISTING ASPHALT THICKNESSES AND APPLY ASPHALT JOINT SEALER.
2. GRADE ASPHALT CONCRETE PARKING, DRIVE AISLE, AND DRIVEWAY AREAS TO THE ELEVATIONS AND GRADES SHOWN. GRADE TO ALLOW DRAINAGE TO SHEET FLOW TO CONSTRUCTED DRAINAGE CONVEYANCES AND INLETS.
3. GRADE INDUSTRIAL AND RAIL YARD AREA GENTLY TOWARD STORM DRAIN INLETS. PLACE IMPORT GRANULAR ROCK FOR YARD SURFACING. 2" MINIMUM DEPTH, COMPACTED WITH 300 LB ROLLER.
6. PERMANENT LANDSCAPING AREA – SEE LANDSCAPE PLANS FOR CONSTRUCTION DETAILS.

DRAINAGE NOTES:

1. CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.
14. CONSTRUCT STORMWATER FILTER STRIP IN ACCORDANCE WITH DETAIL 6 ON DRAWING 0100-CD-007.

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY

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VANCOUVER ENERGY IS A JOINT VENTURE BETWEEN TESORO REFINING & MARKETING COMPANY LLC AND SAVAGE COMPANIES.

FOR MORE INFORMATION CONTACT: KELLY FLINT 801-944-6600
WWW.VANCOUVERENERGY.COM

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 400
GRADING AND DRAINAGE PLAN – 2

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	12/31/2014	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0400-CD-002	1/1	

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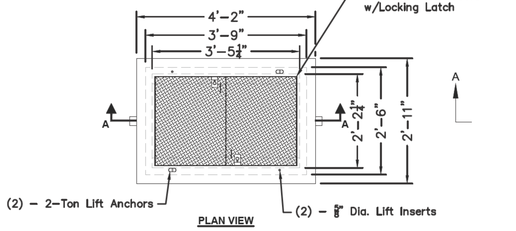
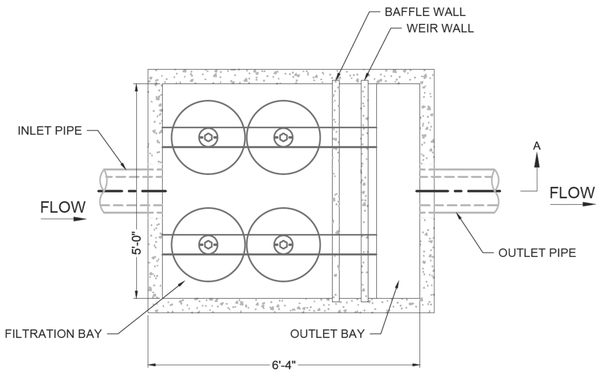
Projected Coalescing Plate Area = 444 Sq.Ft.
*Design Flow Rate = 105 GPM
Maximum Process Flow = 565 GPM



PLAN VIEW



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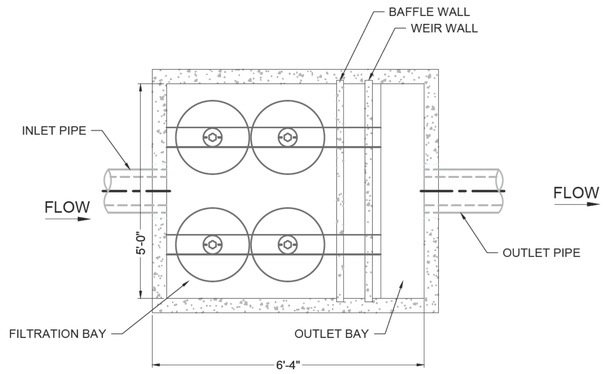

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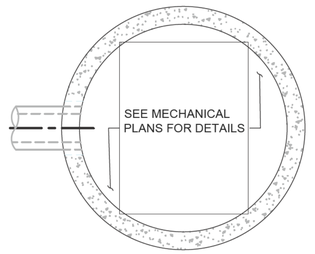

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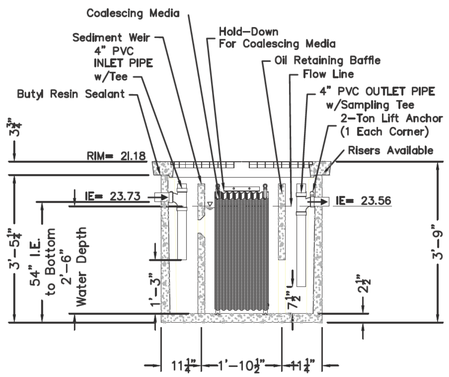

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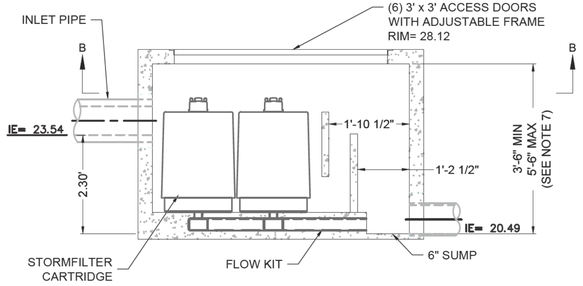
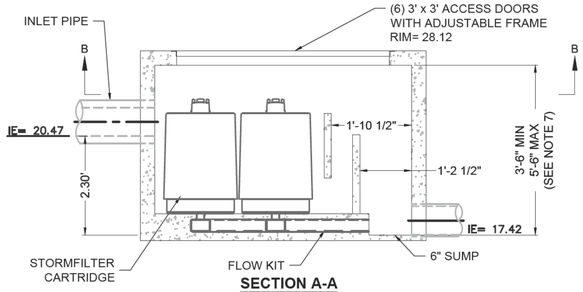
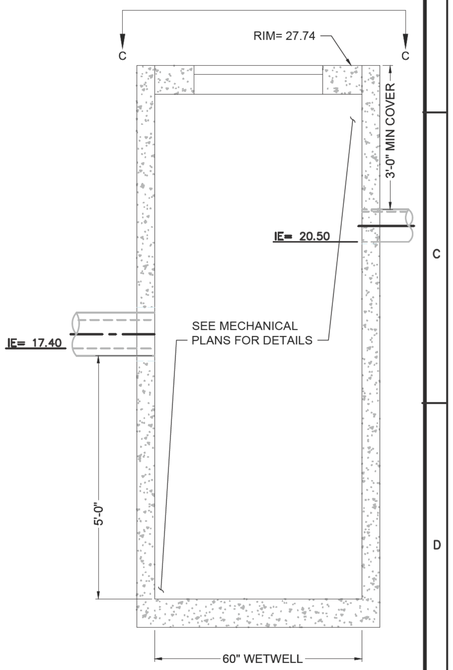


SECTION A-A



SECTION A-A



*DESIGN FLOW RATE	EFFLUENT QUALITY	100% COLLECTED SIZE
105 GPM	10 ppm	60 Micron

Notes:
- Static Water Depth = 4'–0"
- Prior to "Startup" of system, fill with clean water to bottom of outlet pipe. For best results, fill to flow line.
- Follow Regular Inspection, Cleaning, & Maintenance Schedule (See Clean Out & Maintenance).
- Connect to inlet and outlet piping with Fernco adapter with ss shear bands

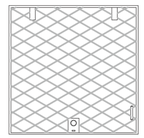
0400-OWS-001

Basic Design Information: *
Influent Characterics
- Oil Specific Gravity = 0.88
- Operating Temperature = 50°
- Influent Oil Concentration = 100 ppm
- Mean Oil Droplet Size = 130 Microns
- .033 ft/min. Critical Oil Droplet Predicted Rise Rate

*Basic Design Information per Washington State Department of Ecology; User to Adjust Estimates for Variations in Real Conditions.

0400-WQV-001

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			0400_WQV–001
WATER QUALITY FLOW RATE (cfs)			0.03
PEAK FLOW RATE (cfs)			0.15
RETURN PERIOD OF PEAK FLOW (yrs)			100–YR
# OF CARTRIDGES REQUIRED			2
CARTRIDGE FLOW RATE			7.5
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)			ZPG
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	23.54'	SA	4"
INLET PIPE #2	N/A	N/A	N/A
OUTLET PIPE	20.49'	SA	4"
UPSTREAM RIM ELEVATION			XXX
DOWNSTREAM RIM ELEVATION			N/A
ANTI–FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			



3' x 3' ACCESS DOORS
(SIZES VARY)
N.T.S.

0400-WQV-002

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			0400_WQV–002
WATER QUALITY FLOW RATE (cfs)			0.03
PEAK FLOW RATE (cfs)			0.15
RETURN PERIOD OF PEAK FLOW (yrs)			100–YR
# OF CARTRIDGES REQUIRED			2
CARTRIDGE FLOW RATE			7.5
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)			GAC
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	20.47'	SA	4"
INLET PIPE #2	N/A	N/A	N/A
OUTLET PIPE	17.42'	SA	4"
UPSTREAM RIM ELEVATION			XXX
DOWNSTREAM RIM ELEVATION			N/A
ANTI–FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			

0400-PS-001

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS — STATE OF WASHINGTON — 17330 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 400
CIVIL DETAILS – 1

DESIGN:	DRS	START DATE:	2/23/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0400–CD–004 | SHEET: 1/1 | REV.

Last Saved by: Tony.pritchett on: Feb 23, 2015 12:03 PM File: Q:\Vancouver\2013\A13.0267102\CADD\Dwgs\04_0400-CD-004.dwg

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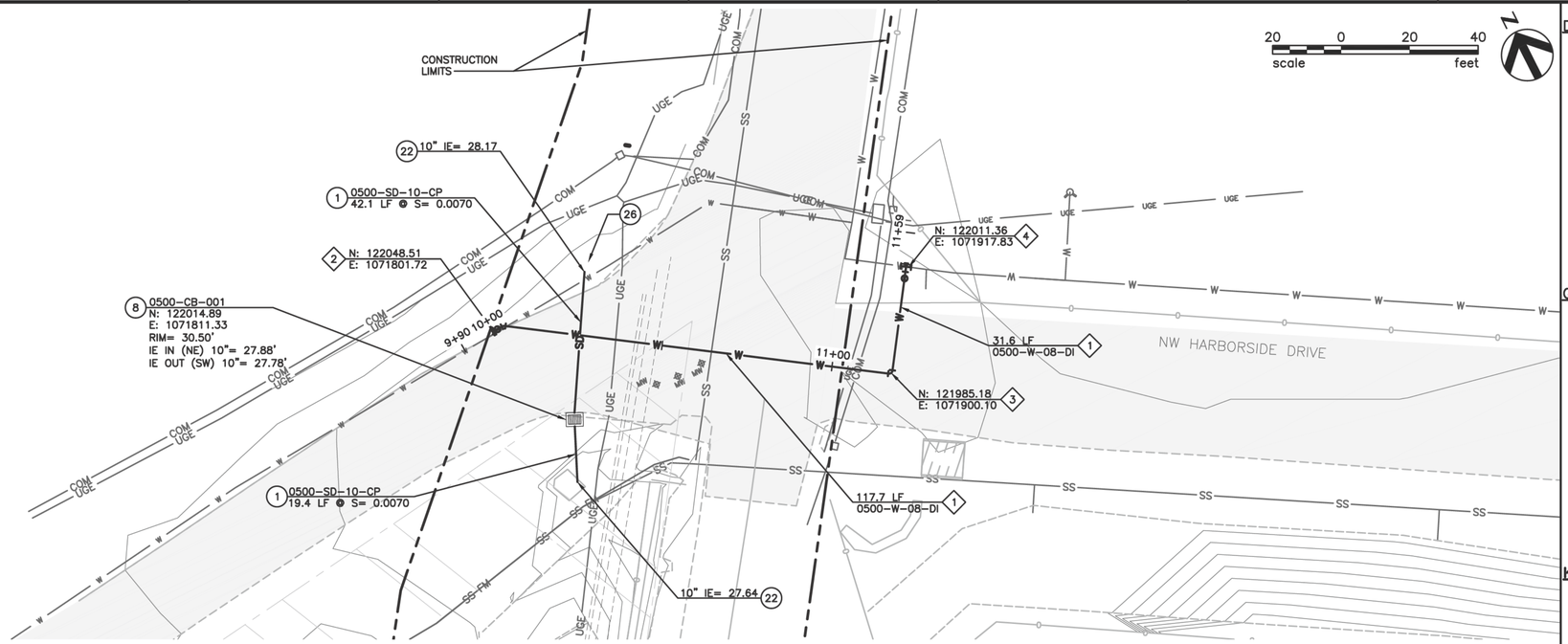
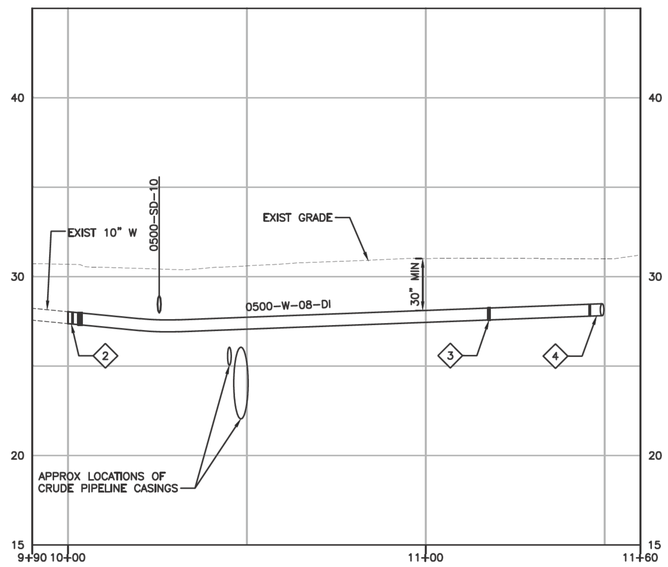




0500-W-1 PROFILE

SCALE: 1"=20' HZ AND 1"=4' VERT

DRAINAGE NOTES:

1. CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005.
8. CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.
22. CONNECTION TO EXISTING STORM DRAIN STRUCTURE. CONSTRUCT PER DETAIL 4 ON DRAWING 0100-CD-007.
26. RETROFIT SPILL TRAP WITHIN EXISTING INLET PER DETAIL 4 ON DRAWING 0100-CD-006.

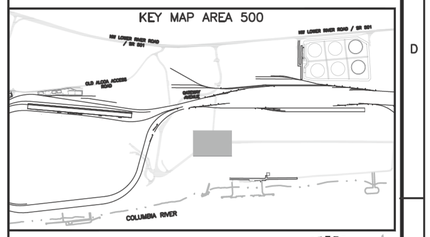
GENERAL WATERLINE NOTES:

1. SEE WATER SYSTEM INSTALLATION NOTES ON DRAWING 0100-CD-008. INSTALL ALL POTABLE WATER SYSTEMS IN ACCORDANCE WITH CITY OF VANCOUVER STANDARDS. NOTIFY CITY OF VANCOUVER A MINIMUM 72-HOURS BEFORE BEGINNING CONSTRUCTION.
2. INSTALL ALL OPEN TRENCH PIPE IN ACCORDANCE WITH COV STD DETAIL W-13.
3. INSTALL THRUST BLOCKS PER COV STD DETAIL W-16, VALVE BOXES AND COVERS PER COV STD DETAIL W-10.
4. RESTORE EXISTING SURFACING IN ACCORDANCE WITH DETAILS SPECIFIED ON DWG 0100-CD-005. REPLACE EXISTING ASPHALT CONCRETE WITH DETAIL X, AND ALL OTHER AREAS ALONG PIPELINE ALIGNMENT WITH DETAIL X.

KEY NOTES:

1. INSTALL:
   8" CL350 DI
   OPEN TRENCH
   FULLY RESTRAINED
2. INSTALL:
   (1) 8" CL350 DI ROMAC 501 COUPLING
   (1) 8" PIPE SPOOL (VARIABLE LENGTH)
   (1) 8" FLGxMJ BFV
   (1) 8" CL350 DI 11.25° ELBOW
   (1) 8" CL350 DI 22.5° ELBOW
3. INSTALL:
   (1) 8" CL350 DI 90° ELBOW
4. INSTALL:
   (1) 8"x8" FLG TAPPING SLEEVE WITH TB – WET TAP
   (1) 8" FLGxMJ TAPPING VALVE

KEY MAP AREA 500



SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 500
UTILITY RELOCATION PLAN AND PROFILES – 1

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0500-CD-001	1 / 1	

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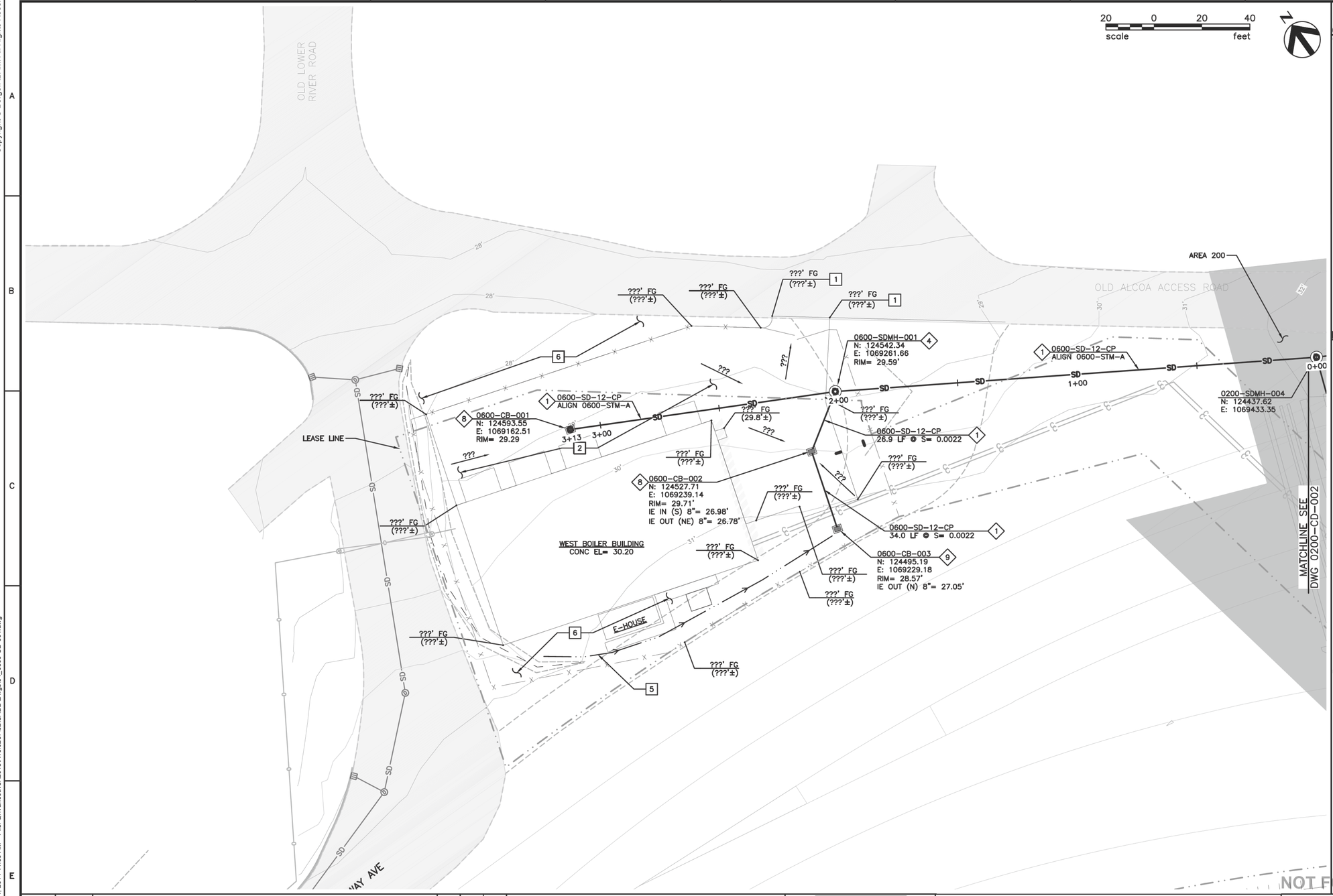


GRADING NOTES:

1. SEE SITE PLAN 0600-SP-001 FOR SITE LAYOUT INFORMATION.

[1] MATCH EXISTING SURFRACE. CONSTRUCT SUBRGRADE TO GRADUALLY TIE INTO EXISTING SURFACE. APPROXIMATE ELEVATIONS ARE SHOWN. WHERE MATCHING INTO EXISTING ASPHALT, SAWCUT MINIMUM 1' OF EXISTING ASPHALT AND MATCH EXISTING ASPHALT THICKNESSES AND APPLY ASPHALT JOINT SEALER.

[2] GRADE ASPHALT CONCRETE PARKING, DRIVE AISLE, AND DRIVEWAY AREAS TO THE ELEVATIONS AND GRADES SHOWN. GRADE TO ALLOW DRAINAGE TO SHEET FLOW TO CONSTRUCTED DRAINAGE CONVEYANCES AND INLETS.

[5] CONSTRUCT MINIMUM 2' WIDE DRAINAGE SWALE GENTLY SLOPING TOWARD PROPOSED AREA INLET.

[6] PERMANENT LANDSCAPING AREA – SEE LANDSCAPE PLANS FOR CONSTRUCTION DETAILS.

DRAINAGE NOTES:

1. SEE PROFILE DRAWING 0600-CD-003 FOR ALIGNMENT 0600-STM-A

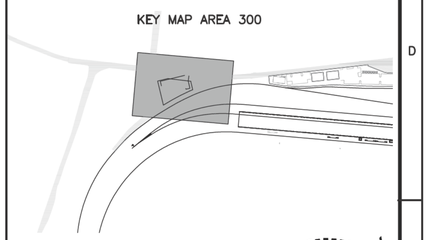
[1] CONSTRUCT PROPOSED STORM DRAIN PIPELINES WITH THE PIPE DIAMETER, MATERIAL, AND SLOPE INDICATED. PIPE TRENCH SECTIONS INCLUDING BEDDING, BACKFILL AND SURFACE RESTORATIONS AS SHOWN ON DRAWING 0100-CD-005. SEE DWG 0300-CD-003 FOR PROFILE.

[4] CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

[8] CONSTRUCT CATCH BASIN INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

[9] CONSTRUCT AREA INLET IN ACCORDANCE WITH DETAIL 2 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.

KEY MAP AREA 300



PRELIMINARY

SAM ADAMS STATE OF WASHINGTON 17330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 600
GRADING AND DRAINAGE PLAN

DESIGN: DRS	START DATE: 12/23/2014	SCALE: AS SHOWN
DRAWN: TNP	PRINT DATE: 2/25/2015	PROJECT MANAGER: SAVAGE_PM
CHECKED: MCH	APPROVED: SA	SIZE: 24X36
DRAWING NUMBER		SHEET	REV.
0600-CD-001		1/1	

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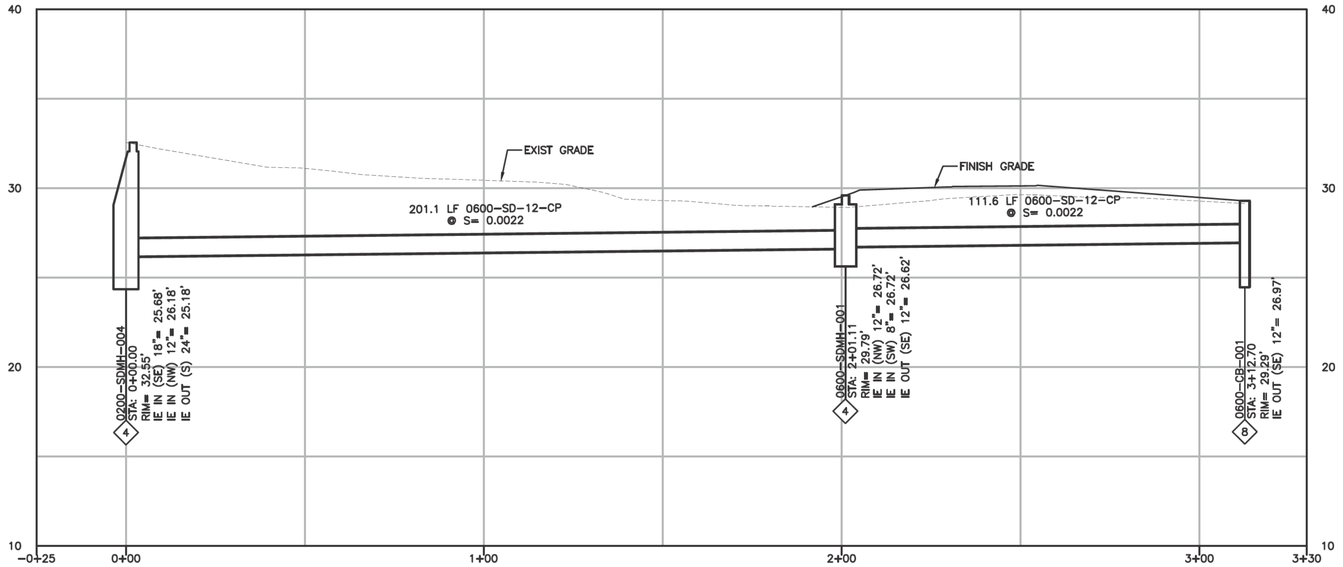
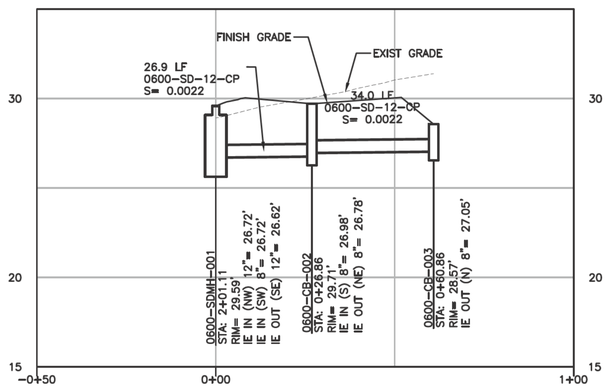


PROFILE 0600-STM-A
SCALE: 1"=20' HORZ AND 1"= 4' VERT

DRAINAGE NOTES:

4. CONSTRUCT 60" DIAMETER PRECAST MANHOLE IN ACCORDANCE WITH DETAIL 5 ON DRAWING 0100-CD-007.

8. CONSTRUCT AREA INLET IN ACCORDANCE WITH DETAIL 1 ON DRAWING 0100-CD-006. ALL STORM DRAIN INLETS MUST INCLUDE ZYMARK BRAND OR EQUIVALENT SPILL CONTROL TRAP INSERT.



PROFILE 0600-STM-A
SCALE: 1"=20' HORZ AND 1"= 4' VERT

AREA 600

STRUCTURE NAME	STRUCTURE DETAILS
0600-CB-001 N: 124593.55 E: 1069162.51	RIM = 29.29' SUMP = 24.97' IE OUT (12") SE = 26.97'
0600-CB-002 N: 124527.71 E: 1069239.14	RIM = 29.71' SUMP = 26.78' IE IN (8") S = 26.98' IE OUT (8") NE = 26.78'
0600-CB-003 N: 124495.19 E: 1069229.18	RIM = 28.57' SUMP = 27.05' IE OUT (8") N = 27.05'
0600-SDMH-001 N: 124542.34 E: 1069261.66	RIM = 29.59' SUMP = 26.62' IE IN (12") NW = 26.72' IE IN (8") SW = 26.72' IE OUT (12") SE = 26.62'

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS
STATE OF WASHINGTON
17330
REGISTERED
PROFESSIONAL ENGINEER
PRELIMINARY

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 600
DRAINAGE PROFILES & STRUCTURE TABLE

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36
DRAWING NUMBER				SHEET	REV.
0600-CD-003				1/1	

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Operations Stormwater Pollution Prevention Plan

Vancouver Energy Terminal
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix B
Training Log

Vancouver Energy Terminal

SWPPP Training Documentation Log

Training Date: _____

Trainer **Name:** **Title:**

Training Topics:

Insert Training Topics:

Attendees		
Name	**Title**	**Signature**

Special issues or events discussed during training:

Insert special issues or topics discussed during the meeting

Certification

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

PRINTED NAME of person with **Signature Authority** (permit condition G2.A) or a **Duly Authorized Representative**	SIGNATURE of person with **Signature Authority** (permit condition G2.A) or a **Duly Authorized Representative**[1]	**DATE**

[1]A

Appendix C
Industrial Stormwater Monthly Inspection Report

Appendix C
Industrial Stormwater Monthly Inspection Report

Inspections must be conducted by a person with the knowledge and skills to assess conditions and activities that could impact stormwater quality at the facility, and evaluate the effectiveness of best management practices required by this permit. Retain a copy of the completed and signed form in accordance with Permit Condition S9.C.

See attached Industrial Stormwater Monthly Inspection Report form.

Industrial Stormwater Monthly Inspection Report

Inspections must be conducted by a person with the knowledge and skills to assess conditions and activities that could impact stormwater quality at the facility, and evaluate the effectiveness of best management practices required by this permit. Retain a copy of the completed and signed form in accordance with Permit Condition S9.C.

FACILITY NAME:	**INSPECTION TIME:**	**DATE:**

WEATHER INFORMATION:

- Description of Weather Conditions (e.g., sunny, cloudy, raining, snowing, etc.):

  _____

  _____

- Was stormwater (e.g., runoff from rain or snowmelt) flowing at outfalls and/or discharge areas shown on the Site Map during the inspection: ☐ **Yes** ☐ **No** ☐ **Comments:**

  _____

  _____

I. POTENTIAL POLLUTANT SOURCE AREA INSPECTION AND BEST MANAGEMENT PRACTICES EVALUATION

	Yes	**No**	**Findings and Remedial Action Documentation:** Describe any findings below and the schedule for remedial action completion including the date initiated and date completed or expected to be completed.
SWPPP and Site Map: Have a copy of the SWPPP and site map with you during the inspection so that you can ensure they are current and accurate. Use it as an aide in recording the location of any issues you identify during the inspection. • Is the Site Map current and accurate? • Is the SWPPP inventory of activities, materials, and products current? Any new potential pollutant sources must be added to the map and reflected in the *SWPPP Facility Assessment and Tables 2, 2A, 3, and 5.*			

	Yes	**No**	**NA**	**Findings and Remedial Action Documentation:**
Vehicle/Equipment Areas: ***Equipment cleaning: Check NA if not performed on site. Skip section.*** Is equipment washed and/or cleaned only in designated areas? • Observe washing: Is all washwater captured and properly disposed of? ***Equipment fueling: Check NA if not performed on site. Skip section.*** • Are all fueling areas free of contaminant buildup and evidence of chronic leaks/spills? • Are all chemical liquids, fluids, and petroleum products, on an impervious surface that is surrounded with a containment berm or dike that is capable of containing 10% of the total enclosed tank volume or 110% of the volume contained in the largest tank, whichever is greater? • Are structures in place to prevent precipitation from accumulating in containment areas? – If not, is there any water or other fluids accumulated within the containment area? – Note: If containment areas are not covered to prevent water from accumulating, the SWPPP must include a plan describing how accumulated water will be managed and disposed of.				

Equipment maintenance:	Yes	No	NA	Findings and Remedial Action Documentation:
• Are maintenance tools, equipment, and materials stored under shelter, elevated, and covered? • Are all drums and containers of fluids stored with proper cover and containment? • Are exteriors of containers kept outside free of deposits? • Are any vehicles and/or equipment leaking fluids? Identify leaking equipment. • Is there evidence of leaks or spills since last inspection? Identify and address. • Are materials, equipment, and activities located so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas)? Add any additional site-specific BMPs: _____ _____ _____ _____				

Good Housekeeping BMPs:	Yes	No	NA	Findings and Remedial Action Documentation:
1. Are paved surfaces free of accumulated dust/sediment and debris? • Date of last quarterly vacuum/sweep _____ • Are there areas of erosion or sediment/dust sources that discharge to storm drains? 2. Are all waste receptacles located outdoors: • In good condition? • Not leaking contaminants? • Closed when is not being accessed? • External surfaces and area free of excessive contaminant buildup? 3. Are the following areas free of accumulated dust/sediment, debris, contaminants, and/or spills/leaks of fluids? • External dock areas • Pallet, bin, and drum storage areas • Maintenance shop(s) • Equipment staging areas (loaders, tractors, trailers, forklifts, etc.) • Around bag-house(s) • Around bone yards • Other areas of industrial activity: _____ _____ _____ _____ _____ _____ _____				

Spill Response and Equipment: Are spill kits available in the following locations? • Fueling stations • Transfer and mobile fueling units • Vehicle and equipment maintenance areas Do the spill kits contain all the permit required items? • Oil absorbents capable of absorbing 15 gallons of fuel. • A storm drain plug or cover kit. • A non-water containment boom, a minimum of 10 feet in length with a 12-gallon absorbent capacity. • A non-metallic shovel. • Two 5-gallon buckets with lids. Are contaminated absorbent materials properly disposed of?	**Yes**	**No**	**NA**	**Findings and Remedial Action Documentation:**
General Material Storage Areas: • Are damaged materials stored inside a building or another type of storm resistance shelter? • Are all uncontained material piles stored in a manner that does not allow discharge of impacted stormwater? • Are scrap metal bins covered? • Are outdoor containers covered?	**Yes**	**No**	**NA**	**Findings and Remedial Action Documentation:**
Stormwater BMPs and Treatment Structures: Visually inspect all stormwater BMPs and treatment structures devices, discharge areas infiltration, and outfalls shown on the site map. • Are BMPs and treatment structures in good repair and operational? • Are BMPs and treatment structures free from debris buildup that may impair function? • The permit requires Permittees to clean catch basins when the depth of debris reaches 60% of the sump depth. In addition, the Permittee must keep the debris surface at least 6 inches below the outlet pipe. Based on this, do catch basins need to be cleaned? • Are berms, curbing, or other methods used to divert and direct discharges adequate and in good condition?	**Yes**	**No**	**NA**	**Findings and Remedial Action Documentation:**
Observation of Stormwater Discharges: • Is the discharge free of floating materials, visible oil sheen, discoloration, turbidity, odor, foam, or any other signs of contamination? • Water from washing vehicles or equipment, steam cleaning, and/or pressure washing is considered process wastewater and is not allowed to comingle with stormwater or enter storm drains. Is process water comingling with stormwater or entering storm drains? • Illicit discharges include domestic wastewater, noncontact cooling water, or process wastewater (including leachate). Were any illicit discharges observed during the inspection?	**Yes**	**No**	**NA**	**Findings and Remedial Action Documentation:**

II. CORRECTIVE ACTION AND SWPPP MODIFICATIONS DESCRIPTIONS: Additional space to describe inspection findings and corrective actions if needed. Provide brief explanation of the general location and the rationale for the additional or different BMPs.

III. CERTIFICATION STATEMENTS AND SIGNATURES:

Inspector - Certification: This section must be completed by the person who conducted the site inspection prior to submitting this form to the person with signature authority (see Permit Condition G2) or a duly authorized representative of that person.

☐ The facility is in compliance with the terms and conditions of the SWPPP and the Industrial Stormwater General Permit.

☐ *The facility is out of compliance with the terms and conditions of the SWPPP and the Industrial Stormwater General Permit. This report includes the remedial actions that must be taken to meet the requirements of the SWPPP and permit, including a schedule of implementation of the remedial actions.*

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief."

Inspector's Name – Printed	**Inspector's Signature**	**Inspector's Title**	**Date**

Permittee – Certification:

☐ The facility is in compliance with the terms and conditions of the SWPPP and the Industrial Stormwater General Permit.

☐ *The facility is out of compliance with the terms and conditions of the SWPPP and the Industrial Stormwater General Permit. This report includes the remedial actions that must be taken to meet the requirements of the SWPPP and permit, including a schedule of implementation of the remedial actions.*

"I certify under penalty of law, that this document and all Appendices were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

PRINTED NAME of person with **Signature Authority** (permit condition G2.A) or a **Duly Authorized Representative**[1]	SIGNATURE of person with **Signature Authority** (permit condition G2.A) or a **Duly Authorized Representative**[1]	**DATE**

[1]A person is duly authorized representative only if (1) the authorization is made in writing by a person described in Permit Condition G2.A and submitted to Ecology, and (2) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated *facility*, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

Appendix D
Individual Industrial Stormwater Permit

[Reserved for Permit Approval]

Appendix E
Permit Coverage Letter

[Reserved for Permit Approval]

Appendix F
Sample Collection Sample Form

Appendix F
Sample Collection Sample Form

Samples of the stormwater discharge must be conducted by a person with the knowledge and skills to assess conditions and activities at the facility, and perform sampling according to the specifications within the Stormwater Pollution Prevention Plan. Retain a copy of the completed and signed form in accordance with Industrial Stormwater General Permit Condition S9.C.

See attached Sample Collection Sample form.

VANCOUVER ENERGY TERMINAL
INDUSTRIAL STORMWATER SAMPLE COLLECTION FORM

Samples of the stormwater discharge must be conducted by a person with the knowledge and skills to assess conditions and activities at the facility, and perform sampling according to the specifications within the Stormwater Pollution Prevention Plan. Retain a copy of the completed and signed form in accordance with Industrial Stormwater General Permit Condition S9.C.

SAMPLING TIME: **DATE:**

WEATHER INFORMATION:

- Description of Weather Conditions at the time of sampling (e.g., sunny, cloudy, raining, snowing, etc.):

_____

_____

I. Sampling Information

	Yes	No	NA	Findings and notes:
Was sample taken within first 30 minutes of the stormwater event? If no, provide an explanation of factor preventing sampling within first 30 minutes.				

	Findings and notes:
Location of Sample	

Observation of Stormwater Discharges:	Yes	No	NA	Findings and notes:
• Is the discharge free of floating materials, visible oil sheen, discoloration, turbidity, odor, foam or any other signs of contamination? • Illicit discharges include domestic wastewater, noncontact cooling water, or process wastewater (including leachate). Were any illicit discharges observed during the sampling?				

Visible Oil Sheen:	Yes	No	NA	Findings and Notes:
• Was a clean sampling bottle used for the oil sheen sampling? • Was the sample allowed to settle for five minutes before the observation was made? • Was a rainbow sheen or floating globules visible? ○ If yes, when stirred did the sheen break into irregular platelets that did not reform?				

Method of sampling and preservation:	Yes	No	NA	Findings and Notes:
• Were powder-nitrile or latex gloves used? • Were clean, unused bottles provided by the lab used for the sample collection? • Were bottles filled to the line and not over filled? • Number of samples collected: • Were samples packed in ice within the required time?				

II. Laboratory Shipment

Shipment Date and Time	

III. Certification:

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief."

Printed Name	**Signature**	**Title**	**Date**

Permittee – Certification:

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

PRINTED NAME of person with **Signature Authority** (permit condition G2.A) or a **Duly Authorized Representative**[1]	SIGNATURE of person with **Signature Authority** (permit condition G2.A) or a **Duly Authorized Representative**[1]	**DATE**

[1]A person is duly authorized representative only if 1) the authorization is made in writing by a person described in Permit Condition G2.A and submitted to Ecology, and 2) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated *facility*, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

Appendix G
SWPPP Certification Form

Appendix G
SWPPP Certification Form

The Permittee shall use this form to sign and certify that the Stormwater Pollution Prevention Plan (SWPPP) is complete, accurate, and in compliance with Conditions S3 and S8 of the Industrial Stormwater General Permit.

- A SWPPP certification form needs to be completed and attached to all SWPPPs.
- Each time a Level 1, 2, or 3 Corrective Action is required, this form needs to be resigned and recertified by the Permittee, and attached to the SWPPP.

Is this SWPPP certification in response to a Level 1, 2, or 3 Corrective Action? ☐ Yes ☐ No

If Yes:

- Type of Corrective Action?: ☐ Level 1 ☐ Level 2 ☐ Level 3
- Date SWPPP update/revision completed:_____

"I certify under penalty of law that this SWPPP and all Appendices were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate information to determine compliance with the Industrial Stormwater General Permit. Based on my inquiry of the person or persons who are responsible for stormwater management at my facility, this SWPPP is, to the best of my knowledge and belief, true, accurate, and complete, and in full compliance with Permit Conditions S3 and S8, including the correct Best Management Practices from the applicable Stormwater Management Manual. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____ _____

Operator's Printed Name * Title

_____ _____

Operator's Signature * Date

* Federal regulations require this document to be signed as follows.

- For a corporation, by a principal executive officer of at least the level of vice president;
- For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
- For a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official.

This document shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if

1. The authorization is made in writing by a person described above and submitted to the Washington State Department of Ecology (Ecology).
2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

Changes to Authorization

If an authorization under No. 2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of No. 2 above shall be submitted to Ecology prior to, or together with, any reports, information, or applications to be signed by an authorized representative.

Appendix D.7

Construction Stormwater Pollution Prevention Plan

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Vancouver Energy
Construction Stormwater Pollution Prevention Plan

Plan No. C.01 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 27 February 2015

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Vancouver Energy

Construction Stormwater Pollution Prevention Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
27 February 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	27 February 2015	Submittal for Application Review

Vancouver Energy
Construction Stormwater Pollution Prevention Plan

Table of Contents

Section

1. Essential Information v
1.1 Facility Information v
1.2 Facility Contact Information v
1.3 Agency Information vi
1.4 Stormwater Pollution Prevention Team vi
Executive Summary viii
2. Site Description 1
2.1 Existing Conditions 4
2.1.1 Stormwater Conveyance and Treatment Systems 5
2.1.2 Surface Water Bodies 13
2.1.3 Floodplains 13
2.1.4 Wetlands 14
2.1.5 Soils Evaluation 15
2.1.6 Past Site Remediation 15
2.1.7 Climate 21
2.2 Proposed Facility Description 21
2.3 Proposed Construction Activities 22
2.3.1 Area 200 – Unloading and Office 22
2.3.2 Area 300 – Storage 23
2.3.3 Area 400 – Marine Terminal 24
2.3.4 Area 500 – Transfer Pipelines 25
2.3.5 Area 600 – West Boiler 26
2.3.6 Rail Improvements 27
2.3.7 Construction within Identified Cap Areas 28
3. Construction Stormwater BMPs 29
3.1 The 12 BMP Elements 29
3.1.1 Element 1: Preserve Vegetation/Mark Clearing Limits 30
3.1.2 Element 2: Establish Construction Access 31
3.1.3 Element 3: Control Flow Rates 33
3.1.4 Element 4A: Install Sediment Controls 36
3.1.5 Element 4B: Turbidity Control BMPs 37
3.1.6 Element 5: Stabilize Soils 40
3.1.7 Element 6: Protect Slopes 43
3.1.8 Element 7: Protect Drain Inlets 44
3.1.9 Element 8: Stabilize Channels and Outlets 45
3.1.10 Element 9: Control Pollutants 47

3.1.11 Element 10: Control Dewatering 49
3.1.12 Element 11: Maintain BMPs 53
3.1.13 Element 12: Manage the Project 53
4. Pollution Prevention Team 55
4.1 Roles and Responsibilities 55
4.2 Team Members 55
5. Site Inspections and Monitoring 56
5.1 Site Inspection 56
5.1.1 Site Inspection Frequency 56
5.1.2 Site Inspection Documentation 56
5.2 Stormwater Quality Monitoring 56
5.2.1 Turbidity 56
5.2.2 pH 57
5.2.3 Contaminates of Concern 57
6. Reporting and Recordkeeping 57
6.1 Recordkeeping 57
6.1.1 Site Logbook 57
6.1.2 Records Retention 58
6.1.3 Access to Plans and Records 58
6.1.4 Updating the Construction SWPPP 58
6.2 Reporting 58
6.2.1 Discharge Monitoring Reports 58
6.2.2 Notification and Noncompliance 58
7. List of Acronyms and Abbreviations 59

List of Tables

Table 1. Summary of Facility Areas 4
Table 2. Drainage Basin and Facility Areas 5
Table 3. Floodplains 14
Table 4. Design Storm Rainfall Intensity 21
Table 5. Facility Site Summary 22
Table 6. Area 200 - Unloading and Office - Site Summary 23
Table 7. Area 300 - Storage - Site Summary 24
Table 8. Area 400 - Marine Terminal - Site Summary 25
Table 9. Area 500 - Transfer Pipelines - Site Summary 26
Table 10. Area 600 - West Boiler - Site Summary 27
Table 11. Rail Improvements - Site Summary 28
Table 12. Areas Requiring Vegetation Preservation/Marking and Clearing Limit BMPs 30
Table 13. Areas Requiring Construction Access BMPs 31
Table 14. Areas Requiring Control Flow Rate BMPs 33
Table 15. Areas Requiring Sediment Control BMPs 36
Table 16. Areas Requiring Turbidity Control BMPs 38
Table 17. Construction Turbidity Control Sampling and Basis of Design 38
Table 18. Areas Requiring Soil Stabilization BMPs 40

Table 19. Areas Requiring Slope Protection BMPs 43
Table 20. Areas Requiring Storm Drain Inlet Protection BMPs 44
Table 21. Types/Conditions of Use of Storm Drain Inlet Protection 44
Table 22. Areas Requiring Channel and Outlet Stabilization BMPs 45
Table 23. Areas Requiring Pollutant Control BMPs 47
Table 24. Construction Turbidity Control Sampling and Basis of Design 47
Table 25. Areas Requiring Dewatering Control BMPs 50
Table 26. Summary of the Deed Restricted Areas at the Proposed Project Site 50
Table 27. Preliminary Construction Schedule 54
Table 28. Pollution Prevention Team Members 55

List of Figures

Figure 1. Vicinity Map 2
Figure 2. Site Plan 3
Figure 3. Existing Terminal 4 Stormwater System 7
Figure 4. Existing Terminal 5 Stormwater System 11
Figure 5. Contaminated Areas 17

List of Appendices

Appendix A. Site Plan

Appendix B. Existing Drainage Reports

Appendix C. FEMA FIRM Maps

Appendix D. Geotechnical Investigation Reports

Appendix E. Isopluvial Mapping

Appendix F. Construction Stormwater Calculations

Appendix G. Environmental Control Drawings

Appendix H. Construction BMPs

Appendix I. Example of General Permit

Appendix J. Alternative BMPs

Appendix K. Historical Water Sampling Data

Appendix L. Sample Site Inspection Forms

Appendix M. Cap Restoration Details

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1. Essential Information

1.1 Facility Information

Facility Information	
Name of Facility:	Vancouver Energy
Site Address:	5501 NW Old Lower River Road
City, State, Zip Code	Vancouver, WA 98660
County:	Clark
SIC Code(s)	5171 Petroleum Bulk Stations and Terminals
Permit Number:	WAR (To Be Issued)
Latitude:	45° 39' 02" N
Longitude	122° 43' 41" W

1.2 Facility Contact Information

Construction Contractor(s)	
Name:	TBD prior to construction
Address:	
City, State, Zip Code	
Telephone Number:	
Fax Number:	
Email Address:	
Name:	TBD prior to construction
Address:	
City, State, Zip Code	
Telephone Number:	
Fax Number:	
Email Address:	
Facility Owner/Lessee	
Name:	Tesoro Savage Petroleum Terminal, LLC
Address:	901 W Legacy Center Way
City, State, Zip Code	Midvale, UT 94047
Telephone Number:	(801) 944-6600
Fax Number:	
Email Address:	
Property Owner	
Name:	Port of Vancouver USA
Address:	3103 NW Lower River Road
City, State, Zip Code	Vancouver, WA 98660
Telephone Number:	(360) 693-3611
Fax Number:	(360) 735-1565
Email Address:	info@portvanusa.com

Primary Construction SWPPP Contact	
Name:	TBD prior to construction
Address:	
City, State, Zip Code	
Telephone Number:	
Fax Number:	
Email Address:	

1.3 Agency Information

Responsible Agency	
Name:	Energy Facility Site Evaluation Council
Address:	1300 South Evergreen Park Drive Southwest
City, State, Zip Code	Olympia, WA 98504-3172
Telephone Number:	(360) 664-1345
Fax Number:	
Email Address:	efsec@utc.wa.gov
Name:	Washington State Department of Ecology, Southwest Regional Office
Address:	300 Desmond Drive
City, State, Zip Code	Lacey, WA 98503
Telephone Number:	(360) 407-6300
Fax Number:	(360) 407-6305
Email Address:	
Name:	Washington State Department of Ecology, Vancouver Field Office
Address:	2108 Grand Boulevard
City, State, Zip Code	Vancouver, WA 98661-4622
Telephone Number:	(360) 690-7171
Fax Number:	
Email Address:	
Emergency Numbers	
General Emergency:	9-1-1
Port of Vancouver Security	(360) 992-1120
WA DOE Report a Spill	(360) 407-6300

1.4 Stormwater Pollution Prevention Team

Primary Construction SWPPP Contact	
Name:	TBD prior to construction
Address:	
City, State, Zip Code	
Telephone Number:	
Fax Number:	
Email Address:	

Staff Name/Title	Individual Responsibilities
Construction Project Manager and Emergency Owner Contact	Individual that is the Facility owner or representative of the Facility owner to be contacted in the case of an emergency. Require individual contractors and suppliers (i.e., concrete, fuel, lubricants, coating products) to implement requirements of construction SWPPP and construction NPDES Individual Permit. Oversee construction contracts and verify work on site complies with required permit conditions.
On-site CESCL	Primary contractor contact, responsible for site inspections (BMPs, visual monitoring, sampling, etc.); to be called upon in case of failure of any ESC measures. Coordinate implementation of construction SWPPP and construction NPDES Individual Permit including: • Installation and ongoing maintenance of required BMPs • Perform daily inspections of all applicable BMPs • Perform daily inspections of all adjacent wetlands and surface water bodies • Coordinate and/or perform sampling of construction stormwater discharges • Monitor construction dewatering for potential contaminates of concern and coordinate and/or perform sampling of construction dewatering
Resident Engineer	Resident Engineer for the owner that is the project's supervising engineer responsible for inspections and issuing instructions and drawings to the contractor's site supervisor or representative.
Emergency EFSEC Contact	Individual to be contacted at Energy Facility Site Evaluation Council in case of emergency.
Non-Emergency EFSEC Contact	Individual to be contacted at Energy Facility Site Evaluation Council.
Monitoring Personnel	This person is responsible for conducting water quality monitoring; may be same individual as the Certified Erosion and Sediment Control Lead.
Conveyance and Treatment System Operator and/or vendor	Perform all tasks necessary to maintain discharge water quality within permitted discharge limits. Tasks include, but are not limited to, • Design and modify water quality treatment system as necessary to maintain permitted discharge limits. • Inspect tanks, filters, chemical feed pumps, discharge pumps, isolation plugs and/or valves, piping, samplers, and other appurtenances as needed. • Replace consumable products on schedule prior to design life expectancy. • Be available (on-call) 24 hours a day for emergency modifications or equipment failure.
Contractor Project Managers	Verify all contractor staff is trained on construction SWPPP and SPCCP. Provide necessary equipment, tools, and cleanup and containment materials necessary to respond to accidental discharge. Verify all construction activities requiring BMPs are performed with BMPs in-place.
Equipment operators and construction personnel	Inspect equipment for signs of leaks from hydraulics, fueling and lubrication systems. Repair any equipment showing signs of faulty mechanical systems. Look for indications in work areas and excavations of possible contamination to groundwater or surface water including: petrochemical odors, suspect changes in colors, and symptoms of foul air.
All persons on site	Notify Construction Project Manager and/or CESCL of any sign of water quality impairment including spills, leaks, contamination, malfunctioning equipment, or violation of any BMPs, or construction management plan.

Executive Summary

This construction stormwater pollution prevention plan (SWPPP) has been prepared as part of the requirements for a National Pollutant Discharge Elimination System (NPDES) construction stormwater permit as issued by the Washington State Energy Facility Site Evaluation Council for the Vancouver Energy Facility in Vancouver, Washington. The site is located within the Port of Vancouver USA (Port) and consists of a total of 47.4[1] acres located in six distinct "areas," including the rail improvements. A vicinity map and a site map are shown in Figure 1 and Figure 2, respectively.

The site primarily consists of existing vacant or underutilized industrial land. A portion of the site is located within the northern portion of the former Evergreen/ALCOA aluminum smelter. The proposed Facility consists of the construction of a rail unloading facility, transfer pipelines, storage tanks, and vessel loading berth for the transloading of crude oil from rail to vessel. The Facility includes support buildings and structures, including administrative offices, access roads, employee parking and facilities, and a future boiler building. Detailed descriptions of the site and construction follow in sections 2.1 and 2.3.

Construction activities will include clearing and grubbing, excavation, grading, relocation of on-site services/utilities, adjustments to existing port rail lines, and the construction of facility elements discussed in detail in section 2.3.

The purpose of this construction SWPPP is to describe the proposed construction activities and all temporary and permanent erosion and sediment control measures, pollution prevention measures, inspection/monitoring activities, and recordkeeping that will be implemented during the proposed construction project. The objectives of the construction SWPPP are to

1. Protect existing water quality and will comply with all required construction phase NPDES permits.
2. Identify site conditions, such as areas of known contaminates, and design construction methods to limit impacts to these areas. Where impacts may occur, this plan will identify construction methods and monitoring and treatment techniques to mitigate for levels of anticipated contamination.
3. Identify possible construction activities that have the potential to cause surface water or groundwater contamination and identify required best management practices (BMPs) to reduce, eliminate, or prevent contamination.
4. Prevent during the construction phase, adverse water quality impacts to the receiving water body (Columbia River) by controlling peak flow rates and volumes of stormwater runoff at the outfalls and downstream of the outfalls.

[1] Previous information submitted to EFSEC indicated an approximate site acreage of 45 acres. The addition of 2.74 acres primarily occurs relative to an increase in the transfer pipeline corridor width in locations where ground surface is currently disturbed and already subject to industrial activity. This increase in acreage does not substantively modify the analysis of environmental impacts described in the Application for Site Certification Supplement as submitted to EFSEC in January 2014. However, to present accurate engineering calculations in this construction SWPPP, this adjusted site acreage has been used herein, as well as in the operations SWPPP and Engineering Report submitted under separate cover. The Applicant also acknowledges that final Facility design will take into account actual permit conditions that are not available at this time; such conditions could also result in further adjustments to the final site boundary.

This construction SWPPP was prepared in reference to the Washington State Department of Ecology (Ecology) SWPPP template downloaded from the Ecology website on 23 December 2014. The construction SWPPP was prepared based upon the requirements set forth in the NPDES Construction Stormwater General Permit and in Ecology's *2012 Stormwater Management Manual for Western Washington*[2].

This construction SWPPP is divided into eight sections with several appendices that include reference materials related to stormwater and how it will be handled on the site. The main sections describe the site, its existing conditions, and the proposed Facility. Discussions follow of each of the 12 types of construction stormwater BMPs that would be employed during the construction of the Facility. The construction SWPPP then discusses site inspections and monitoring and reporting and recordkeeping.

[2] In accordance with WAC 463-76-031 (1)(a), construction stormwater discharges will be authorized under an individual construction stormwater NPDES permit issued by EFSEC. In the absence of a permit being available, the Applicant herein uses Ecology's general permit as the basis for plan requirements. However, prior to construction, this plan will be updated to reflect actual requirements of the permit issued by EFSEC.

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2. Site Description

The proposed Vancouver Energy (Facility) would be constructed at the Port of Vancouver USA (Port) within the City of Vancouver (City) in Clark County, Washington. The Facility includes construction in different “areas,” each area serving a different function. The site is located on the Washington shore of the Columbia River. State Route 501 (SR 501) (Lower River Road) is located immediately to the north of the site and is available from the east. Each area of the proposed Facility is described in further detail below. The entire Facility would be constructed on approximately 47.4 acres. (See the vicinity map shown in Figure 1.) Facility site plans are included as Appendix A and environmental control drawings are included in Appendix G.

Most of the site will be leased from the port and will be used exclusively by Tesoro Savage Petroleum Terminal LLC (the Applicant) for the construction and operation of the Facility. The transfer pipelines and portions of the rail improvements will be located on non-exclusive easements within the port.

The site is located in the SE 1/4 of Section 18, NW 1/4 of Section 19, and the NW and NE 1/4 of Section 20, Township 2 North, Range 1 East W.M. Berths 13 and 14 are located at approximately Columbia River Mile 103.5 (RM 103.5).

This construction stormwater pollution prevention plan (SWPPP) describes the site conditions and proposed construction activities in detail and enumerates the mitigation measures and best management practices (BMPs) that apply to each activity. The construction SWPPP has been prepared as part of the requirements for the NPDES construction stormwater permit as issued by the Washington State Energy Facility Site Evaluation Council (EFSEC) for the Facility.

The Facility would be developed in six “areas.” Figure 2 is a site plan schematic that shows the site development plan, including the location of each Facility area. Table 1 lists the six Facility areas (including rail improvements) and they are discussed in detail below. Note that the designation Area 100 is used in the engineering drawings for site overview and general information that pertains to all areas of construction.

Figure 1 - Vicinity Map

LEGEND

- Project Boundary
- Vancouver_WA
- Portland,_Oregon

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

N

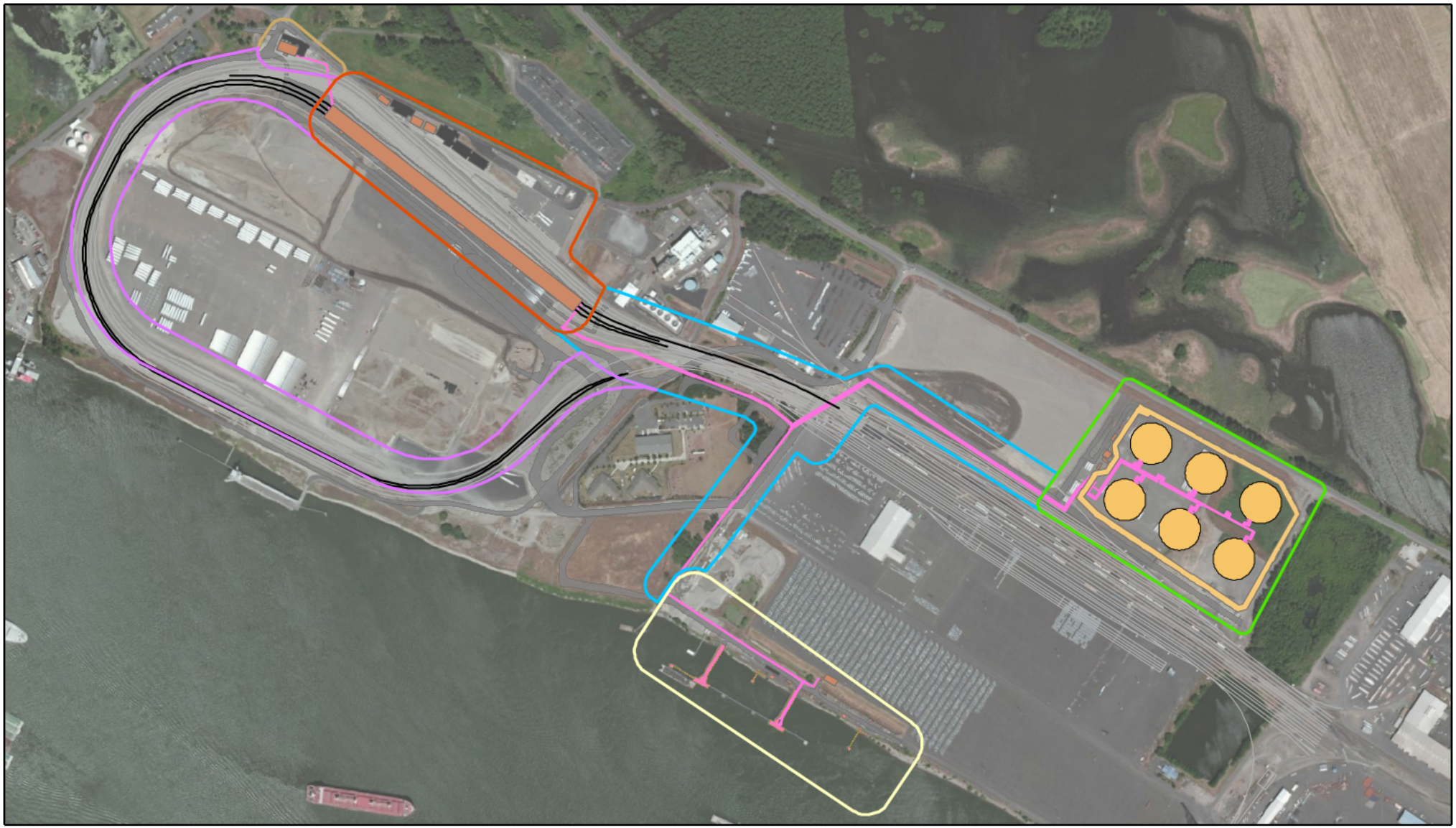

Figure 2 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000 Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

Table 1. Summary of Facility Areas

Facility Area	Project Elements	Acreage
200 – Unloading and Office	Rail Unloading Area Control Rooms/E-houses Fire Pump and Foam Building Admin/Support Buildings	7.8 Acres
300 – Storage	Crude Oil Storage Tanks Secondary Containment Berm Storage Building Pump Basin Control Room/E-house Fire Pump and Foam Building	20.8 Acres
400 – Marine Terminal	Marine Vessel Loading Hoses and Equipment Control Room/E-house Dock Safety Unit Marine Vapor Combustion Units Vapor Blower Skid Spill Prevention, Response and Containment Equipment Dock Improvements Piping from Vessel Loading to Marine Vapor Combustion Units	7.7 Acres
500 – Transfer Pipelines	Transfer Piping from Area 200 to Area 300 Transfer Piping from Area 300 to Area 400	4.9 Acres
600 – West Boiler	West Boiler Building Piping from West Boiler Building to Rail Unloading Area	0.8 Acre
Rail Improvements	Rail Transportation Corridor	5.4 Acres
Total		47.4 Acres

2.1 Existing Conditions

Thorough descriptions of the existing conditions within and adjacent to the project area follow. The descriptions are provided to delineate the geographic and natural resource elements of the Facility. Descriptions of the existing conditions include the following elements.

- Stormwater Conveyance and Treatment Systems
- Surface Water Bodies
- Floodplains
- Wetlands
- Soil Evaluations
- Past Site Remediation
- Climate

2.1.1 Stormwater Conveyance and Treatment Systems

The existing site is located in three distinct primary drainage areas. The drainage areas are segregated by topography and the stormwater is discharged to different locations. Table 2 shows which drainage area contains each of the six Facility areas.

Table 2. Drainage Basin and Facility Areas

Drainage Area	Facility Areas
Terminal 4	Area 300 – Storage Area 500 – Transfer Pipelines
Terminal 5	Area 200 – Unloading and Office Area 600 – West Boiler Building Rail Improvements
Marine Terminal	Area 400 – Marine Terminal Area 500 – Transfer Pipelines

For the purpose of this section, the three drainage areas are discussed separately. The corresponding figures indicate the drainage area in which each Facility area is located and the relationship of the Facility area to the existing collection, treatment, and detention systems.

The following sections describe each of the three primary drainage areas (Terminal 4, Terminal 5, and the Marine Terminal). The designations are intended to delineate the portion of the site described and its respective downstream drainage system. According to the port, the Marine Terminal drainage area is technically part of Terminal 4; however, it has a distinct and separate stormwater system and, for that reason, is segregated as its own descriptive area.

2.1.1.1 Terminal 4

The Terminal 4 drainage system comprises approximately 250 acres of industrial land. A system of inlets and conveyance pipelines collects stormwater from the drainage area and discharges the stormwater to the Terminal 4 water quality pond, as shown in Figure 3. The water quality pond was modified recently to increase detention time and vegetative plantings were added for shading and bio-uptake. From the water quality pond, the stormwater is routed to the southeast where it is discharged to the Columbia River through an existing outfall under an Industrial Stormwater General Permit (WAR000424) held by the Port.

Facility elements located within the Terminal 4 drainage basin are Area 300 – Storage, and a portion of Area 500 – Transfer Pipelines. There are two parallel stormwater systems running east-west along the south side of Area 300 and the portion of Area 500. The southern pipeline was installed for stormwater from the port's general use area and rail corridor. The northern pipeline was installed for the use of port tenants and is intended to bypass the water quality pond. Farwest Steel is the only current discharger into this system. During construction of the Facility, stormwater from Area 300 would be discharged into the northern pipeline. Area 500 is located within the general use area and runoff would continue to the port's stormwater system.

Both pipelines currently discharge to the Terminal 4 water quality pond. However, the port is completing a project to separate the tenant stormwater from port general use area stormwater. It is anticipated that construction of the separation project would be complete prior to construction of the Facility.

No existing stormwater collection or conveyance systems will need to be relocated or modified by construction of the Facility.

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LEGEND:

CONSTRUCTION AREAS	LEASE AREAS	EXISTING SURFACE TYPE
		ASPHALT PAVEMENTS
		MISCELLANEOUS IMPERVIOUS
		LANDSCAPE/PERVIOUS
		INDUSTRIAL YARD (IMPERVIOUS)

• CM — CONSTRUCTION STORMWATER MONITORING POINT

NW Lower River Rd

N

175 0 175 350
scale feet

AREA 300
PARCEL 1A

CM 4

CM 5

30"
36"
30"
42"
36"
30"
36"
42"

AREA 500

MATCHLINE SEE TERMINAL 5 EXISTING DRAINAGE AREAS

TERMINAL 4

WATER QUALITY POND

48"

60"

60"

BIO–FILTRATION SWALES

BIO–INFILTRATION SWALE

BIO–FILTRATION SWALES

BIO–INFILTRATION SWALE

AREA 400,
MARINE TERMINAL

CM 6

CM 7

COLUMBIA RIVER

PORT 60" OUTFALL T40

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
TERMINAL 4 – EXISTING CONSTRUCTION STORMWATER MONITORING

DESIGN:	DRS	START DATE:	2/26/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/26/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24x36
				DRAWING NUMBER	SHEET 1/1 REV.

Last Saved by: Tony.pritchett on: Feb 26, 2015 1:28 PM File: Q:\Vancouver\2013\A13.0267\02\CADD\Figures\TERMINAL 4 EXISTING CONSTRUCTION MONITORING.dwg

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2.1.1.2 Terminal 5

The Terminal 5 drainage system was installed as part of the remediation and decommissioning of the former Evergreen/ALCOA aluminum smelter, construction of the West Vancouver Freight Access (WVFA) project, and the Terminal 5 laydown project. The drainage system was designed and analyzed as part of the analysis for the construction of the WVFA project. A copy of the report is attached as Appendix B.

The Terminal 5 drainage area consists of approximately 91 acres of industrial land that is collected through inlets and conveyed to a common stormwater pump station as shown in Figure 4. The stormwater system includes a high flow bypass that overflows to the Columbia River. During normal operations, stormwater from the basin is pumped to two treatment lagoons that were installed to treat both process water and stormwater from the Evergreen/ALCOA plant. The lagoons are capable of treating stormwater prior to its discharge to the Columbia River under a Western Washington Phase II Municipal Stormwater Permit, WAR045201.

On the Facility site, three legs of the existing stormwater system run north/south through the proposed rail unloading facility. The west lateral extends towards Old Lower River Road for future use, the middle lateral collects runoff from atop the Vanexco Cap, and the east lateral collects stormwater from a portion of Old Lower River Road and NGL Supply. The middle lateral conveys only stormwater that collects from a liner system installed above the contaminated material; stormwater from this area is only exposed to existing General Use industrial yard areas, and a portion of the rail transportation corridor. The Facility areas that would be constructed on Terminal 5 include Area 200, Area 600, and a portion of Area 500.

Modifications to the existing collection system for Terminal 5 is included in section 2.3.1. No modifications are proposed to the downstream conveyance system, pump station, or treatment lagoons.

2.1.1.3 Marine Terminal

The Marine Terminal is located within Terminal 4, however, stormwater in this area is a separate stormwater system. The system was installed with Phase I of the Columbia Gateway project in 1995. The stormwater serves three operational areas, including a gravel barge unloading operated by CalPortland/Glacier Northwest, an Auto Terminal consisting of first point of rest unloading and service facility for Subaru, and the proposed Facility infrastructure for the Marine Terminal. In total, the drainage area consists of approximately 25 acres. Stormwater is collected through a series of inlets and conveyance pipes from which it is discharged to the treatment and infiltration swales, except for the existing Marine Terminal area, which sheet flows directly into the infiltration swales.

Stormwater is collected and discharged to biofiltration swales for basic water quality treatment and then flows into two hydraulically connected infiltration swales. Figure 4 shows the general arrangement of the collection and treatment facilities located at the Marine Terminal.

Modifications to the existing collection and treatment systems would be completed within the Marine Terminal drainage area. A detailed explanation of modifications to the existing system is included in section 2.3.3.

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LEGEND:

CONSTRUCTION AREAS	LEASE AREAS	
		ASPHALT PAVEMENTS
		MISCELLANEOUS IMPERVIOUS
		LANDSCAPE/PERVIOUS
		INDUSTRIAL YARD (IMPERVIOUS)

• CM — CONSTRUCTION STORMWATER MONITORING POINT

scale 175 0 175 350 feet

N

FIORAM

CM 1

CM 2

CM 3

24"

36"

30"

48"

MATCHLINE SEE TERMINAL 4 EXISTING DRAINAGE AREAS

TERMINAL 5

TREATMENT LAGOONS

32"

PUMP STATION

PORT 36" OUTFALL T5O

EXISTING OVERFLOW OUTFALL

COLUMBIA RIVER

PRELIMINARY

SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
TERMINAL 5 – EXISTING CONSTRUCTION STORMWATER MONITORING

DESIGN:	DRS	START DATE:	2/26/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/26/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24x36
DRAWING NUMBER				SHEET	REV.
				1/1	

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2.1.2 Surface Water Bodies

The Facility site is located immediately north of the Columbia River and portions of the site are bordered by wetlands. A discussion of the wetlands follows in section 2.1.4. No streams or open surface water features are located within the upland areas of site development. A portion of the project will modify the existing Berth 13 and work over water is covered under separate permit.

The project site is located within the Salmon-Washougal Watershed (WRIA 28) located in southwest Washington. The nearest surface water feature is the Columbia River. The river drains an estimated basin of roughly 258,000 square miles and is approximately 1,243 miles long. The project site is located at approximately RM 103.5. The Columbia River eventually discharges to the Pacific Ocean near Astoria, Oregon.

Multiple government agencies and non-governmental organizations monitor water quality within the Columbia River. The U.S. Geological Service (USGS) is the federal agency responsible for conducting water quality testing in the river. In 2004–2005, the USGS conducted water column samples. Significant findings of the Water-Quality Data, Columbia River Estuary, 2004-2005 report are summarized below.

- None of the aquatic life or human health benchmarks established by the U.S. Environmental Protection Agency were exceeded.
- Concentrations of arsenic, copper, and lead were not present at levels of concern with regards to aquatic toxicity.
- Trace element concentration were higher downstream than at the upstream reaches of the Columbia River.
- Eight of the 54 wastewater compounds analyzed were detected at least once, usually at trace levels. Bisphenol A was the only endocrine disruptor in wastewater compounds detected in the Columbia River.
- During seasonal samplings of suspended sediment, no organochlorine compounds or polycyclic aromatic hydrocarbons (PAHs) were detected
- All 11 polybrominated diphenyl ether (PBDE) congeners were detected on suspended sediments, usually in trace amounts.
- 102 of the 209 PCB congeners were detected on suspended sediments, usually in trace amounts.

A copy of the report is available from the USGS at http://pubs.usgs.gov/ds/2006/213/#download. Additionally, the USGS report “Water Quality of the Lower Columbia River Basin: Analysis of Current and Historical Water-Quality Data through 1994” can be downloaded at http://or.water.usgs.gov/pubs_dir/Abstracts/95-4294.html.

The average water level in the Columbia River is usually 7 to 8 feet (National Geodetic Vertical Datum [NGVD] 29) during the winter. Flood stage is considered to occur at 16 feet when low level flooding begins to occur. A detailed discussion of the floodplain limits follows as section 2.1.3. The flood of record is a 1996 event when the river crested at 27.2 feet. This is not the highest recorded event, which occurred on 13 June 1948 with a crest of 31.00 feet.

2.1.3 Floodplains

The local floodplain within the project vicinity is defined by the Columbia River. This lower portion of the Columbia River is generally regulated by the upstream Bonneville Dam. Flooding in and adjacent to the site from the north watershed, including Vancouver Lake, is hydraulically connected directly to the elevation of the water surface of the Columbia River.

This site area has been extensively studied for floodplain and flood impacts. The most recent analysis was conducted by the Federal Emergency Management Agency (FEMA), which developed Flood Insurance Rate Maps (FIRM) published on 5 September 2012. The base flood elevation and limits are shown on the FIRM maps contained in Appendix C. The FEMA FIRMs that cover the project site are Map Item ID Nos. 53011C0363D and 553011C0364D.

Table 3 summarizes the floodplain elevations discussed below in the different vertical datums. North American Vertical Datum (NAVD) 88 is the vertical datum used by FEMA in the FIRM mapping, while NGVD 1929 is the datum used by the Port and the Facility. The NGVD 1929 datum is also the datum referenced in the historical flood record maintained by Clark County. The Columbia River Datum (CRD) is used by river users and is based on relative elevations to water levels.

Table 3. Floodplains

Floodplain	NAVD 88	NGVD 1929	CRD
100 Year	30.0	26.9	25.3
500 Year	33.7	30.6	29.0

2.1.3.1 100-Year Floodplain

The Base Flood Elevation (BFE) is identified in the FIRM for the 100-year floodplain as 30 feet based on the NAVD 88 datum. The limits of the 100-year floodplain are classified in the FIRMs as Zone AE, which indicates that there is a 1 percent annual chance flood, with the BFE being the water surface elevation of the 1 percent annual chance flood.

The 100-year floodplain is generally located along the top of the riverbank. The FIRMs show an isolated component of the 100-year floodplain encroaching into Area 300 on Terminal 4 and Area 600 at Terminal 5. The 2012 FIRM maps do not reflect the grading and filling of these sites that has occurred on site. Because of filling and grading completed by the Port, the existing ground elevations is outside of the 100-year floodplain at approximately Elevation 32 NGVD 1929. A detailed description of the prior authorizations for filling this area is included in the Application for Site Certification.

2.1.3.2 500-Year Floodplain

The 500-year floodplain is identified in the FIRM as Zone X with the black dotted hatch pattern. Zone X is an area with a 0.2 percent annual chance flood. The 0.2 percent annual chance flood is listed with average depth of less than 1 foot.

With very little exception, the 500-year floodplain extends across the entire project site. The rough grading completed since the adoption of the 2012 FIRMs does not affect the limits of the 500-year floodplain.

2.1.4 Wetlands

The National Wetland Inventory map for Vancouver (U.S. Fish and Wildlife Service 1989) indicates the presence of numerous wetlands within the project vicinity. Before development, nine wetlands, totaling approximately 16 acres in size, were present on this site, but they were all filled through permitted actions that began in 1996.

There are two wetland mitigation sites in the vicinity of the project site. The approximately 7.9-acre Parcel 1A wetland mitigation site, located immediately east of Area 300, was established in 1994. This is a depressional, palustrine forested wetland vegetated with mature black cottonwood trees and a variety of native shrubs and herbaceous species. Stormwater from Area 300 or Area 500 would not discharge to any existing wetlands. The wetlands are not hydraulically connected to any of the project elements.

The Parcel 2 wetland mitigation site is an approximately 16.4-acre mitigation site situated immediately north of the existing Terminal 5 site. The wetland was established in 2000 for impacts associated with the initial development of Parcel 1A. The site is currently a mosaic of forested, scrub-shrub, and emergent vegetation. Stormwater from the Facility would not discharge to Parcel 2 wetlands.

The most significant complex of wetlands in the general vicinity is associated with the southern end of Vancouver Lake. The wetlands in this area are a mosaic of emergent, scrub-shrub, and forested wetlands that are hydraulically connected to Vancouver Lake and, by extension, the Columbia River. These wetlands provide high quality seasonally inundated and tidally influenced habitats that most closely resemble the original hydrologic and wetland habitat functions of the Vancouver Lake Lowlands.

2.1.5 Soils Evaluation

Geotechnical Resources, Inc. (GRI) performed geotechnical investigations for the proposed Facility. The geotechnical investigations are attached as Appendix D. Detailed soil maps are included in Appendix D. Construction on the site would disrupt surficial soils and minor topographical grading will be necessary for facility construction. Construction of the Facility will not change the geologic condition of the site.

2.1.6 Past Site Remediation

Terminal 5 is the former location of the Evergreen/ALCOA smelter, which operated until the early 2000s. Industrial and solid wastes from the construction and operation of the aluminum smelter were stored in waste piles and consolidated in landfills on site over the years. Hazardous contaminants in these wastes include petroleum hydrocarbons, polychlorinated biphenyls (PCBs), cyanide, fluoride, trichloroethylene (TCE), low-level organic chemicals, and metals. Evergreen and ALCOA completed site remediation and facility decommissioning under Consent Decree No. 09-2-00247-2 and Enforcement Order 4931 with Ecology. Efforts included removing structures and foundations to a depth of approximately 4 feet and the site soil and sediment with concentrations of chemicals of concern above the cleanup levels established by the consent decree.

Five cap locations subject to environmental restrictive covenants are located within the boundary of the Facility. The Terminal 5 area also includes a groundwater restrictive covenant. For detailed descriptions of the landfill areas, caps, and contaminates of concern, see the contaminated media management plan (CMMP), which has been prepared under a separate cover. These areas are shown in Figure 5.

Construction of the Facility would make minor modifications to the Vanexco/Rod Mill Site Cap. The remaining construction activities located within the Facility lease boundaries have been designed to avoid impacts and work within the landfill areas. Work within the restrictive covenant areas is limited to work outside of the landfill limits or above the cap. Detailed descriptions of this work follow in section 2.3.7. Construction of the rail improvements will require minor modifications to the North/North 2 Landfill, Spent Pot Liner Storage Area, and the Ingot Cap similar to those completed as part of the current WVFA project.

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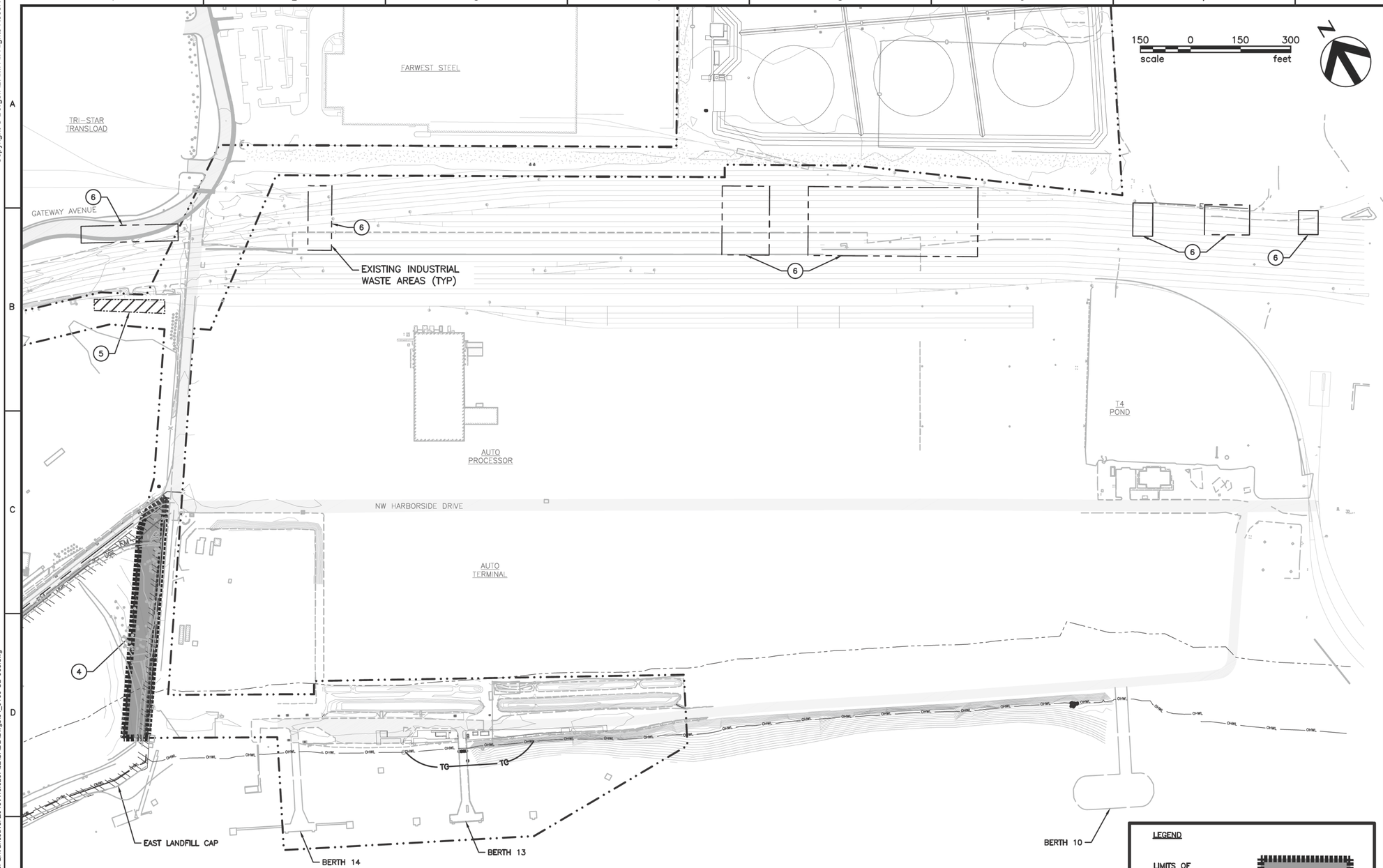

GENERAL NOTES:

1. CONTRACTOR'S ACTIVITY SHALL STRICTLY COMPLY WITH ALL PERMITTED CONDITIONS OF APPROVAL.
2. EXCAVATIONS AND GROUND DISTURBING ACTIVITIES WITHIN DEED RESTRICTED AREAS REQUIRES NOTIFICATION TO THE WASHINGTON STATE ENERGY FACILITY SITE EVALUATION COUNCIL (EFSEC) AND COMPLIANCE WITH THE APPROVED CONTAMINATED MEDIA MANAGEMENT PLAN, APPLICABLE PORT PROTOCOLS AND ADDITIONAL REQUIREMENTS PROVIDED BY EFSEC.
3. SPECIFIC LIMITS FOR THE EAST LANDFILL LIMITS ARE PROVIDED BASED UPON PRIOR SURVEY'S CONDUCTED BY HDJ DESIGN GROUP. WORK LIMIT SHALL ENCROACH UPON THE BOUNDARY OF THE EAST LANDFILL.
4. WHERE KNOWN, ADDITIONAL AREAS OF CONCERN AND POSSIBLE CONTAMINATED MEDIA LOCATIONS HAVE BEEN GENERALLY DEPICTED. CONTRACTOR SHALL COORDINATE FULLY WITH PORT OF VANCOUVER ENVIRONMENTAL STAFF AND INSPECTORS FOR MONITORING AND TESTING OF EXCAVATED MEDIA FOR POSSIBLE CONTAMINATES. PORTIONS OF AREA 200 AND AREA 500 ARE SPECIFICALLY IDENTIFIED WHERE CONTAMINATION IS LIKELY TO BE ENCOUNTERED DURING EXCAVATIONS.
5. IF MEDIA INCLUDING SOILS, OR GROUNDWATER ARE ENCOUNTERED THAT INDICATE POSSIBLE CONTAMINATION, CONTRACTOR SHALL NOTIFY VANCOUVER ENERGY SITE MANAGER, PORT OF VANCOUVER AND EFSEC IMMEDIATELY PRIOR TO PROCEEDING. SIGNS OF CONTAMINATION INCLUDE UNUSUALLY DARK SOIL AND ODORS.
6. IN AREAS OF CONCERN EXCAVATED MATERIAL SHALL BE PLACED IN SEALED WATER-TIGHT CONTAINERS OR LINED STAGING AREAS IMMEDIATELY ADJACENT TO THE WORK AREA FOR TESTING AND CLASSIFICATION OF MATERIAL PRIOR TO HAUL OFF.

CONTAMINATED MEDIA NOTES:

(4) CONSTRUCTION WITHIN THE EAST LANDFILL CAP AREA CONSISTS OF GRADING A SUITABLE LEVEL BENCH WITHIN THE DEED RESTRICTED AREA TO CONSTRUCT FOUNDATIONS FOR THE CRUDE OIL PIPELINE. CONSTRUCTION ACTIVITIES SHALL NOT ENCROACH UPON THE LANDFILL AREA ITSELF AND SHALL REMAIN EAST OF THE HIGH VISIBILITY FENCING DELINEATED ON THE EROSION CONTROL PLANS.

(5) PORT OF VANCOUVER IDENTIFIED POCKETS OF CONTAMINATED GROUNDWATER AND SOIL WITHIN THIS AREA. CONTRACTOR SHALL BE ADVISED THAT WORK ADJACENT TO THIS AREA WILL REQUIRE TESTING OF EXCAVATED MATERIAL PRIOR TO DISPOSAL.

(6) NO CONSTRUCTION ACTIVITY IS PROPOSED IN THESE AREAS OF INDUSTRIAL WASTE. PORT HAS COMPLETED CLEANUP OF THESE SITES DURING RAIL CONSTRUCTION WHERE FEASIBLE.

LEGEND

LIMITS OF CONSTRUCTION ACTIVITY WITHIN DEED RESTRICTED AREAS

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: CONTAMINATED MEDIA LOCATIONS – 2

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-003	1 / 1	

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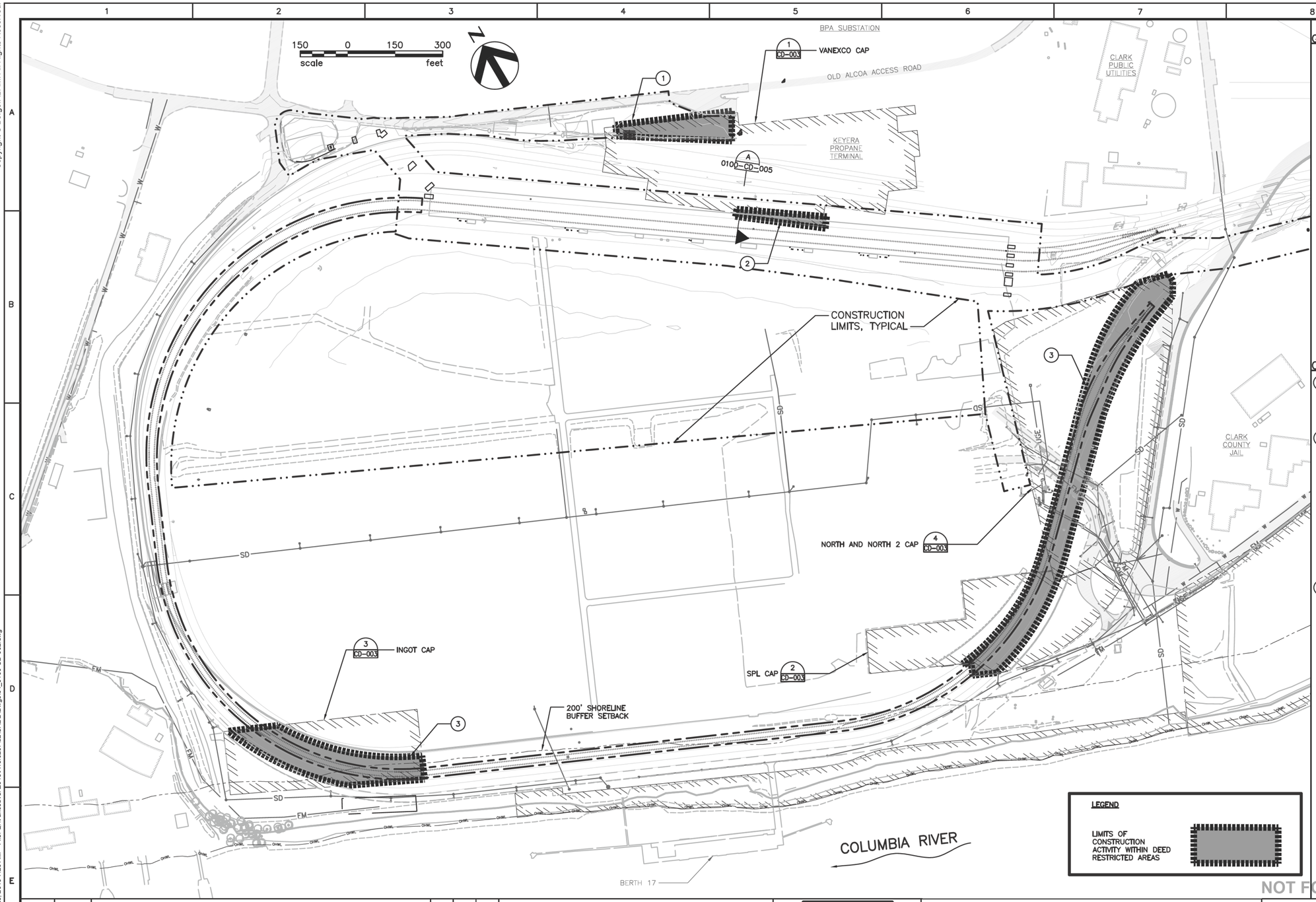

GENERAL NOTES:

1. CONTRACTOR'S ACTIVITY SHALL STRICTLY COMPLY WITH ALL PERMITTED CONDITIONS OF APPROVAL.
2. EXCAVATIONS AND GROUND DISTURBING ACTIVITIES WITHIN DEED RESTRICTED AREAS REQUIRES NOTIFICATION TO THE WASHINGTON STATE ENERGY FACILITY SITE EVALUATION COUNCIL (EFSEC) AND COMPLIANCE WITH THE APPROVED CONTAMINATED MEDIA MANAGEMENT PLAN, APPLICABLE PORT PROTOCOLS AND ADDITIONAL REQUIREMENTS PROVIDED BY EFSEC.
3. SPECIFIC LIMITS FOR THE EAST LANDFILL LIMITS ARE PROVIDED BASED UPON PRIOR SURVEY'S CONDUCTED BY HDJ DESIGN GROUP. WORK LIMIT SHALL ENCROACH UPON THE BOUNDARY OF THE EAST LANDFILL.
4. WHERE KNOWN, ADDITIONAL AREAS OF CONCERN AND POSSIBLE CONTAMINATED MEDIA LOCATIONS HAVE BEEN GENERALLY DEPICTED. CONTRACTOR SHALL COORDINATE FULLY WITH PORT OF VANCOUVER ENVIRONMENTAL STAFF AND INSPECTORS FOR MONITORING AND TESTING OF EXCAVATED MEDIA FOR POSSIBLE CONTAMINATES. PORTIONS OF AREA 200 AND AREA 500 ARE SPECIFICALLY IDENTIFIED WHERE CONTAMINATION IS LIKELY TO BE ENCOUNTERED DURING EXCAVATIONS.
5. IF MEDIA INCLUDING SOILS, OR GROUNDWATER ARE ENCOUNTERED THAT INDICATE POSSIBLE CONTAMINATION, CONTRACTOR SHALL NOTIFY VANCOUVER ENERGY SITE MANAGER, PORT OF VANCOUVER AND EFSEC IMMEDIATELY PRIOR TO PROCEEDING. SIGNS OF CONTAMINATION INCLUDE UNUSUALLY DARK SOIL AND ODORS.
6. IN AREAS OF CONCERN EXCAVATED MATERIAL SHALL BE PLACED IN SEALED WATER-TIGHT CONTAINERS OR LINED STAGING AREAS IMMEDIATELY ADJACENT TO THE WORK AREA FOR TESTING AND CLASSIFICATION OF MATERIAL PRIOR TO HAUL OFF.

CONTAMINATED MEDIA NOTES:

(1) CONSTRUCTION ACTIVITIES WITHIN THIS PORTION OF THE VANEXCO CAP WILL BE LIMITED TO GROUND DISTURBANCES ABOVE THE EXISTING CONCRETE CAP. SOME MINOR EXPOSURE OF THE CONCRETE SURFACE MAY OCCUR IN LOCALIZED AREAS. NO WORK WITHIN THIS AREA WILL REMOVE OR PENETRATE PORTIONS OF THE CAP.

(2) CONSTRUCTION ACTIVITIES WITHIN THIS PORTION OF THE VANEXCO CAP WILL RESULT IN MODIFICATION OF THE UNDERDRAIN SYSTEM AND HDPE LINER. DISCHARGES FROM THE UNDERDRAIN SYSTEM WILL BE RE-ROUTED TO AVOID CONFLICTS WITH THE PROPOSED RAIL UNLOADING BUILDING FOUNDATIONS AND CONTAINMENT TRENCHES, SEE DWG 0100-CD-006 FOR LINER PENETRATION DETAIL, AND SHEET 0100-CD-007 FOR NEW STORMWATER DETAILS. LINER WILL BE EXTENDED TO AND TIED INTO THE GRADE BEAMS OF THE RAIL UNLOADING BUILDING FOUNDATION SEE DWG 0100-CD-006 FOR DETAILS. FOUNDATIONS OF THE RAIL UNLOADING BUILDING WITHIN THE EXISTING CAP AREA WILL BE LIMITED TO SHALLOW SPREAD FOOTINGS TO LIMIT EXCAVATION ACTIVITIES. CONSTRUCTION OF RAIL UNLOADING BUILDING CONSISTS OF FULLY IMPERVIOUS ROOF WITH CAST-IN-PLACE CONCRETE SURFACING WITH FLOOR DRAINS. ALL RAINWATER WILL BE COLLECTED AND DIVERTED, THEREBY EXCLUDING SURFACE WATER FROM ENTERING CAP AREA.

(3) CONSTRUCTION WITHIN THE INGOT CAP, SPL CAP, AND NORTH AND NORTH 2 CAP AREAS ARE LIMITED TO RAIL IMPROVEMENTS ONLY. RAIL LINES TO BE UNDER TSJV CONTROL ARE PERMITTED UNDER EFSEC APPLICATION. CONSTRUCTION DRAWINGS, DETAILS, AND CONSTRUCTION ADMINISTRATION FOR ADDITIONAL 2 RAIL LOOPS WILL BE COMPLETED BY THE PORT OF VANCOUVER AS DISCUSSED IN THE LEASE AGREEMENT.

LEGEND

LIMITS OF CONSTRUCTION ACTIVITY WITHIN DEED RESTRICTED AREAS

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: CONTAMINATED MEDIA LOCATIONS – 1

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100-CD-002 | SHEET: 1/1 | REV.:

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2.1.7 Climate

The climate of the city is predominantly temperate, characterized by wet, mild winters and dry warm summers. The climate is influenced by the relative proximity of the Pacific Ocean and the Cascade and Coast ranges of Oregon and Washington. Temperature and precipitation measurement records from the "Vancouver 4 NNE" agricultural meteorological station were accessed to analyze the climate at the project site. The station is located approximately 4 miles northeast of the project site and has been collecting measurements since 1856. The maximum temperature ever recorded at the site was 106°F on 30 July 2009 and minimum temperature recorded was -8.0°F in 1909. The site averages about 39.6 inches of rainfall and 6.5 inches of snow a year, with most of the precipitation occurring during the winter months. Prevailing winds are from the west-northwest.

Isopluvial mapping of Washington was prepared by the National Oceanic and Atmospheric Administration. Table 4 shows estimates of precipitation amounts for the following design storms as shown in Volume IX of the NOAA Atlas 2 and attached in Appendix E.

Table 4. Design Storm Rainfall Intensity

Design Storm	Precipitation (in.)
2-Year, 24-Hour	2.4
5-Year, 24-Hour	2.7
10-Year, 24-Hour	3.2
25-Year, 24-Hour	3.6
50-Year, 24-Hour	4.0
100-Year, 24-Hour	4.3

Precipitation amounts shown in Table 4 are used in the conveyance system model which uses the SCS Type 1A rainfall distribution hydrograph to determine the peak flow rates for the design storm. The Western Washington Hydraulic Model (WWHM) used catalogued map information that is automatically selected when the project site is selected. The gauge used in the WWHM is "Portland" with a precipitation factor of 0.933.

2.2 Proposed Facility Description

The project would construct a facility to receive crude oil by rail, store it on site, and load it on marine vessels for shipment to end users primarily located on the West Coast. Unit trains would arrive at the project site and be stationed on the Facility rail loops. The trains would be brought to the unloading area (Area 200) where the crude oil would be gravity-drained into the collection piping system, and pumped into the transfer pipeline system (Area 500). Crude oil would be pumped through the transfer pipelines to the storage tanks (Area 300) where it would be held until marine vessel loading operation. Marine vessels would arrive and moor at the dock (Area 400). Crude oil would be pumped from the storage tanks or unloading building to the loading area and loaded to marine vessels. A complete facility description is located within the Application for Site Certification.

Table 5 summarizes the entire surface coverage for the Facility. Detailed Facility area data and runoff volumes is described in the following sections. The existing surface coverages used to calculate runoff for Pre-Construction and During Construction for all of the runoff tables below are derived from the surfaces indicated in Figures 3 and 4.

Table 5. Facility Site Summary

	Pre-Construction	During Construction	Completed Facility
Total Site Area	47.4 Acres	103.9 Acres	47.4 Acres
Percent Impervious	95.7 %	94.7 %	93.7 %
Disturbed Area	40.4 Acres	96.1 Acres	43.4 Acres
2-Year Peak Runoff	15.68 cfs	37.75 cfs	15.23 cfs
10-Year Peak Runoff	24.60 cfs	59.13 cfs	23.86 cfs
25-Year Peak Runoff	29.66 cfs	71.30 cfs	28.76 cfs
100-Year Peak Runoff	38.02 cfs	91.34 cfs	36.86 cfs

2.3 Proposed Construction Activities

2.3.1 Area 200 – Unloading and Office

The primary element within the Unloading and Office area is the construction of the rail unloading facility and administrative/support building areas. The rail car unloading facility is a covered structure through which the trains would be pulled and secured for unloading. The structure would be approximately 1,850 feet long by 90 feet wide and has a maximum height of approximately 50 feet. The building structure would be open on the north, west, and east sides, while the southern wall would be partially enclosed to act as a weather break along the southern wall.

Each track would include unloading stations for handling of crude oil. Each station will use a completely closed loop of piping to prevent by design any atmospheric contact with the product during unloading. The entire 1,850 feet of unloading facility includes full length coverage rail collection pans, and the interior surfaces are concrete to provide containment for any accident releases as well as provide catchments for all stormwater that drips from rail cars or is blown into the unloading facility by the wind.

All mechanical piping is primarily located in concrete secondary containment trenches and the pump basins utilized for transferring product from the unloading facility to the storage tanks are below-grade concrete basins. The collection piping from the rail drip pans and facility floor drains is also located in these concrete trenches with discharge pumps located in the pump basins. Any water collected from within the unloading facility would be collected in these systems and pumped to two containment tanks located at the administrative and support building areas. There is no connection to storm or sanitary sewer from within the rail unloading facility.

Several accessory structures and equipment pads are located adjacent to the rail unloading facility. These buildings include electrical houses (E-houses) control rooms, fire pump and foam building, electrical equipment pads, and mechanical equipment pads.

The administrative and support buildings are located north of the rail unloading facility adjacent to Old Lower River Road. This area consists of three proposed modular structures, parking, and associated landscaping. In addition, the containment tanks for discharges from the rail unloading facility are located near the parking lot. A pedestrian bridge is proposed to connect the administrative/support buildings to the rail unloading facility.

Associated utility extension and relocations for communication, electrical, water service and sanitary sewer are also included.

Construction activities in the area would include site preparation, temporary and permanent erosion and sediment control (TESC) installation and maintenance, demolition and relocation of existing franchise utilities, rough grading, installation of underground utilities including water, sewer, and storm drainage, building foundation and pump pit excavations and construction, construction of building elements, installation of mechanical systems, and final site stabilization, including restoration of industrial yard, gravel access roads, site paving, and final landscape installation.

Stormwater runoff flow rates and volumes were calculated using the WWHM for the Area 200 facility elements. During construction, stormwater and excavation dewatering would be collected on site in above-grade tankage or sediment ponds. Stormwater from the tanks would be treated prior to discharge to the existing on-site stormwater system. A detailed discussion of the BMPs and monitoring systems used during construction is included as section 3.

Table 6 summarizes Area 200 and WWHM results. Detailed stormwater calculations are included in Appendix F for pre-construction and during construction. Area 200 results are included in the Analysis Results as Point of Compliance (POC) 1. Stormwater calculations for the completed facility are detailed in the facility's Industrial Stormwater Engineering Report.

Table 6. Area 200 - Unloading and Office - Site Summary

.	Pre-Construction	During Construction	Completed Facility
Total Site Area	7.8 Acres	47.3 Acres	7.8 Acres
Percent Impervious	100 %	98.1 %	95.4 %
Disturbed Area	7.8 Acres	47.2 Acres	7.4 Acres
2-Year Peak Runoff	3.21 cfs	19.45 cfs	3.03 cfs
10-Year Peak Runoff	5.03 cfs	30.47 cfs	4.75 cfs
25-Year Peak Runoff	6.07 cfs	36.74 cfs	5.72 cfs
100-Year Peak Runoff	7.78 cfs	47.06 cfs	7.33 cfs

2.3.2 Area 300 – Storage

The Storage Area is dominated by the construction of the storage tanks and associated containment areas. In addition, the area includes a single pump basin used to transfer crude oil from the storage tanks to the Marine Terminal and associated support buildings and equipment pads.

The Facility includes six double-bottom, internal floating-roof aboveground storage tanks (ASTs) for storing crude oil. The tanks would be approximately 48 feet in height and 240 feet in diameter and have a shell capacity of approximately 380,000 barrells (bbl) each. Each tank can store a maximum of approximately 360,000 bbl of product, which accounts for the presence of the internal floating roof and the headspace required to allow product movement in the event of a seismic event.

The tanks would be field-erected on a ring wall style footing. Ground improvements will be required to improve soil conditions underneath the storage tanks. An impervious liner system would be installed within the containment area to protect sub-surface native soils from any accidental discharge. The containment area includes an earthen perimeter berm of approximately 6 feet in height sized to contain the release of an entire tank volume plus 10 percent and a 100-year rainfall event. Intermediate berms approximately 2 feet tall between each tank additionally segregate the containment area.

The support buildings, including a storage building, fire pump and foam building, E-houses, electrical pads, and mechanical pads, would be constructed outside of the containment area on slab on grade footings. The pump basin would be isolated from the containment area by its concrete walls and basin that would serve as secondary containment.

The containment area includes a stormwater system that is segregated from the rest of the site. The system inside the containment area includes catch basins, structures, piping, control structures, and oil-water separators. All stormwater structures inside the containment area would be installed above the liner system.

Site improvements would also include utility extensions and relocations as necessary. A portion of the aboveground crude oil transfer piping would be installed within Area 300.

Construction activities in the area include site preparation, TESC installation and maintenance, demolition and relocation of existing franchise utilities, rough grading, installation of underground utilities including water, sewer, and storm drainage, tank and building foundation and ground improvements, tank and building construction, installation of mechanical systems, and final site stabilization including restoration of industrial yard, gravel access roads, site paving, and final landscape installation.

Stormwater runoff volumes were calculated using the WWHM. During construction stormwater and excavation dewatering would be collected on site in above-grade tankage or sediment ponds. Stormwater from the tanks would be treated prior to discharge to the existing on-site stormwater system. A detailed discussion of the BMPs and monitoring systems used on site during construction is included in section 3.

Table 7 summarizes Area 300 and the WWHM results. Detailed stormwater calculations are included in Appendix F for pre-construction and during construction. Area 300 results are included in the Analysis Results as POC 2. Stormwater calculations for the completed facility are detailed in the facility's Industrial Stormwater Engineering Report.

Table 7. Area 300 - Storage - Site Summary

	Pre-Construction	During Construction	Completed Facility
Total Site Area	20.8 Acres	24.9 Acres	20.8 Acres
Percent Impervious	100 %	100 %	92.5 %
Disturbed Area	20.8 Acres	24.9 Acres	19.2 Acres
2-Year Peak Runoff	8.57 cfs	10.26 cfs	7.95 cfs
10-Year Peak Runoff	13.43 cfs	16.07 cfs	12.46 cfs
25-Year Peak Runoff	16.19 cfs	19.38 cfs	15.03 cfs
100-year Peak Runoff	20.74 cfs	24.83 cfs	19.25 cfs

2.3.3 Area 400 – Marine Terminal

Crude oil would be transferred from the Storage Area to the Marine Terminal. Improvements at the Marine Terminal include upland construction of support facilities and improvements to the existing dock to meet current seismic standards. Improvements at the dock includes reinforcing of the existing steel piles supporting Berth 13 and mooring points, replacement of dock deck and steel trestles, and new grated steel walkways. Improvements upland include new abutment, associated ground improvements along the shoreline, fire pump and foam building, a combined control room and E-house, marine vapor combustion units, and associated site improvements including, utilities, stormwater improvements, access roads and parking, and landscaping.

The dock includes a containment area for the work areas, including all flanges and transfer hose areas. Pedestrian walkways connecting the dock to the dolphins and mooring points would be replaced or constructed with new grated steel. The access trestle would be prefabricated steel deck with concrete infill.

Upland electrical gear and the marine vapor combustion units would be located on slab-on-grade foundations. The fire pump and foam building, and the two-story E-house/Control Room, would be on

drilled piers. Additional site improvements include ground improvements along the aboveground transfer pipeline, paved access roads and parking, underground utility relocations and extensions, stormwater improvements, and permanent landscaping.

Construction activities in the area include site preparation, TESC installation and maintenance, demolition and relocation of existing franchise utilities, rough grading, installation of underground utilities including water and storm drainage, building foundation and ground improvements, building construction, installation of mechanical systems, and final site stabilization including paved access roads, site paving, and final landscape installation.

Stormwater runoff volumes were calculated using WWHM. During construction, stormwater and excavation dewatering would be collected and treated prior to discharge to the existing on-site stormwater system. A detailed discussion of the BMPs and monitoring systems used on site is included in section 3.

Table 8 summarizes Area 4 and the WWHM results. Detailed stormwater calculations are included in Appendix F for pre-construction and during construction. Area 400 results are included in the Analysis Results as POC 3. Stormwater calculations for the completed facility are detailed in the facility's Industrial Stormwater Engineering Report.

Table 8. Area 400 - Marine Terminal - Site Summary

	Pre-Construction	During Construction	Completed Facility
Total Site Area	7.7 Acres	12.0 Acres	7.7 Acres
Percent Impervious	93.8 %	79.0 %	88.1 %
Disturbed Area	1.8 Acres	2.2 Acres	1.1 Acres
Undisturbed Bank & Open Water Areas	5.0 Acres	6.8 Acres	5.2 Acres
Overwater Coverage	0.5 Acres	0.5 Acres	0.5 Acres
2-Year Peak Runoff	0.74 cfs	0.91 cfs	0.48 cfs
10-Year Peak Runoff	1.16 cfs	1.42 cfs	0.75 cfs
25-Year Peak Runoff	1.40 cfs	1.71 cfs	0.90 cfs
100-Year Peak Runoff	1.80 cfs	2.19 cfs	1.16 cfs

2.3.4 Area 500 – Transfer Pipelines

A combination of above- and below-ground steel transfer pipelines would convey crude oil from the rail unloading structure in Area 200 to the storage tanks in Area 300 and from the storage tanks to the marine vessel loading system in Area 400. Three 24-inch-diameter, approximately 5,500-foot-long pipelines would connect the rail car unloading facility to the storage tanks in Area 300; one of these pipes would be electrically heat-traced to maintain the viscosity of the crude oil requiring heating would be maintained while it is conveyed from the unloading facility to the Storage Area. A 36-inch-diameter, approximately 5,300-foot-long pipeline would connect the storage tanks with the vessel loading system in Area 400. A 6-inch-diameter pipeline would return crude oil from the vessel loading system to the storage tanks and also serve as the return line for pressure relief system to prevent pipe hammer.

Aboveground pipe sections would be supported on spread footings located every 35 feet. Vertical expansion loops would be located at key locations along the pipeline and supports for the expansion loops would also be on spread footings. Underground sections of the pipelines would be located in fully sealed, welded casing sections and transition concrete vaults. The aboveground section of the transfer piping which runs parallel with the Columbia River would most likely require ground improvements to comply with current seismic standards.

The transfer pipelines are located predominately in non-exclusive lease areas with the port. Transfer pipelines would be located a minimum of 1 foot above the ground and in cleared and gravel surface corridors to facilitate frequent inspection. Downstream catch basins and drainages would be retrofitted with spill control devices capable of capturing a minimum of 5 gallons of oil.

Construction activities in the area include site preparation, TESC installation and maintenance, demolition and relocation of existing franchise utilities, rough grading, relocation of underground utilities including water and storm drainage, pipeline foundation and ground improvements, pipeline construction, and final site stabilization including gravel surfacing and pavement restoration

Stormwater runoff volumes were calculated using WWHM. During construction, stormwater and excavation dewatering would be excluded from active work areas and stockpiles with plastic sheathing and treated with BMPs. A detailed discussion of the BMPs and monitoring systems used on site is included in section 3.

Table 9 summarizes Area 500 and the WWHM results. Detailed stormwater calculations are included in Appendix F for pre-construction and during construction. Area 500 results are included in the Analysis Results as POC 4. Stormwater calculations for the completed facility are detailed in the facility's Industrial Stormwater Engineering Report.

Table 9. Area 500 - Transfer Pipelines - Site Summary

	Pre-Construction	During Construction	Completed Facility
Total Site Area	4.9 Acres	12.9 Acres	4.9 Acres
Percent Impervious	68.1 %	96.2 %	100 %
Disturbed Area	3.3 Acres	12.4 Acres	4.9 Acres
2-Year Peak Runoff	1.40 cfs	5.11 cfs	2.02 cfs
10-Year Peak Runoff	2.20 cfs	8.01 cfs	3.16 cfs
25-Year Peak Runoff	2.66 cfs	9.66 cfs	3.81 cfs
100-Year Peak Runoff	3.41 cfs	12.37 cfs	4.88 cfs

2.3.5 Area 600 – West Boiler

The West Boiler comprises a boiler building, paved parking and access areas, aboveground steam and condensate piping, and site landscaping. The boiler building would have a footprint of approximately 6,000 square feet and would be approximately 45 feet high. The building would house two primary and one standby natural gas-fired boilers, to provide steam for the heating of tank cars during unloading.

The boiler building, equipment pads, E-house, and pipeline supports would all utilize slab on grade or spread footings. Natural gas, water supply, and wastewater utilities would be extended onto the site to provide service. The stormwater system from Area 200 would be extended to Area 600 for storm drainage.

Construction activities in the area include site preparation, TESC installation and maintenance, demolition and relocation of existing franchise utilities, rough grading, relocation of underground utilities including water and storm drainage, building foundation, building construction, piping and mechanical installation and final site stabilization including site paving and landscaping.

Stormwater runoff volumes were calculated using WWHM. During construction, stormwater and excavation dewatering would be excluded from active work areas and stockpiles with plastic sheathing and treated with BMPs. A detailed discussion of the BMPs and monitoring systems used on site is included in section 3.

Table 10 summarizes Area 600 and the WWHM results. Detailed stormwater calculations are included in Appendix F for pre-construction and during construction. Area 600 results are included in the Analysis Results as POC 5. Stormwater calculations for the completed facility are detailed in the facility's Industrial Stormwater Engineering Report.

Table 10. Area 600 - West Boiler - Site Summary

	Pre-Construction	During Construction	Completed Facility
Total Site Area	0.8 Acres	1.3 Acres	0.8 Acres
Percent Impervious	100 %	100 %	87.5 %
Disturbed Area	0.8 Acres	1.3 Acres	0.7 Acres
2-Year Peak Runoff	0.32 cfs	0.58 cfs	0.31 cfs
10-Year Peak Runoff	0.52 cfs	0.90 cfs	0.48 cfs
25-Year Peak Runoff	0.62 cfs	1.09 cfs	0.58 cfs
100-Year Peak Runoff	0.80 cfs	1.40 cfs	0.75 cfs

2.3.6 Rail Improvements

One additional rail loop would be constructed on approximately 1.80 acres at Terminal 5. In addition, rail infrastructure would be relocated and modified in the west vicinity of the Area 200 rail unloading structure to facilitate the switching and departure of trains. The total area for rail improvements for the facility totals 3.47 acres. The additional rail loop will bring the total number of permitted loop tracks in Terminal 5 to six. The additional rail loop will be constructed as part of the second phase of the project.

The new rail line approximately 4,900 feet long, would be added to the Terminal 5 rail infrastructure. The track would consist of railroad ballast (rock), 115-pound hardened steel rails that are continuously welded and mounted on either 8-foot x 6-inch or 8-foot x 3-inch crossties, and other miscellaneous materials. Crossties would be concrete for the most part, except at crossings where timber would be used. The rails would be continuously welded to reduce noise and increase safety. The rail loops would be designed to comply with railroad and federal requirements.

The corridor that will be used for the additional rail loop is currently portion of a gravel inspection road. The road width will be reduced to 13-feet without modification to the southern extents of the inspection road. Pullouts will be added along the road to allow passing of vehicles along the corridor.

These improvements are anticipated to be located adjacent to the existing corridor for the WVFA project. The existing stormwater drainage systems installed as part of the WVFA project are capable of handling operational stormwater. Minor adjustments to collection systems may be needed depending upon the final location of rail lines. Existing treatment systems and capacities will not be impacted by construction.

Construction activities in the area include site preparation, TESC installation and maintenance, demolition and relocation of existing franchise utilities, rough grading, relocation of underground utilities, including storm drainage, rail construction and final site stabilization including adjacent surface restorations where necessary.

Construction of the rail improvements is not part of the first phase of work for the Vancouver Energy Facility. Construction of the additional loop will be completed based upon long-term capacity of the Terminal 5 rail infrastructure and the future phase of the Facility.

Table 11 summarizes rail improvements and the WWHM results. Detailed stormwater calculations are included in Appendix F for pre-construction and during construction. Rail improvements results are included in the Analysis Results as POC 6. Stormwater calculations for the completed facility are detailed in the facility's Industrial Stormwater Engineering Report.

Table 11. Rail Improvements - Site Summary[3]

	Pre-Construction	During Construction	Completed Facility
Total Site Area	3.5 Acres	3.5 Acres	3.5 Acres
Percent Impervious	100 %	100 %	100 %
Disturbed Area	5.4 Acres	5.4 Acres	5.4 Acres
2-Year Peak Runoff	1.44 cfs	1.44 cfs	1.44 cfs
10-Year Peak Runoff	2.26 cfs	2.26 cfs	2.26 cfs
25-Year Peak Runoff	2.72 cfs	2.72 cfs	2.72 cfs
100-Year Peak Runoff	3.49 cfs	3.49 cfs	3.49 cfs

2.3.7 Construction within Identified Cap Areas

This section is intended to provide detailed descriptions of surface area disruptions within the Deed Restrictive Areas shown in Figure 5. Detailed construction drawings indicating existing cap sections and restoration details are included in Appendix M.

2.3.7.1 Vanexco Cap

The areas of potential contaminates are contained below an existing concrete slab that has been preserved in place and buried with approximately 3 to 4 feet of fill. In areas where the rail corridor has been constructed, portions of the existing concrete slab have been removed and replaced with an impervious liner and drainage system. The combination of liner and concrete slab protects the contaminated material from exposure to stormwater.

A total of approximately 20,000 square feet of improvements is proposed as part of the parking lot and containment storage tanks at the administrative/support building area. Work in this area has been designed utilizing surface features for stormwater collection and conveyance. The amount of fill over the concrete slab allows standard construction techniques for parking lot construction. Spread footings and thickened slabs are proposed for the containment tanks. The bottom of the containment tank footings are proposed at 31.25 feet. The existing concrete cap is at Elevation 31.1 according to as-built drawings.

Construction of the rail unloading building would consist of the installation of 19 column footings and 357 linear feet of grade beam within the cap areas. Existing drawings showing cross sections from the installation of the high-density polyethylene (HDPE) liner indicate that the liner is at an approximate elevation between 28.0 and 28.3 feet. Construction of the footings within the Vanexco Cap would require foundation excavation to an elevation of 26.33 feet.

Portions of the rail unloading facility would occur within the existing HDPE liner. In those locations, this sequence of construction would follow.

1. The fill on top of the liner would be removed carefully to expose the liner and the liner would be rolled back to facilitate construction of the rail unloading facility.
2. Excavated soils from this area would be placed in separate containment bins for testing and clean backfill would be used.
3. The liner would be rolled back into place preserving positive drainage to the existing liner drainage system.
4. The liner would be tied into the grade beam of the facility while the roof and concrete surfacing would maintain the necessary stormwater segregation and the function of the existing cap.

[3] Note that the areas displayed for rail improvements within this construction SWPPP only apply to the additional rail loop being permitted by the Facility and the modifications to existing rail infrastructure to connect into the rail unloading building. The rail infrastructure discussed within the NPDES Engineering Report and Operations SWPPP specifically apply to rail infrastructure that the Facility operates on.

Work within this area would be restricted to periods of dry weather and, if rainfall is forecast, work would be stopped and the disturbed areas covered with plastic sheathing to preserve cap function.

2.3.7.2 North, North 2, SPL, and Ingot Caps

Construction is limited within the North, North 2 Landfills, SPL Storage Area, and Ingot Cap to improvements required by the rail improvements only. Construction of the rail improvements will occur within the limits of the prior project boundary for the Port's WVFA project. Construction of the outermost loop track will require reconfiguration of the inspection/access road. The road width will be reduced to 13 feet to accommodate the outer track. The southern limits of the gravel inspection road will not be adjusted. Construction within these areas would be substantially similar and is proposed to comply with all currently permitted conditions of approval for this work, and minimum cap restoration would be as follows. Complete engineering drawings and updated construction SWPPP will be prepared and submitted to EFSEC prior to construction.

- SPL Cap – This cap has been modified by the Port during expansion of the rail facility. Construction techniques generally use a system of 30-mil PVC membrane installed underneath track ballast and 10 inches of crushed rock. Construction modifications would be tied into the existing asphalt cap areas using concrete transition ties to transition from membranes to asphalt.
- North/North 2 Cap – The cap is protected by native subgrade covered by dredge and selected fill.
- Ingot Cap – The cap is protected by prepared subgrade and selected fill, with a layer of backfilled sand of various depths and 12 inches of crushed concrete.

2.3.7.3 East Landfill

Construction within the east landfill area consists of grading a suitable level bench within the area to construct foundations for the aboveground crude oil pipeline. The actual limits of the landfill areas was surveyed by the port. By design, improvements within this area would not impact the landfill area.

3. Construction Stormwater BMPs

These construction stormwater BMPs have been selected for the proposed project. Detailed environmental control plans for the project are attached in Appendix G. The plans have been designed, unless noted specifically, for wet-weather construction activities. The design of the environmental control plan places a priority on erosion prevention. Sediment controls and stormwater treatment are additionally selected at each project area in the event that erosion does occur.

Specific emphasis is placed in the environmental control plans to protect the surface water quality of nearby wetlands and the Columbia River. Perimeter improvements have been identified for all construction areas, and where ground improvements are necessary, additional perimeter improvements such as temporary berms, cutoff ditches, and/or wick drains have been included.

3.1 The 12 BMP Elements

The BMPs discussed in this section are as specified by Ecology in the *2012 Stormwater Management Manual for Western Washington* (Washington State Department of Ecology 2012). The BMPs must satisfy the requirements set forth in the General NPDES Permit (Appendix I).

To avoid potential issues that may cause a violation(s) of the permit, at the first sign that existing BMPs are ineffective or failing, the Certified Erosion and Sediment Control Lead (CESCL) will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix J. The alternate BMPs are a quick reference tool for the onsite inspector in the event the listed BMPs are deemed ineffective or inappropriate during construction.

3.1.1 Element 1: Preserve Vegetation/Mark Clearing Limits

To protect adjacent properties and to reduce the area of soil exposed to construction, the limits of construction would be clearly marked before land-disturbing activities begin. Trees that are to be preserved, as well as all sensitive areas and their buffers, would be clearly delineated, both in the field and on the plans. In general, natural vegetation and native topsoil would be retained in an undisturbed state to the maximum extent possible. The BMPs related to marking the clearing limits that may be used on this project include:

- High Visibility Plastic or Metal Fence (BMP C103)
- Silt Fence (BMP C233)

Table 12 lists the project elements that would require the use of BMPs to preserve vegetation and mark clearing limits.

Table 12. Areas Requiring Vegetation Preservation/Marking and Clearing Limit BMPs

Area	High Visibility Plastic or Metal Fence	Silt Fence
200 – Unloading & Office	Required	Required
300 – Storage	Required	Required
400 – Marine Terminal	Required	Required
500 – Transfer Pipelines	Required	Required
600 – West Boiler	Required	Required
Rail Improvements	Required	Required

High visibility fencing and silt fencing would be used on all areas of the project to delineate the construction boundaries. Where natural vegetation, wetlands, or surface water bodies are adjacent, those areas (regardless of ground slope) would be protected by silt fencing, while silt fencing would be installed in all areas on the downslope gradient of the work areas. High visibility fencing would be used on all upslope gradients of the work areas. All fencing would be held a minimum of 20 feet back from all rail corridors.

3.1.1.1 High-Visibility Plastic or Metal Fence (BMP C103)

Fencing is intended to fulfill the following purposes.

1. Restrict clearing to approved limits.
2. Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed.
3. Limit construction traffic to designated construction entrances, exits, or internal roads.
4. Protect areas where marking with survey tape may not provide adequate protection.

To establish clearing limits, plastic, fabric, or metal fencing may be used in the following situations.

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

3.1.1.2 Silt Fence (BMP C233)

A silt fence is used to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Silt fence may be used downslope of all disturbed areas, but the project would follow these Ecology caveats: The fence would prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but would allow the water to pass through the fence. The silt fence would not be used to treat concentrated flows or to treat substantial amounts of overland flow. Any concentrated flows would be conveyed through the drainage system to a sediment pond. Silt fences would not be constructed in

streams or used in V-shaped ditches because in these situations, silt fence does not provide an adequate method of silt control.

3.1.2 Element 2: Establish Construction Access

Construction access or activities occurring on unpaved areas would be minimized, yet where access points are necessary, they would be stabilized to minimize tracking sediment onto public roads, and wheel washing, street sweeping, and street cleaning would be employed to prevent sediment from entering state waters. All wash wastewater would be controlled on site. The specific BMPs related to establishing construction access that may be used on this project include:

- Stabilized Construction Entrance/Exit (BMP 105)
- Wheel Wash (BMP C106)
- Construction Road/Parking Area Stabilization (BMP C107)

Table 13 lists the areas of the project that would require stabilization and/or wheel washing.

Table 13. Areas Requiring Construction Access BMPs

Area	Stabilized Construction Entrance/Exit	Wheel Wash	Construction Road/Parking Area Stabilization
200 – Unloading & Office	Required	Required[1]	Required
300 – Storage	Required	Required[1]	Required
400 – Marine Terminal	Required	Required[1]	Required
500 – Transfer Pipelines	N/A	N/A	N/A
600 – West Boiler	Required	-	Required
Rail Improvements	Required	-	-

Wheel washing for vehicles from within the ground disturbing activity area will be required during excavations with dewatering and during ground improvement activities. A wheel wash will be installed at the staging/laydown area at Area 200 for the duration of ground-disturbing activities if needed.

Delineated construction access points have been established for each project area where ground-disturbing activities exist. Entrance locations are generally placed near the construction laydown and staging areas for each site. Wheel washes would be provided during all ground improvement activities and rough grading. Construction roads/parking areas are provided at each construction laydown/staging area. Detailed descriptions of each area are included below:

Area 200 – Unloading and Office

The primary project laydown and staging area is proposed within the Terminal 5 rail loop. Entrances and exits to the laydown area and construction area for the rail unloading facility would have stabilized construction entrances and wheel wash. Construction road/parking areas would be stabilized per BMP C107 for all parking and regular vehicular traffic areas. A high visibility fence would separate the staging/laydown area from the construction site. All trucks hauling equipment, excavated soils, or backfill material would be required to use the wheel wash at a minimum when exiting the site.

A laydown area is proposed at the location of the future office building in the administration and support area. A construction entrance is proposed adjacent to this in the alignment of the proposed parking area. The construction entrance located at Area 600 to the west would have a wheel wash for material import and haul trucks. It is anticipated that workers in this area would report to the primary laydown/staging area within the Terminal 5 rail loop and private vehicles would not be parked in this area.

Area 300 – Storage

Two construction entrances would be located at Area 300. The primary laydown and staging area would be located on the west end of the project area. This area is predominantly for construction workers, office trailers, and material storage. The entrance on the east side of the project area would include the wheel wash and is designated for excavation haul off, material import, and for concrete truck access. The water quality units and concrete washout facilities for the project are located at the southeast corner, and this entrance would additionally support that facility.

A construction road would be maintained along the south and east portions of the project for vehicles accessing the concrete washout and water quality facilities. Construction workers on this site are anticipated to report to the staging/laydown areas at the west access and construction parking would be provided in that area.

Area 400 – Marine Terminal

The Marine Terminal would use two construction entrances, one on the west end near the current CalPortland lease area and one in alignment with the current waterfront access road on the east end. The primary access into this area would be from the west near the identified staging/laydown area. Office trailers and parking for the workers would be provided. Material hauling would be in/out of this access as well and a wheel wash unit would be provided during ground-disturbing activities.

Area 500 – Transfer Pipelines

The construction of the transfer pipelines would use the project staging and laydown area within the Terminal 5 rail loop (Area 200) for staging, laydown, construction worker parking, and offices. Material stockpiling also would occur in Area 200.

Area 600 – West Boiler

Construction of the West Boiler is assumed to be completed as a second, deferred improvement. This work would include minor grading. As shown, a construction entrance would be constructed and worker parking on the site would be minimal. The remainder of the work for the pipe bridge and the mechanical improvements within the rail unloading building would use staging/laydown within the Terminal 5 loop.

Rail Improvements

The Rail Improvements construction will primarily occur within the existing project footprint for WVFA. The staging and laydown area for the construction will provide a stabilized construction entrance to delineate the location and entrance to the area. It is anticipated that this area will be located adjacent to rail construction and will be used for equipment as well.

3.1.2.1 Stabilized Construction Entrance/Exit (BMP C105)

Construction entrances are stabilized by constructing a pad of quarry spalls at their entrances and exits; this reduces the amount of sediment transported onto paved roads by vehicles or equipment. The following provisions affect the installation and operation of stabilized construction entrances.

- Construction entrances are stabilized wherever traffic enters or leaves a construction site if paved roads or other paved areas are within 1,000 feet of the site.
- Stabilized surfaces should be long and wide enough to provide vehicle access/parking, based on lot size/configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow additional stabilized entrances not shown in the initial construction SWPPP. It is difficult to determine exactly where access to these projects would take place; additional materials will enable the contractor to install them where needed.

3.1.2.2 Wheel Wash (BMP C106)

Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles and are used when a stabilized construction entrance (see BMP C105) does not prevent sediment from being tracked onto pavement. The following provisions affect the installation and operation of wheel washes.

- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street. Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.
- Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland land application, or to the sanitary sewer with local sewer district approval.
- Wheel wash or tire bath wastewater should not include wastewater from concrete washout areas.

3.1.2.3 Construction Road/Parking Area Stabilization (BMP C107)

This BMP involves reducing erosion caused by construction traffic or runoff by stabilizing roads, parking areas, and other on-site vehicle transportation routes immediately after grading.

As the BMP stipulates, whenever roads or parking areas (whether temporary or permanent) are constructed for use by construction traffic, they would be stabilized and high visibility fencing would be installed as required by BMP C103.

3.1.3 Element 3: Control Flow Rates

In order to protect the properties and waterways downstream of the project site, stormwater discharges from the site would be controlled. The specific flow control BMPs that may be used on this project include

- Check Dams (BMP C207)
- Outlet Protection (BMP C209)
- Compost Socks (BMP C235)
- Storage/Surge Tanks/Sediment Pond (Custom BMP)

Table 14. Areas Requiring Control Flow Rate BMPs

Area	Check Dams	Outlet Protection	Compost Sock	Storage/Surge Tanks
200 – Unloading & Office	Required	N/A	-	450,000 gallons Required
300 – Storage	N/A	N/A	-	250,000 gallons Required
400 – Marine Terminal	N/A	Required	Required	40,000 gallons Required
500 – Transfer Pipelines	N/A	N/A	Required	N/A
600 – West Boiler	N/A	N/A	Required	N/A
Rail Improvements	N/A	N/A	N/A	N/A

Flow control elements are identified for each construction area. The flow control is not intended to provide for detention requirements. The existing condition on site is considered to be fully impervious as a result of decades of industrial activity. Flow control is designed to maintain safe conveyance of construction stormwater, and surge protection to verify water quality treatment benchmarks are achieved.

The Stormwater Management Manual for Western Washington (SMMWW) specifies that upstream tankage required for the use of construction stormwater filtration or chemical treatment is 1.5 times the 10-year, 24-hour storm volume minus 8 hours of the provided treatment system flow rate. For this project,

the construction stormwater monitoring and treatment systems are designed with redundancy on-site and on-call personnel 24 hours a day. As such, the calculations for required tankage use an expanded 20-hour-a-day treatment period. The table above specifies the required tankage volume as determined by the modified sizing criteria specified in BMP C251 for flow control exempt water bodies. The tankage volumes above correlate to the treatment capacities specified in section 3.1.5.

Area 200 – Unloading and Office

Construction at the unloading and office area is not anticipated to have a significant impact on stormwater runoff. Silt fence would be installed along the southern boundary and ground-disturbing activities would be sequenced to, at a minimum, install the gravel surfacing immediately following grading. Runoff from this area would continue along the existing drainage patterns sheet flowing to the south.

Construction of the rail unloading building would require deep excavations for the pump pits and excavations within the Vanexco Cap. Excavation dewatering from these areas would be removed from the excavation and pumped into a storage/weir tank located to the south of the rail unloading building. This groundwater would be isolated from the remainder of the construction stormwater system, and would be tested for contaminates of concern. If testing for contaminates is negative or below surface water quality standards, the water would be released into the construction stormwater system for treatment and discharge. If tests are positive, the contaminated water would be removed from the site from a licensed disposal company for treatment and legal disposal.

Construction stormwater from the rail unloading building and staging/laydown areas would be collected in the existing stormwater system. Where stormwater needs to be intercepted at the laydown/staging boundaries, a cutoff ditch with check dams would be installed and directed towards existing inlets or a new sump with pump to direct stormwater to the on-site weir tanks. The downstream portion of this system would be plugged, and stormwater would be pumped out of the system and discharged into weir tanks for flow control, followed by an enhanced sand filter system as described in section 3.1.5.

Construction within the Vanexco cap area will be restricted to working periods without precipitation. The site will be covered, and runoff will be directed toward the remainder of the facility or collected in the existing storm drainage system above the contaminated media.

Area 300 – Storage

Construction stormwater within Area 300 would be directed through constructed cutoff ditches, sumps, and pumped to on-site weir tanks. The weir tanks would provide initial settling of large sediment and attenuate surges of stormwater. Stormwater following the tanks would be processed through enhanced sand filtration as described in section 3.1.5.

Area 400 – Marine Terminal

The Marine Terminal would be graded to drain into the bio-infiltration swales using a media filter drain for water quality. Runoff into the area would be controlled through compost socks installed along the slope. Compost socks also would be installed along the slope of the river embankment to protect the slope from erosion. Additionally, during ground improvements, any groundwater or jet water used and brought to the surface would be collected and pumped into weir tanks. Enhanced sand filtration for water quality treatment follows downstream of the weir tanks.

Area 500 – Transfer Pipelines

Ground disturbance of the transfer pipelines consists largely of foundation excavations. These areas would be surrounded by compost socks to control runoff flow rates. Excavations within this area would be temporary and exposed for only a short time.

Area 600 – West Boiler

The downslope portions of the West Boiler and the utility excavations to the site would use compost socks to control runoff. Excavations within this area would be temporary and exposed for a short time.

Rail Improvements

The majority of construction stormwater from the rail corridor is expected to runoff to the existing conveyance system. Additionally, the Columbia River is a flow control exempt waterbody according to Ecology's SMMWW Volume I. In the event that stormwater is not captured and flow control is needed, flow control devices specified below or in Appendix J may be necessary.

3.1.3.1 Check Dams (BMP C207)

A small dam constructed across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam. Check dams are used where temporary channels or permanent channels are not yet vegetated, channel lining is infeasible, and/or velocity checks are required. The following provisions affect the use of this BMP.

- Check dams may not be placed in streams unless approved by the Washington Department of Fish and Wildlife. Check dams may not be placed in wetlands without approval from a permitting agency.
- Do not place check dams below the expected backwater from any salmonid bearing water between October 1 and May 31 to provide for no loss of high flow refuge habitat for overwintering juvenile salmonids and emergent salmonid fry.
- Construct rock check dams from appropriately sized rock. The rock used must be large enough to stay in place given the expected design flow through the channel. The rock must be placed by hand or by mechanical means (no dumping of rock to form dam) to achieve complete coverage of the ditch or swale and to verify that the center of the dam is lower than the edges.
- Check dams may also be constructed of either rock or pea-gravel filled bags. Numerous new products are also available for this purpose. They tend to be re-usable, quick and easy to install, effective, and cost efficient.
- Place check dams perpendicular to the flow of water.
- The dam should form a triangle when viewed from the side. This prevents undercutting as water flows over the face of the dam rather than falling directly onto the ditch bottom. Before installing check dams impound and bypass upstream water flow away from the work area. Options for bypassing include pumps, siphons, or temporary channels.
- Check dams in association with sumps work more effectively at slowing flow and retaining sediment than just a check dam alone. A deep sump should be provided immediately upstream of the check dam.
- In some cases, if carefully located and designed, check dams can remain as permanent installations with very minor regrading. They may be left as either spillways, in which case accumulated sediment would be graded and seeded, or as check dams to prevent further sediment from leaving the site.
- The maximum spacing between the dams shall be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.
- Keep the maximum height at 2 feet at the center of the dam.
- Keep the center of the check dam at least 12 inches lower than the outer edges at natural ground elevation.
- Keep the side slopes of the check dam at 2H:1V or flatter.
- Key the stone into the ditch banks and extend it beyond the abutments a minimum of 18 inches to avoid washouts from overflow around the dam.
- Use filter fabric foundation under a rock or sand bag check dam. If a blanket ditch liner is used, filter fabric is not necessary. A piece of organic or synthetic blanket cut to fit will also work for this purpose.
- In the case of grass-lined ditches and swales, all check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale - unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- Verify that channel appurtenances, such as culvert entrances below check dams, are not subject to damage or blockage from displaced stones. Figure 4.2.7 depicts a typical rock check dam.

3.1.3.2 Outlet Protection (BMP C209)

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows. Outlet protection is required at the outlets of all ponds, pipes, ditches, or other conveyances, and where runoff is conveyed to a natural or manmade drainage feature such as a stream, wetland, lake, or ditch.

3.1.3.3 Compost Sock (BMP C235)

Wattles are TESC barriers consisting of straw, compost, or other material that is wrapped in biodegradable tubular plastic or similar encasing material. Wattles reduce the velocity of stormwater and can spread the flow of rill and sheet runoff and can capture and retain sediment. Typical wattles are 8 to 10 inches in diameter and 25 to 30 feet long. Wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes. See Figure 4.2.14 for typical construction details. WSDOT Standard Plan I-30.30-00 also provides information on wattles (http://www.wsdot.wa.gov/Design/Standards/Plans.htm#SectionI).

This BMP stipulates the use of wattles in the following circumstances.

- In disturbed areas that require immediate erosion protection.
- On exposed soils during the period of short construction delays, or over winter months.
- On slopes requiring stabilization until permanent vegetation can be established.

The material used dictates the effectiveness period of the wattle, but they usually are effective for one to two seasons. Riling beneath wattles can be prevented by properly entrenching and abutting them to prevent water from passing between them.

3.1.3.4 Storage/Surge Tanks (Custom BMP)

Storage/Surge tanks are used in conjunction with erosion control practices to reduce the amount of sediment flowing into the basin. Tanks remove sediment from runoff originating from disturbed areas of the site. The tanks are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, tanks usually reduce turbidity only slightly. This BMP stipulates that, before stormwater runoff leaves a construction site, the runoff must pass through a sediment pond, storage/surge tank, or other appropriate sediment removal BMP. Sediment ponds are used where the contributing drainage area is 3 acres or more.

3.1.4 Element 4A: Install Sediment Controls

All stormwater runoff from disturbed areas would pass through an appropriate sediment removal BMP before leaving the construction site or before the discharge of the stormwater to an infiltration facility. The specific sediment control BMPs that may be used on this project include:

- Silt Fence (BMP C233)
- Compost Sock (BMP C235)

Table 15. Areas Requiring Sediment Control BMPs

Area	Silt Fence	Compost Sock
200 – Unloading & Office	Required	Required
300 – Storage	Required	-
400 – Marine Terminal	Required	Required
500 – Transfer Pipelines	Required	Required
600 – West Boiler	Required	Required
Rail Improvements	Required	Required

Area 200 – Unloading and Office

Sediment controls at Area 200 would consist of silt fencing installed along the downslope project areas. On slopes or where localized excavations occur within the 20-foot rail clearance area, compost socks would be used.

Area 300 – Storage

Sediment controls at Area 300 would consist of silt fencing installed along all downslope project areas.

Area 400 – Marine Terminal

Sediment controls at Area 400 would consist of silt fencing installed along all downslope project areas and along the top of bank. Compost socks would be installed along the embankment and along the media filter drain.

Area 500 – Transfer Pipelines

Silt fencing would be installed along the top of bank where the transfer pipelines and ground improvements are constructed along the river. Compost socks would be used to protect downslope areas from localized foundation excavation runoff. Additionally, compost socks would be installed along river embankment.

Area 600 – West Boiler

Sediment controls would consist of silt fencing installed along all downslope project areas.

Rail Improvements

Silt fencing and straw wattles will be used to intercept stormwater as is flows from the construction site. Sediment controls will be installed along all downslope project areas.

3.1.4.1 Silt Fence (BMP C233)

Section 3.1.1.2 discusses silt fence.

3.1.4.2 Compost Socks (BMP C235)

Section 3.1.3.3 describes compost socks.

3.1.4.3 Additional Measures to Control Sediment Discharge

In addition, sediment would be removed from paved areas in and adjacent to construction work areas manually or using mechanical sweepers, as needed, to minimize tracking of sediments on vehicle tires away from the site and to minimize wash off of sediments from adjacent streets in runoff.

Whenever possible, sediment-laden water would be discharged into relatively level, vegetated areas of the project site (BMP C240 paragraph 5, page 4-102).

In some cases, sediment discharge in concentrated runoff can be controlled using permanent stormwater BMPs (e.g., infiltration swales, ponds, trenches). Sediment loads can limit the effectiveness of some permanent stormwater BMPs, such as those used for infiltration or biofiltration; however, those BMPs designed to remove solids by settling (wet ponds or detention ponds) can be used during the construction phase. When permanent stormwater BMPs are used to control sediment discharge during construction, the structure would be protected from excessive sedimentation with adequate erosion and sediment control BMPs. Any accumulated sediment would be removed after construction is complete and, once the remainder of the site has been stabilized, the permanent stormwater BMP would be restabilized with vegetation per applicable design requirements.

3.1.5 Element 4B: Turbidity Control BMPs

The following BMPs will be implemented as end-of-pipe sediment controls as required to meet permitted turbidity limits in the site discharge(s). Prior to the implementation of these technologies, sediment sources and erosion control and soil stabilization BMP efforts will be maximized to reduce the need for end-of-pipe sedimentation controls. The specific turbidity control BMPs that may be used on this project include

- Weir Tanks (Custom BMP)
- Construction Stormwater Chemical Treatment (BMP C250)

- Construction Stormwater Filtration (BMP C251)
- Wick Drains (Custom BMP)

Table 16. Areas Requiring Turbidity Control BMPs

Area	Weir Tanks	Chemical Treatment	Filtration	Wick Drains
200 – Unloading & Office	2 Tanks Required	750 gpm Required	750 gpm Required	-
300 – Storage	2 Tanks Required	2,500 gpm Required	2,500 gpm Required	Required
400 – Marine Terminal	-	250 gpm Required	250 gpm Required	Required
500 – Transfer Pipelines	-	-	-	Required
600 – West Boiler	-	-	-	-
Rail Improvements	-	-	-	-

The required treatment flow rates indicated above were selected based upon sizing criteria for upstream tankage specified in BMP C250 of the SMMWW. The flow rates above are minimum flow rates that generally conform to standard intervals of available units within the industry. The flow rate of 5,000 gpm was selected at Area 200 to keep downstream conveyance systems from being overloaded. The flow rates also assume that the treatment systems will operate for 16 hours a day during the 10-year, 24-hour design storm.

The Port conducted water quality sampling during two storms in 2013. The full results of this report are located in Appendix K. Construction activity was underway during the testing period at Farwest Steel (Parcel 1A). The results of this testing are used as the basis of design for the Facilities Turbidity Control BMPs. The results of the sampling and the resultant assumed basis of design are summarized in Table 17 below.

The basis of design assumes higher than the sampled average for turbidity to conservatively design the proposed filtration systems can adequately handle construction runoff from the Facility. The highest value of 500 was not used as the basis of design because the treatment train of construction BMPs includes pretreatment with surge/storage tanks and weir tanks prior to the filtration processes required.

The sample point of 270 mg/L for total suspended solids (TSS) is suspect as no other sampling indicated levels to this degree. The other highest TSS in the report was 55 mg/L from runoff of an adjacent parking lot/paved laydown area. The geotechnical report attached in Appendix D characterizes the Facility areas as predominately sands, which will have a much larger particle size and resulting lower TSS. A design value of 100 mg/L is considered adequate, especially with the construction BMP treatment train with upstream surge/storage tanks and weir tanks.

Table 17. Construction Turbidity Control Sampling and Basis of Design

Parameter	Sampling Data			Basis of BMP Selection and Design
	28 January 2013	28 February 2013	Average	
Turbidity (NTU)	196.1	500	348.05	400
TSS (mg/L)	34.0	270	152	100

Areas 200, 300, and 400

Construction stormwater from Area 200 would be collected and stored in weir tanks for initial sediment settling. Stormwater from the weir tanks would overflow and be processed through sand filtration. The sand filters would be equipped for the addition of chemical treatment (flocculent) to additionally provide

higher levels of treatment when needed. All water resulting from ground improvements would be processed through chemical treatment BMPs.

Areas 500 and 600

Turbidity controls are not required at areas 500 and 600. BMPs for sediment control and erosion prevention would be strictly enforced to reduce turbidity loading in the downstream stormwater system.

Rail Improvements

Turbidity controls for the rail improvements may include use of permanent stormwater controls, such as downstream ponds and trenches. Sediment deposited in these BMPs will be removed. Alternative BMPs are listed in in Appendix J if needed.

Ground Improvements

Wick drains will be used between areas of ground improvement (stone columns, soil mixing, jet grouting, etc.) and surface waters and wetlands. At Area 300, wick drains will be installed at a minimum of 16 feet on center where ground improvements are within 150 feet of the adjacent wetlands to the north and east. At areas 400 and 500, wick drains will be installed along the top of bank at 8 feet on center for the entire bank area receiving ground improvement. Visual monitoring of turbidity within the wetlands or Columbia River will occur daily during ground improvement. If any turbidity is observed as a result of ground improvement, ground improvement activities will be stopped and additional mitigation measures will be installed, including additional wick drains, turbidity curtains, or change in ground improvement methods will be considered.

3.1.5.1 Weir Tanks (Custom BMP)

Weir tanks are used in conjunction with erosion control practices to reduce the amount of sediment flowing into the basin. Tanks remove sediment from runoff originating from disturbed areas of the site. The tanks are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, tanks usually reduce turbidity only slightly. This BMP stipulates that, before stormwater runoff leaves a construction site, the runoff must pass through a sediment pond, weir tank, or other appropriate sediment removal BMP. Sediment ponds/weir tanks are used where the contributing drainage area is 3 acres or more.

3.1.5.2 Construction Stormwater Chemical Treatment (BMP C250)

This BMP applies when using stormwater chemicals in batch treatment or flow-through treatment.

Turbidity is difficult to control once fine particles have become suspended in stormwater runoff from a construction site. Sedimentation ponds are effective at removing larger particulate matter by gravity settling, but are ineffective at removing smaller particulates such as clay and fine silt.

Traditional erosion and sediment control BMPs may not be adequate to maintain compliance with the water quality standards for turbidity in receiving water.

Chemical treatment can reliably provide exceptional reductions of turbidity and associated pollutants. Chemical treatment may be required to meet turbidity stormwater discharge requirements, especially when construction is to proceed through the wet season.

Ecology must provide formal written approval for the use of chemical treatment regardless of the size of the site. The local permitting authority may also require review and approval. After the use of the chemical treatment system has been approved, it must be included in the construction SWPPP.

3.1.5.3 Construction Stormwater Filtration (BMP C251)

Filtering stormwater from construction removes the sediment from runoff that originates from the areas of the site that have been disturbed.

Filtration with sand media has been used for over a century to treat water and wastewater. Using sand filtration to treat stormwater is more recent and is generally used to treat runoff from streets, parking lots, and residential areas. The application of filtration to treating construction stormwater is currently under development.

Traditional BMPs used to control soil erosion and sediment loss from sites under development may not be adequate to maintain compliance with the water quality standard for turbidity in the receiving water. Filtration may be used in conjunction with gravity settling to remove sediment as small as fine silt (0.5 µm). The reduction in turbidity would depend on the particle sizes in the sediment in the stormwater. In some circumstances, sedimentation and filtration may achieve compliance with the water quality standard for turbidity.

The use of construction stormwater filtration does not require approval from Ecology as long as treatment chemicals are not used. Filtration in conjunction with polymer treatment requires testing under the Chemical Technology Assessment Protocol before it can be initiated. If the use of polymers is proposed, approval from the appropriate regional Ecology office must be obtained beforehand. For more guidance on the chemical treatment of stormwater, see BMP C250 in section 3.1.5.2.

3.1.6 Element 5: Stabilize Soils

Exposed and unworked soils would be stabilized throughout the life of the project by the application of BMPs that are effective in preventing erosion. The specific soil stabilization BMPs that may be used on this project include

- Temporary and Permanent Seeding (BMP C120)
- Mulching (BMP C121)
- Plastic Covering (BMP C123)
- Surface Roughening (BMP C130)
- Dust Control (BMP C140)

Table 18. Areas Requiring Soil Stabilization BMPs

Area	Temporary and Permanent Seeding	Mulching	Plastic Covering	Surface Roughening	Dust Control
200 – Unloading & Office	Required	-	Required	-	Required
300 – Storage	Required	-	Required	Required	Required
400 – Marine Terminal	Required	Required	Required	-	Required
500 – Transfer Pipelines	N/A	Required	-	-	Required
600 – West Boiler	Required	-	-	-	Required
Rail Improvements	-	-	Required	-	Required

Area 200 – Unloading and Office

Landscaping areas would be mulched or permanently seeded as soon as the area is graded. Stockpiles in the construction and laydown areas would be covered when not in active use. Dust control measures would be in place for use when needed.

Area 300 – Storage

Landscaping areas would be mulched or permanently seeded as soon as the area is graded. Stockpiles in the construction and laydown areas would be covered when not in active use. Side slopes of the containment area berm would be roughened according to BMP C130 and seeded as soon as possible. Dust control measures would be in place for use when needed.

Area 400 – Marine Terminal

Landscaping areas would be mulched or permanently seeded as soon as the area is graded. All exposed slopes and surfaces in the Marine Terminal area would be mulched. Stockpiles in the construction and laydown areas would be covered when not in active use. Dust control measures would be in place for use when needed.

Area 500 – Transfer Pipelines

All exposed soils in the transfer pipeline area would be mulched, and mulching will be placed to stabilize exposed soils. Where applicable, erosion control seeding also would be completed. The primary surfacing in this area is gravel and gravel would be placed following construction of the foundations. Dust control measures would be in place for use when needed.

Area 600 – West Boiler

Landscaping areas would be mulched or permanently seeded as soon as the area is graded. Dust control measures would be in place for use when needed.

Rail Improvements

Plastic covering will be used to provide immediate and short-term erosion for stockpiles and exposed areas. Dust control measures will be used to prevent wind transport of disturbed soils.

3.1.6.1 Temporary and Permanent Seeding (BMP C120)

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

The BMP stipulates the use of seeding throughout the project on disturbed areas that have reached final grade or that are to remain unworked for more than 30 days. The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1. Between July 1 and August 30, the BMP requires irrigation until 75 percent grass cover is established. Between October 1 and March 30, seeded areas must be covered with mulch or an erosion control blanket until 75 percent grass cover is established.

The BMP also requires reviewing all disturbed areas in late August to early September and completing all seeding by the end of September; this is so the vegetation can become well enough established to provide more than average protection.

- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching below for specifications.
- Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil-disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions or geotextiles) which will prevent erosion.

3.1.6.2 Mulching (BMP C121)

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. An enormous variety of mulches is available. This section discusses only the most common types. The BMP suggests using mulch as a temporary cover measure as follows.

- For less than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.
- Mulch may be applied at any time of the year and must be refreshed periodically.
- For seeded areas mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, kenaf; compost; or blends of these. Tackifier shall be plant-based, such as guar or alpha plantago,

or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used must be installed per manufacturer's instructions. Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at the time of application.

3.1.6.3 Plastic Covering (BMP C123)

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas. The BMP stipulates that plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than six months) applications.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- While plastic is inexpensive to purchase, the added cost of installation, maintenance, removal, and disposal make this an expensive material, up to $1.50-2.00 per square yard.
- Whenever plastic is used to protect slopes install water collection measures at the base of the slope. These measures include plastic covered berms, channels, and pipes used to covey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
  - Temporary ditch liner.
  - Pond liner in temporary sediment pond.
  - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored.
  - Emergency slope protection during heavy rains.
  - Temporary drainpipe ("elephant trunk") used to direct water.

3.1.6.4 Surface Roughening (BMP C130)

Surface roughening helps the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and traps sediment. A tiller or other suitable equipment is used on the contour to create horizontal depressions or slopes are left in a roughened condition by not fine grading them. This BMP is used in conjunction with others such as seeding, mulching, or sodding. The following conditions are stipulated for the use of this BMP.

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

3.1.6.5 Dust Control (BMP C140)

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters. Dust control is used in areas (including roadways) that are subject to surface and air movement of dust where on-site and off-site impacts to roadways, drainage ways, or surface waters are likely.

The project site is located west of the crest of the Cascade Mountains. Therefore, no soils will remain exposed and unworked for more than 7 days during the dry season (May 1 to September 30) and 2 days during the wet season (October 1 to April 30). Regardless of the time of year, all soils would be stabilized at the end of the shift before a holiday or weekend if needed based on weather forecasts.

In general, as part of dust control, cut and fill slopes would be stabilized as soon as possible and soil stockpiles would be covered temporarily with plastic sheeting. All stockpiled soils would be stabilized to prevent erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

3.1.7 Element 6: Protect Slopes

All cut and fill slopes would be designed, constructed, and protected in a manner than minimizes erosion. The specific slope protection BMPs that may be used on this project include:

- Surface Roughening (BMP C130)
- Silt Fence (BMP C233)
- Compost Socks (BMP C235)

Table 19. Areas Requiring Slope Protection BMPs

Area	Surface Roughening	Silt Fence	Compost Sock
200 – Unloading & Office	-	-	-
300 – Storage	Required	-	-
400 – Marine Terminal	-	Required	Required
500 – Transfer Pipelines	-	-	-
600 – West Boiler	-	-	-
Rail Improvements	-	-	-

Area 300 – Storage

Slopes constructed for the containment area would be stabilized initially with surface roughening. The exterior of the slope would be permanently seeded and the interior of the containment area would be surfaced with granular surfacing.

Area 400 – Marine Terminal

Silt fencing would be installed along the top of the bank. The upland areas would be graded toward the bio-infiltration swales and away from the bank. Where the bank is not hardscaped with riprap slope protection, compost socks would be installed above the water level to protect slopes during construction.

Area 500 – Transfer Pipelines

There are no slopes within this Facility area; therefore, slope protection BMPs are not applicable.

Area 600 – West Boiler

There are no slopes within this Facility area; therefore, slope protection BMPs are not applicable.

Rail Improvements

There are no slopes within this Facility area; therefore, slope protection BMPs are not applicable.

3.1.7.1 Surface Roughening (BMP C130)

See description of surface roughening in section 3.1.6.4.

3.1.7.2 Silt Fence (BMP C233)

See description of silt fence in section 3.1.4.1.

3.1.7.3 Compost Sock (BMP C235)

See description of compost socks in section 3.1.3.3.

3.1.8 Element 7: Protect Drain Inlets

All storm drain inlets and culverts made operable during construction would be protected to prevent unfiltered or untreated water from entering the drainage conveyance system. However, the first priority is to keep all access roads clean of sediment and keep street wash water from entering storm drains until treatment can be provided. Storm drain inlet protection (BMP C220) would be implemented for all drainage inlets and culverts that could be impacted by sediment-laden runoff on and near the project site.

Table 20. Areas Requiring Storm Drain Inlet Protection BMPs

Area	Storm Drain Inlet Protection
200 – Unloading & Office	Required
300 – Storage	Required
400 – Marine Terminal	Required
500 – Transfer Pipelines	Required
600 – West Boiler	Required
Rail Improvements	Required

All Areas

All storm drain inlets within 500 linear feet of the facility, construction boundary, or laydown areas would receive inlet protection. Inlet protection would be the type indicated in the environmental control plan required for each type of inlet.

3.1.8.1 Storm Drain Inlet Protection (BMP C220)

Storm drain inlet protection prevents coarse sediment from entering drainage systems prior to the permanent stabilization of the disturbed area. Storm drain inlet protection would be used at inlets that are operational before permanent stabilization of the disturbed drainage area. Protection would be provided for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless runoff entering catch basins is conveyed to a sediment pond or trap.

Table 21 lists several options for inlet protection (Volume II – Construction Stormwater Pollution Prevention - August 2012, page 4-80). All of these methods tend to plug and require frequent maintenance. Drainage areas would be limited to one acre or less. Where stormwater ponding would cause a hazard, emergency overflows with additional end-of-pipe treatment can be provided if appropriate.

Table 21. Types/Conditions of Use of Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated Drop Inlet Protection	Yes, temporary flooding will occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area. Requirement: 30' X 30'/acre
Block and Gravel Drop Inlet Protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and Wire Drop Inlet Protection	No		Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch Basin Filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/Earthen Surfaces	Conditions of Use
Curb Inlet Protection with a Wooden Weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and Gravel Curb Inlet Protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap			18-month expected life

3.1.9 Element 8: Stabilize Channels and Outlets

Where site runoff is to be conveyed in channels, or discharged to a stream or some other natural drainage point, efforts would be made to prevent downstream erosion. The specific BMPs for channel and outlet stabilization that may be used on this project include the following.

- Channel Lining (BMP C202)
- Check Dams (BMP C207)
- Outlet Protection (BMP C209)

Table 22. Areas Requiring Channel and Outlet Stabilization BMPs

Area	Cutoff Channel Design Flowrate	Channel Lining	Check Dams	Outlet Protection
200 – Unloading & Office	23.3 cfs	Required	Required	-
300 – Storage	12.3 cfs	Required	Required	-
400 – Marine Terminal	-	-	-	Required
500 – Transfer Pipelines	-	-	-	-
600 – West Boiler	-	-	-	-
Rail Improvements	-	-	-	-

Cutoff swales for the facility were designed to convey the 25-year peak runoff flow rate. A gravel-lined swale was assumed using a manning's coefficient of 0.035. Calculations showed that a standard cutoff swale for the facility would be used. Additionally, it was assumed that each of the above areas requiring cutoff channels would direct construction runoff to a minimum of two swales. The cutoff channel, when necessary, should be a minimum of 1.5 feet wide, with 3H:1V side slopes and be a minimum 1 foot deep. Cutoff channels will use channel lining and check dams to protect against erosion of the swale. Anticipated velocities at a minimum 1 percent slope are approximately 3.5 feet per second.

Areas 200 and 300

Cutoff channels would be installed along the downslope construction area to capture construction stormwater where existing site grading is insufficient to direct stormwater into conveyances for the construction stormwater. These channels would also be used to contain ground improvement runoff where necessary. Channel lining and check dams would be used to protect channel from erosion, and check dams to assist in flow control.

The construction laydown area south of the facility construction area will be unaltered by the project. The facility will use this area for staging and storage of materials. Surface water will be conveyed to stormwater inlets and discharged to the Terminal 5 lagoon to the west. Surface water that does not reach the conveyance system will be infiltrated as-is in the current condition.

Area 400 – Marine Terminal

The discharge from the stormwater treatment system would discharge into the bio-filtration swale. This would provide additional treatment prior to infiltration. Outlet protection would be installed to diffuse concentrated runoff and maintain existing vegetation.

Area 500 – Transfer Pipelines

There are no channels or outlets requiring BMPs in this area.

Area 600 – West Boiler

There are no channels or outlets requiring BMPs in this area.

Rail Improvements

Stormwater within the rail improvement corridor is conveyed to stormwater inlets and discharged to the Terminal 5 lagoon to the west. Surface water that does not reach the stormwater conveyance systems is assumed to infiltrate on site and through the rail ballast.

3.1.9.1 Channel Lining (BMP C202)

Channels can be protected by using either blankets or riprap as channel liners. Channel lining can be used as follows.

- When natural soils or vegetated stabilized soils in a channel are not adequate to prevent channel erosion.
- When a permanent ditch or pipe system is to be installed and a temporary measure is needed.
- In almost all cases, synthetic and organic coconut blankets are more effective than riprap for protecting channels from erosion. Blankets can be used with and without vegetation. Blanketed channels can be designed to handle any expected flow and longevity requirement. Some synthetic blankets have a predicted life span of 50 years or more, even in sunlight.
- Other reasons why blankets are better than rock include the availability of blankets over rock. In many areas of the state, rock is not easily obtainable or is very expensive to haul to a site. Blankets can be delivered anywhere. Rock requires the use of dump trucks to haul and heavy equipment to place. Blankets usually only require laborers with hand tools, and sometimes a backhoe.
- The Federal Highway Administration recommends not using flexible liners whenever the slope exceeds 10 percent or the shear stress exceeds 8 pounds per square foot.

3.1.9.2 Check Dams (BMP C207)

Section 3.1.3.1 describes check dams.

3.1.9.3 Outlet Protection (BMP C209)

Section 3.1.3.2 describes outlet protection.

3.1.10 Element 9: Control Pollutants

All pollutants, including waste materials and demolition debris, that occur on site will be handled and disposed of in a manner that does not cause contamination of stormwater. Good housekeeping and preventive measures will keep the site clean, well-organized, and free of debris. The BMPs that would be implemented to control specific sources of pollutants in the various project areas are shown in the following table and discussed below.

Table 23. Areas Requiring Pollutant Control BMPs

Area	Concrete Handling	Sawcutting and Surface Pollution Protection	Material Delivery, Storage and Containment	Concrete Washout Area	Chemical Filtration	Filtration	pH Neutralization
200 – Unloading & Office	Required	Required	Required	-	Required	Required	-
300 – Storage	Required	Required	Required	Required	Required	Required	Required
400 – Marine Terminal	Required	Required	Required	-	Required	Required	-
500 – Transfer Pipelines	Required	-	-	-	-	-	-
600 – West Boiler	Required	Required	Required	Required	-	-	-
Rail Improvements	Required	Required	Required	Required	-	-	-

The above pollutant control table indicates in which areas pollutants of specific concern need to be addressed. Areas 200, 300, and 400 are of greatest concern to this construction SWPPP as they are the primary areas for laydown and storage of construction equipment and materials. Concrete washout facilities are being provided for the entire facility at Area 300. As a result, pH neutralization also would occur there. Washout water would be discharged to sanitary sewer. Higher levels of pollutant control through filtration and chemical filtration would occur at the major work sites, including areas 200, 300, and 400.

The Port conducted water quality sampling for two storms during 2013. The full results of this report are located in Appendix K. Construction activity was underway during the testing period at Farwest Steel. The results of this testing are used as the basis of design for the Facilities Turbidity Control BMPs. The results of the sampling and the resultant assumed basis of design are summarized in Table 24 below.

The basis of design for the pollutant parameters below were selected based upon the average observed during prior construction activities. The basis of design values were rounded up slightly to provide additional conservatism. Higher than average levels of zinc are not anticipated as the existing galvanized fencing on the facility site will be removed as part of construction. Additionally, no known sources of copper concentrations are known to occur on site.

Table 24. Construction Turbidity Control Sampling and Basis of Design

Parameter	Sampling Data			Basis of BMP Selection and Design
	28 January 2013	28 February 2013	Average	
Total Cu (µg/L)	27.3	57	42.2	45.0
Dissolve CU (µg/L)	3.5	4.5	4.0	4.0
Total Zn (µg/L)	64.6	170	117.3	120.0
Dissolved Zn (µg/L)	<4.0	<4.0	<4.0	<4.0

Additional pollutants have been categorized on site within the Deed Restrictive Areas (see Figure 5). Excavations within and adjacent to these areas would proceed with a separate discharge location for excavation dewatering as described in section 3.1.11.

3.1.10.1 Concrete Handling (BMP C151)

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the state is prohibited. This BMP would be used to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the state. These management practices would be used whenever concrete is used, such as in the following situations.

- Curbs
- Sidewalks
- Foundations
- Floors
- Marine Structures

3.1.10.2 Sawcutting and Surface Pollution Protection (BMP C152)

Sawcutting and surfacing operations generate slurry and process water that contain fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the state is prohibited. Containment wattles or compost socks should be placed on the downslope side of work, and all slurry and debris resulting from this work shall be removed via vacuum from the construction area, and legally disposed of.

This BMP would be used to minimize and eliminate process water and slurry created through sawcutting or surfacing from entering waters of the state whenever sawcutting or surfacing operations take place. The following situations are among those when this BMP should be used.

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

3.1.10.3 Material Delivery, Storage, and Containment (BMP C153)

The discharge of pollutants to the stormwater system or watercourses can result from the delivery and/or storage of material. This BMP is intended to prevent, reduce, or eliminate the discharge of pollutants, and to implement it, the storage of hazardous materials on site would be minimized, the potentially hazardous materials would be stored in a designated area, and secondary containment would be installed.

Ecology specifies the use of this BMP at all construction sites with delivery and storage of the following materials.

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents and curing compounds
- Any other material that may be detrimental if released to the environment

3.1.10.4 Concrete Washout Area (BMP C154)

Performing washout off site, or installing a washout area off site, prevents or reduces the discharge of pollutants to stormwater from concrete waste and prevents pollutants from entering surface waters or ground water.

Ecology specifies the use of concrete washout area BMPs on construction projects where:

- Concrete is used as a construction material
- It is not possible to dispose of all concrete wastewater and washout off-site (ready mix plant, etc.).
- Concrete trucks, pumpers, or other concrete coated equipment are washed on site.
- Note: If less than 10 concrete trucks or pumpers need to be washed out on site, the wash water may be disposed of in a formed area awaiting concrete or an upland disposal site where it will not contaminate surface or ground water. The upland disposal site must be at least 50 feet from sensitive areas such as storm drains, open ditches, or water bodies, including wetlands.

3.1.10.5 Construction Stormwater Chemical Filtration (BMP C250)

Section 3.1.5.1 describes construction stormwater chemical filtration.

3.1.10.6 Construction Stormwater Filtration (BMP C251)

Section 3.1.5.3 describes construction stormwater filtration.

3.1.10.7 Control for High pH Water (BMP C253)

A pH level range of 6.5 to 8.5 is typical of most natural watercourses, and this pH range is required for the survival of aquatic organisms. Should the pH rise or drop out of this range, fish and other aquatic organisms may become stressed and may die. When pH levels in stormwater rise above 8.5, they must be lowered to the acceptable range of 6.5 to 8.5 through pH neutralization.

High pH levels at construction sites are most commonly caused by the contact of stormwater with poured or recycled concrete, cement, mortars, and other Portland cement or lime containing construction materials. (Section 3.1.10.1 of BMP C151 discusses concrete handling.) The principal caustic agent in cement is calcium hydroxide (free lime).Stormwater with pH levels exceeding water quality standards may be treated by infiltration, dispersion in vegetation or compost, pumping to a sanitary sewer, disposal at a permitted concrete batch plant with pH neutralization capabilities, or carbon dioxide sparging. Additional Ecology guidelines regarding carbon dioxide sparging are discussed in BMP C252 included in Appendix J and an alternative BMP.

3.1.11 Element 10: Control Dewatering

BMPs may be required to control dewatering. If that is the case, the BMPs that may be implemented include

- Construction Stormwater Chemical Filtration (C250)
- Construction Stormwater Filtration (C251)
- Weir Tanks (Custom BMP)

Table 25. Areas Requiring Dewatering Control BMPs

Area	Construction Stormwater Chemical Filtration	Construction Stormwater Filtration	Weir Tanks
200 – Unloading & Office	Required	Required	Required
300 – Storage	Required	Required	Required
400 – Marine Terminal	Required	Required	Required
500 – Transfer Pipelines	-	-	-
600 – West Boiler	-	-	-
Rail Improvements	-	-	-

Pollutant loadings for dewatering are assumed to be consistent with the runoff assumptions used in Sections 3.1.5 and 3.1.10. For construction excavations and dewatering within the environmental restrictive covenant areas, dewatering and groundwater will need to be stored in separate systems.

Stormwater or groundwater removed from these excavations would be pumped into a separate system of storage tanks. When full, the tanks would be tested for water quality, and if the water quality meets the surface water quality limits, the stormwater would be released into the construction stormwater system. If any pollutant limits exceed the surface water quality limits, the water would discharged into the City's sanitary sewer or be removed from the site by a licensed disposal company. Detailed discussion of soil and groundwater contaminates of concern, including MTCA, EPA, and Port Acceptance criteria, are described in detail in the CMMP as submitted under separate cover.

Dewatering and groundwater from Area 200 and the portion of Area 500 within the Environmental Restrictive Covenant Areas will need to be tested for the following pollutants of concern to determine appropriate disposal methods for work near each of the following Deed Restrictive Areas.

Table 26. Summary of the Deed Restricted Areas at the Proposed Project Site

Area (see Fig 6)	Summary	Contaminants of Concern[4]		Regulatory or Cleanup Status
		Soil	Groundwater	
Ecology/ALCOA Consent Decree 95-2-03268-4				
Vanexco Cap	PCB impacted soil removal occurred in 1992. Groundwater monitoring from 1996 through 2001 indicated that groundwater is not affected by residual PCB impacted soils. The building foundations and floor slabs were left in place to form a cap over the contaminated soils as required by the Consent Decree. Approximately 4 feet of surface material was placed above the foundation and is sloped to provide drainage away from the area or the foundation is replaced with an impervious layer and stormwater control facilities are located above the layer.	PCBs – (concentrations up to 2,000 ppm left in soil and 16,000 ppm in concrete pit chip samples left in place after EPA approval in 1992) and hydraulic oil (greater than 2,000 ppm. 9 feet below the ground surface	No COCs detected (depth ranges from approximately 15 feet to 25 feet bgs)	Vanexco Cap

[4] Anchor Environmental LLC, 2008. "ALCOA/Evergreen Vancouver Site RI/FS"

Area (see Fig 6)	Summary	Contaminants of Concern[4]		Regulatory or Cleanup Status
		Soil	Groundwater	
Ecology/ALCOA Consent Decree 92-2-00783-9				
Spent Pot Liner (SPL) Cap	A former EPA NPL site; 47,500 cubic yards of spent pot liner and reclaimed alumina insulation were removed in 1992. The residual affected soils were capped with a high-density polyethylene (HDPE) cover. In 2010 the Port of Vancouver placed a specially engineered double layered asphalt cap over the HDPE cover.	Cyanide (concentrations up to 491 mg/kg) and fluoride (concentrations up to 2,500 mg/kg) Potentially extending from the HDPE cover to approximately 15 feet bgs, the vertical point of compliance defined in the Final 2008 Corrective Action Plan	Fluoride (concentrations up to 27,500 ug/l)	Spent Pot Liner (SPL) Cap
Ecology/Evergreen Enforcement Order 4931				
Ingot Cap	Approximately 14,000 tons of brick, concrete, and soil were removed and the area was covered with 1 foot of soil. Subsequently the Port has placed additional material over the capped area to raise the site grade.	PCBs at concentrations less than 10 mg/kg are estimated to be present from 1 foot bgs to the depth of the groundwater surface, between approximately 15 and 25 feet bgs	None detected	Ingot Cap
Ecology/ALCOA Agreed Orders DE90-I053 and DE03 TCPIS-5737				
North/North 2 Landfill	In 2004 approximately 38,000 cubic yards of contaminated soil at the North/North 2 Landfill site was removed and the area was covered with 1 foot of sand.	Concentrations likely present up to the following industrial MTCA site soil clean levels: PCBs (up to 10 mg/kg),PAHs (20 mg/kg), VOCs (up to 0.03 mg/kg trichloroethylene [TCE]) (estimated to be present from 1 foot bgs down to at least groundwater level)	VOCs [vinyl chloride at 3.3 micrograms per liter (ug/l)], PAHs [benzo(a)-pyrene up to 0.30 ug/l] and PCBs (up to 2 ug/l) Groundwater level is estimated at 15 to 25 feet bgs.	North/North 2 Landfill

Area (see Fig 6)	Summary	Contaminants of Concern[4]		Regulatory or Cleanup Status
		Soil	Groundwater	
Ecology/ALCOA Consent Decree 09-2-00247-2				
East Landfill	Contaminated material from the South Bank and North/North 2 landfills were placed into the East Landfill in 2003. A multi-layer impermeable cap consisting of a geosynthetic liner and a clay layer covered with HDPE, a synthetic drainage net, a 19-inch layer of compacted fill soil, a 6-inch layer of soil and vegetation was placed over the East Landfill in 2004. The shoreline adjacent to the East Landfill was armored to provide long-term stability of the riverbank and engineered cap.	Lead, cyanide, fluoride, PCBs (concentrations exceeding 10 mg/kg), petroleum hydrocarbons, VOCs (concentrations potentially exceeding 0.03 mg/kg for TCE) and PAHs (concentrations potentially exceeding 20 mg/kg) (estimated present in soil below approximately 2 feet bgs)	VOCs: (TCE, vinyl chloride) (TCE concentrations up to 620 ug/L in the intermediate zone)	East Landfill
Ecology/ALCOA Agreed Order DE97 TCI032				
Northeast Parcel	In 1997 approximately 12,000 tons of contaminated soil were removed from the Northeast Parcel. Confirmation soil samples indicated that the site was remediated in accordance with MTCA Method A unrestricted use soil cleanup levels. The area was covered with clean fill compacted, graded for proper surface water drainage, and vegetated.	PCBs, metals, and PAHs (estimated to be present below groundwater depth at concentrations less than MTCA Method A CULs.	VOCs (vinyl chloride – 6.6 ug/l) Groundwater level is estimated at about 10 feet bgs (Hahn and Associates, 2013)	Northeast Parcel

Areas 200, 300, and 400

Dewatering from excavations within or adjacent to capped areas would be completed in accordance with provision set forth in Element 9. Excavation dewatering from all other areas would be pumped to weir tanks or construction conveyance channels or pipes. Excavation dewatering is typically sediment laydown and large sediments would be treated with weir tanks. Additional downstream filtration would consist (at a minimum) of sand filters. When necessary, chemical treatment (flocculent) would be added to verify compliance with water quality standards.

Areas 500 and 600 and Rail Improvements

Dewatering is not anticipated in these areas, therefore BMPs are not expected to be required in these facility areas. The relatively shallow depth of the proposed excavations in these areas is such that groundwater is not anticipated.

3.1.11.1 Construction Stormwater Chemical Filtration (BMP C250)

Section 3.1.5.1 above discusses construction stormwater chemical filtration.

3.1.11.2 Construction Stormwater Filtration (BMP C251)

Section 3.1.5.3 above discusses construction stormwater filtration.

3.1.11.3 Weir Tanks (Custom BMP)

Section 3.1.3.4 above discusses weir tanks.

3.1.12 Element 11: Maintain BMPs

All TESC BMPs would be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair would be conducted in accordance with the specifications of the particular BMP (attached in Appendix H). The BMPs would be monitored at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive and is temporarily stabilized, the frequency of inspection would be reduced to once every month.

All TESC BMPs would be removed within 30 days after the final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment would be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation would be permanently stabilized.

3.1.13 Element 12: Manage the Project

Erosion and sediment control BMPs for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.
- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Monitor the site thoroughly and maintain all erosion and sediment control measures.
- Schedule major earthwork during the dry season.

In addition, as this project site is located west of the crest of the Cascade Mountains, the project will be managed according to the phasing discussed in sections 3.1.13.1 through 3.1.13.5.

3.1.13.1 Sequencing of Construction

Construction is being phased to the extent practicable in order to prevent soil erosion and, to the maximum extent possible, the transport of sediment from the site during construction.

Revegetation of exposed areas and the maintenance of that vegetation will be integral to clearing activities during each phase of construction, per the scheduling BMP (C 162).

3.1.13.2 Seasonal Work Limitations

From 1 October through 30 April, clearing, grading, and other soil-disturbing activities will be permitted and wet-weather BMPs are proposed to contain and treat silt-laden runoff prior to discharge from the site. The following measures are in place to protect water quality during wet weather.

- Advanced turbidity and TSS treatment methods including weir tanks, sand filtration, and enhanced sand filtration;
- Existing site infrastructure and downstream water quality treatment located on Terminal 5, and the Marine Terminal area; and
- Proposed erosion and sediment control measures.

3.1.13.3 Coordination with Utilities and Other Jurisdictions

Project planners have coordinated with utilities, other construction projects, and the local jurisdiction in preparing this construction SWPPP and scheduling the construction work.

3.1.13.4 Inspection and Monitoring

All BMPs would be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections would be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. This person will have the necessary skills to:

- Assess the site conditions and construction activities that could impact the quality of stormwater, and
- Assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

A CESCL would be on site or on call at all times.

As stated above, whenever inspection and/or monitoring reveal that the BMPs identified in this construction SWPPP are inadequate because of the actual discharge of, or potential to discharge, a significant amount of any pollutant, the CESCL will promptly initiate the implementation of one or more of the alternate BMPs listed in Appendix J.

3.1.13.5 Maintaining an Updated Construction SWPPP

This construction SWPPP will be retained on site or will be reasonably accessible to it.

The construction SWPPP will be modified whenever there is a change in the design, construction, operation, or maintenance of the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

The construction SWPPP will be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the plan is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The plan will be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the plan will be completed within seven (7) days following the inspection.

The schedule of BMP implementation will be driven by the construction schedule. Table 27 is a sequential list of the proposed construction schedule milestones.

BMP implementation is keyed to proposed phases of the construction project, and reflects differences in BMP installations and inspections that relate to wet season construction. The project site is located west of the crest of the Cascade Mountains and the dry season therefore is considered to be from 1 May to 30 September and the wet season is considered to be from 1 October to 30 April.

Table 27. Preliminary Construction Schedule

Construction Milestone	Anticipated Milestone Date
Construction Start Date	January 4, 2016
Completion of Underground Utility Installation	May 1, 2016
Initial Site Stabilization	May 1, 2016
Commissioning of proposed stormwater system	May 1, 2016
Facility Operations Startup	June 1, 2016
Completion of Grading	July 1, 2016
Landscape Installation	July 1, 2016
Facility Tanks 1-4 Operational	February 1, 2017
Final Grading (Tanks 5-6)	February 1, 2017
Landscape Installation (Tanks 5-6)	March 1, 2017
Facility Tanks 5-6 Operational	November 1, 2017

4. Pollution Prevention Team

4.1 Roles and Responsibilities

The pollution prevention team consists of personnel responsible for implementing the construction SWPPP. They include the following persons.

- Certified Erosion and Sediment Control Lead (CESCL) – primary contractor contact, responsible for site inspections (BMPs, visual monitoring, sampling, etc.); to be called upon in case of failure of any ESC measures.
- Resident Engineer – For projects with engineered structures only (sediment ponds/traps, sand filters, etc.): site representative for the owner that is the project's supervising engineer responsible for inspections and issuing instructions and drawings to the contractor's site supervisor or representative
- Emergency Ecology Contact – individual to be contacted at Ecology in case of emergency.
- Emergency Owner Contact – individual that is the site owner or representative of the site owner to be contacted in the case of an emergency.
- Non-Emergency Ecology Contact – individual that is the site owner or representative of the site owner than can be contacted if required.
- Monitoring Personnel – personnel responsible for conducting water quality monitoring; for most sites this person is also the Certified Erosion and Sediment Control Lead[5].

4.2 Team Members

The following pollution prevention team members have been identified. The specific names and phone numbers will be provided prior to construction will be maintained current throughout Facility construction.

Table 28. Pollution Prevention Team Members

Title	Names(s)	Phone No.
Construction Project Manager and Emergency Owner Contact	TBD	(XXX) XXX-XXXX
Certified Erosion and Sediment Control Lead (CESCL)	TBD	(XXX) XXX-XXXX
Resident Engineer	TBD	(XXX) XXX-XXXX
Emergency Ecology Contact	TBD National Response Center Washington Emergency Management	(XXX) XXX-XXXX (800) 424-8802 (800) 258-5990
Non-Emergency Ecology Contact	TBD	(XXX) XXX-XXXX
Monitoring Personnel	TBD	(XXX) XXX-XXXX
Conveyance & Treatment System Operator and/or vendor	TBD	(XXX) XXX-XXXX
Contractor Project Managers	TBD	(XXX) XXX-XXXX
Equipment operators and construction personnel	TBD	(XXX) XXX-XXXX
All persons on site	TBD	(XXX) XXX-XXXX

[5] The Applicant recognizes that EFSEC may also provide an Environmental Monitor for the construction of the Facility at the Certificate Hodler's cost. Such Environmental Monitor will be added to the Pollution Prevention Team if requested by EFSEC.

5. Site Inspections and Monitoring

Monitoring includes visual inspection, monitoring for water quality parameters of concern, and documentation of the inspection and monitoring findings in a site logbook. A site logbook will be maintained for all on-site construction activities and will include records of the following.

- Implementation of the construction SWPPP and other permit requirements
- Site inspections
- Stormwater quality monitoring

For convenience, the inspection form and water quality monitoring forms included in this construction SWPPP include the required information for the site logbook. This construction SWPPP may function as the site logbook if desired, or the forms may be separated and included in a separate site logbook. However, if separated, the site logbook but must be maintained on site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

5.1 Site Inspection

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. The inspector will be a CESCL per BMP C160. The name and contact information for the CESCL is provided above in section 1.4 of this construction SWPPP.

Site inspection will occur in all areas disturbed by construction activities and at all stormwater discharge points. Stormwater will be examined for the presence of suspended sediment, turbidity, discoloration, and oily sheen. The site inspector will evaluate and document the effectiveness of the installed BMPs and determine if it is necessary to repair or replace any of the BMPs to improve the quality of stormwater discharges. All maintenance and repairs will be documented in the site logbook or forms provided in Appendix L. All new BMPs or design changes will be documented in the construction SWPPP as soon as possible.

Preliminary monitoring points are identified in Figures 3 and 4. Discharge locations may vary throughout construction and final Facility design. Updates to the construction SWPPP will be maintained in accordance with section 6.1.4.

5.1.1 Site Inspection Frequency

Site inspections will be conducted at least once a week and within 24 hours following any discharge from the site. For sites with temporary stabilization measures, the frequency of inspection can be reduced to once every month.

5.1.2 Site Inspection Documentation

The site inspector will record each site inspection using the site log inspection forms provided in Appendix L. The site inspection log forms may be separated from this construction SWPPP document, but will be maintained on site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

5.2 Stormwater Quality Monitoring

5.2.1 Turbidity

Turbidity sampling and monitoring will be conducted during the entire construction phase of the project. Samples will be collected daily at each monitoring point identified. If there is no flow at any location the attempt to sample will be recorded in the site logbook and reported to Ecology in the monthly discharge

monitoring report (DMR) as “No Discharge.” Samples will be analyzed for turbidity using the EPA 180.1 analytical method.

The key benchmark turbidity value is 25 nephelometric turbidity units (NTU) for the downstream receiving water body. If the 25 NTU benchmark is exceeded in any sample collected, the following steps will be conducted.

1. Verify all BMPs specified in this construction SWPPP are installed and functioning as intended.
2. Assess whether additional BMPs should be implemented, and document modified BMPs in the construction SWPPP as necessary.
3. Sample discharge daily until the discharge is 25 NTU or lower.

If the turbidity exceeds 25 NTU at any time, the following steps will be conducted:

1. Notify Ecology by phone within 24 hours of analysis (see section 1.4 for contact information).
2. Continue sampling daily until the discharge is 25 NTU or lower.
3. Initiate additional treatment BMPs such as off-site treatment, infiltration, filtration and chemical treatment within 24 hours, and implement those additional treatment BMPs as soon as possible, but within a maximum of 7 days.
4. Describe inspection results and remedial actions taken in the site logbook and in monthly DMRs as described in section 6.2.1.

5.2.2 pH

Sampling and monitoring for pH will occur during the phase of construction when concrete pouring will be conducted until fully cured (3 weeks from last pour) and discharges are documented to be below pH 8.5. Samples will be collected weekly at the sedimentation pond prior to discharge to surface water. Samples will be analyzed for pH using a calibrated pH meter and recorded in the site logbook.

The key benchmark pH value for stormwater is a maximum of 8.5. If a pH greater than 8.5 is measured in the sedimentation trap/pond(s) that has the potential to discharge to surface water, the following steps will be conducted:

1. Prevent (detain) all discharges from leaving the site and entering surface waters or storm drains if the pH is greater than 8.5
2. Implement CO_2 sparging or dry ice treatment in accordance with Ecology BMP C252.
3. Describe inspection results and remedial actions that are taken in the site logbook and in monthly discharge monitoring reports as described in section 6 of this construction SWPPP.

5.2.3 Contaminates of Concern

A CMMP has been prepared under separate cover to address contaminates of concern in areas of the site near existing landfill areas, caps, and addresses groundwater restrictive covenant on Terminal 5. Detailed testing methodologies and regulatory limits for these contaminates are provided in that report.

6. Reporting and Recordkeeping

6.1 Recordkeeping

6.1.1 Site Logbook

A site logbook will be maintained for all on-site construction activities and will include records of the following.

- Implementation of the construction SWPPP and other permit requirements
- Site inspections
- Stormwater quality monitoring

For convenience, the inspection form and water quality monitoring forms included in this construction SWPPP include the information that is required for the site logbook.

6.1.2 Records Retention

Records of all monitoring information (site logbook, inspection reports/checklists, etc.), this construction SWPPP, and any other documentation of compliance with permit requirements, will be retained during the life of the construction project and for a minimum of three years following the termination of permit coverage in accordance with anticipated permit conditions similar to Industrial Stormwater General Permit condition S5.C.

6.1.3 Access to Plans and Records

The construction SWPPP, Construction Stormwater Permit No. TBD, and site logbook will be retained on site, or within reasonable access to the site, and will be made immediately available upon request to Ecology or the local jurisdiction. A copy of this plan will be provided to Ecology within 14 days of receipt of a written request for it from Ecology. Any other information requested by Ecology will be submitted within a reasonable time. A copy of the construction SWPPP, or access to it, will be provided to the public when requested in writing in accordance with anticipated permit conditions similar to Industrial Stormwater General Permit condition S5.G.

6.1.4 Updating the Construction SWPPP

In accordance with anticipated permit conditions similar to Industrial Stormwater General Permit conditions S3, S4.B, and S9.B.3 of the General Permit, this construction SWPPP will be modified if it is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site or if there has been a change in design, construction, operation, or maintenance at the site that has a significant effect on the discharge, or potential for discharge, of pollutants to the waters of the state. The construction SWPPP will be modified within seven days of determination based on inspection(s) that additional or modified BMPs are necessary to correct problems identified, and an updated timeline for BMP implementation will be prepared.

6.2 Reporting

6.2.1 Discharge Monitoring Reports

DMRs will be submitted to Ecology electronically. If there was no discharge during a given monitoring period, the Permittee will submit the form as required, with the words “no discharge” entered in the place of monitoring results. The due date of the DMR is 15 days following the end of each month.

6.2.2 Notification and Noncompliance

If any of the terms and conditions of the permit are not met causing a threat to human health or the environment, the following steps will be taken in accordance with anticipated permit conditions similar to Industrial Stormwater General Permit section S5.F.

1. Ecology will be immediately notified of the failure to comply.
2. Immediate action will be taken to control the noncompliance issue and to correct the problem. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five days, unless requested earlier by Ecology.

Any time turbidity sampling indicates turbidity is 25 nephelometric turbidity units (NTU) or greater, Ecology’s regional office will be notified by phone within 24 hours of analysis as required by anticipated

permit conditions similar to Industrial Stormwater General Permit t condition S5.A (see section 1.4 above for contact information).

In accordance with anticipated permit conditions similar to Industrial Stormwater General Permit condition S4.F.6.b, Ecology's regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water (see section 0 above for contact information).

7. List of Acronyms and Abbreviations

Applicant: Tesoro Savage Petroleum Terminal LLC

AST: aboveground storage tank

bbl: barrel and barrels

BFE: Base Flood Elevation

bgs: belowground surface

BMPs: best management practices

bpd: barrels per day

BTEX: benzene, toluene, ethylbenzene, and xylenes

CESCL: Certified Erosion and Sediment Control Lead

CFR: Code of Federal Regulations

cfs: cubic feet per second

City: City of Vancouver

CMMP: contaminated media management plan

COCs: contaminants of concern

CRD: Columbia River Datum

DMR: discharge monitoring report

Ecology: Washington State Department of Ecology

EFSEC: Energy Facility Site Evaluation Council

EPA: U.S. Environmental Protection Agency

Facility: Vancouver Energy Terminal

FEMA: Federal Emergency Management Agency

FIRMs: Flood Insurance Rate Maps

GMA: Growth Management Act

gpm: gallons per minute

GRI: Geotechnical Resources, Inc.

HAZWOPER: hazardous waste operations and emergency response

HDPE: high-density polyethylene

MTCA: Model Toxics Control Act

NAVD: North American Vertical Datum

NEPA: National Environmental Policy Act

NGVD: National Geodetic Vertical Datum

NPDES: National Pollutant Discharge Elimination System

NTU: nephelometric turbidity unit

PAHs: polynuclear aromatic hydrocarbons

PBDE: polybrominated diphenyl ether

PCBs: polychlorinated biphenyls

Port: Port of Vancouver USA

PPE: personal protection equipment

RCW: Revised Code of Washington

RM 103.5: River Mile 103.5

SEPA: State Environmental Policy Act

SMMWW: Stormwater Management Manual for Western Washington

SWPPP: stormwater pollution prevention plan

SPL: spent pot liner

SR 501: State Route 501

TAP: toxic air pollutant

TCE: trichloroethylene

TESC: temporary erosion and sediment control

TSS: total suspended solids

USGS: U.S. Geological Survey

VOC: volatile organic compound

WAC: Washington Administrative Code

WDFW: Washington State Department of Fish and Wildlife

WVFA: West Vancouver Freight Access

WWHM: Western Washington Hydrology Model

Appendix A
Site Plan

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PLAN
1"=250'

N

PRELIMINARY
FOR INTERNAL DISCUSSION ONLY
DO NOT USE FOR CONSTRUCTION

NOTE:
1. THERE ARE NO OPEN SPACES AND/OR RECREATION AREAS.

NO.	DATE	REVISION	BY	CK'D	APP

R&M ENGINEERING CONSULTANTS
SALT LAKE CITY, UTAH
(801)263-3419
13014

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: OVERALL SITE PLAN

DESIGN:	START DATE: 05-06-13	SCALE:	1"=250'
DRAWN: JBH	PRINT DATE: 02-26-15	PROJECT MANAGER:	DC
CHECKED:	APPROVED:	SIAAE:	24x36
DRAWING NUMBER		SHEET	REV.
0100-SP-001		1/1	

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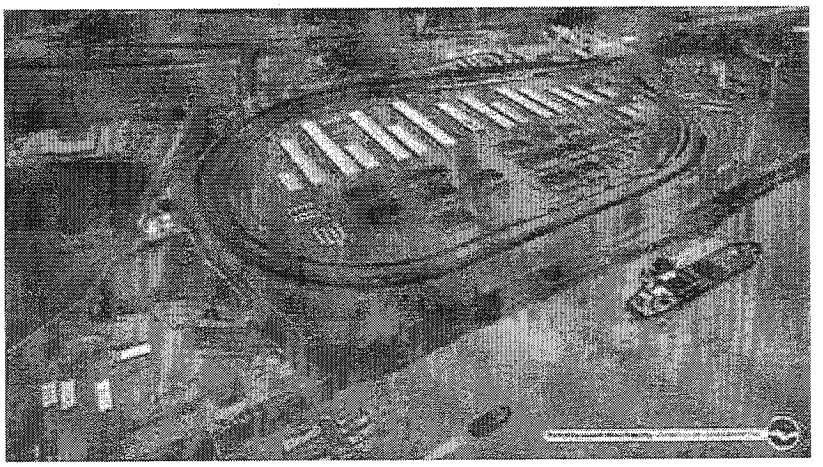
Appendix B
Existing Drainage Reports

West Vancouver Freight Access

Terminal 5 Expansion (4000A and SPL)

Final Hydrologic and Hydraulic Analysis Report

Case Number ENG2012-00016
Project PRJ2012-00414



Revision 1: May 3rd, 2012

PORT OF VANCOUVER U.S.A.

Prepared by:
HDR Engineering, Inc.
1001 SW Fifth Ave, Suite 1800, Portland, Oregon 97204

HDR

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1.0 PROJECT OVERVIEW 2

1.1 Site Description 2

1.2 Existing Conditions 2

1.3 Proposed Design 2

1.3.1 Full Build-Out 3

1.3.2 Phases of the T5 Expansion: 4000A and SPL 3

1.4 Conveyance System Analysis and Design 4

1.5 Drainage to and from Adjacent Properties 5

1.6 Downstream Boundary Condition 5

2.0 CONVEYANCE SYSTEM MODELING 5

2.1 Model Development 5

2.2 Pipe Capacity 6

LIST OF APPENDICES

Appendix A. Project Figures

Figure 1. Vicinity Map

Figure 2. USGS Map

Figure 3. NRCS Soils Map

Figure 4. Port of Vancouver Terminal 5 Vicinity Floodplain Map

Figure 5. 25-Year and 100-Year 24-Hour Isopluvials

Figure 6. Existing Stormwater System

Figure 7. T5 Expansion Proposed Stormwater System

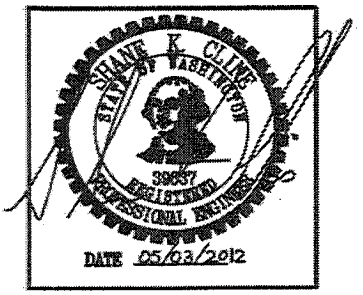
Figure 8. 4000A and SPL Pipe Alignments

Figure 9. Basin Map for Terminal 5

Appendix B. Hydrology Calculations

Appendix C. Hydraulic Calculations

Figure C1. Hydrograph Showing 100 Year Flow Rate Through Outfall Pipe to the Columbia River



EXECUTIVE SUMMARY

This report provides the stormwater system design and hydrologic and hydraulic analysis information for the Terminal 5 (T5) Expansion, part of the West Vancouver Freight Access (WVFA) Project (Project) located at the Port of Vancouver (Port), Washington.

The Project will expand the capacity of the rail system in order to reduce track congestion. Currently, stormwater runoff either infiltrates directly into the ground or is collected by an existing stormwater system and treated at the T5 lagoons. Quantity treatment or detention of stormwater will not be required on the Project because all stormwater at the Port is discharged to the Columbia River, which is an exempt water body with respect to quantity treatment.

The T5 Expansion will relocate existing tracks and construct a new perimeter access road around the outside of the track loop. Several crossings will be constructed to allow vehicular access to the inside of the track loop. New lighting and electrical conduit will be installed and multiple casings will be placed under the shifted tracks. A new tenant, Broken Hill Proprietary Billiton (BHPB), will be performing extensive site improvements at T5 beginning in the summer of 2012. These site improvements will include construction of a potash storage and transfer facility, rail dumper pit, and a ship loading facility. The stormwater design for T5 is intended to prepare the terminal for the construction associated with these site improvements.

The T5 Expansion will be constructed in phases to facilitate coordination with other projects on the site and reduce the impact of construction issues associated with groundwater. The 4000A project is the first phase of the T5 Expansion during which a portion of the complete stormwater system will be completed. The remainder of the stormwater system will be constructed during the next phase called the SPL Project. The second phase includes addition of a pump station and wet well, which will pump the water quality flow rate to the T5 lagoons. The stormwater system will not be operational during the end of the 4000A project (when the existing system is decommissioned) and during the beginning of the SPL Project (when the new stormwater system is completed).

HDR's stormwater design for the Project includes re-routing of the existing stormwater system so that the pipes do not cross the new tenant's lease area, additional stormwater infrastructure associated with roadway improvements, and a connection from BHPB's lease area to discharge treated stormwater to the existing outfall. The existing outfall will be used to discharge overflows from other portions of T5, as well as the BHPB's treated runoff, to the Columbia River. The SPL Project includes a rehabilitation of this existing outfall using a cured-in-place pipe lining method.

1.0 PROJECT OVERVIEW

1.1 Site Description

The Port's WVFA project will construct approximately 3.2 miles of new rail line to expand its rail capacity within the existing facility and relieve track congestion. Overall, the goals of the WVFA project are:

- Expand the Port rail capacity and operations within the existing Port facility;
- Relieve congestion and ensure continued safe operations as rail traffic expands in the Port and along the existing north-south and west-east main lines; and
- Minimize disruption to existing Port tenants and businesses while enhancing the rail system for future growth.

The Project site starts approximately 1,200 feet east of the Columbia River Rail Bridge, extends approximately 3.2 miles west, and ends just before the intersection of N.W. Old Lower River Road. Figures 1 and 2 provide the project location. The Port has filled the floodplain with dredge spoils which are the top layer of soils for much of the project area.

This report evaluates impacts to stormwater drainage resulting from the 4000A and SPL Projects of the T5 Expansion, associated with the full build-out of T5.

1.2 Existing Conditions

T5 currently consists of a track loop which was recently cleared to provide a graded surface for windmill turbine parts storage. The graded area is mostly compacted gravel with minimal paved roadways, several environmental caps, and a stormwater catchment and conveyance system composed of both recently constructed and older components. A trunkline collecting all of the flow conveys runoff to an existing pump station which operates as a temporary solution at this time. No power is currently routed to the existing pumps, so a generator is parked adjacent to the pump station. This generator must be manually activated to power the pumps so that water can be routed to the T5 lagoons west of the track loop.

Overflows are routed to a diversion box that spills into the outfall to the Columbia River. This system as a whole, including the T5 lagoons, was designed to drain and treat the terminal in its past condition, which included significantly more impervious pavement and roofing. Since most of the Terminal is now surfaced with gravel, the pumps are rarely activated. Figure 6 shows the layout of the existing system.

The T5 Lagoons were designed to treat industrial process water and stormwater for Terminal 5. The total area draining to the lagoons was over 130 acres when the site was used for aluminum industry related purposes.

1.3 Proposed Design

The Project includes relocation of existing tracks, construction of a new perimeter access road around the outside of the track loop and several crossings for vehicular access to the inside of the track loop, and installation of several utilities. The Port's new tenant, BHPB, will be performing extensive site improvements including construction of a

potash storage and transfer facility, rail dumper pit, and a ship loading facility. The stormwater design for T5 is intended to provide drainage for the future build-out of T5.

The proposed stormwater system needs to satisfy the City of Vancouver's stormwater management requirements, which are based on the Department of Ecology's 2005 Stormwater Management Manual for Western Washington (SMMWW) for design of water quality treatment facilities. These requirements include the need to treat runoff from new pollutant generating impervious surfaces (PGIS) to a "basic treatment" level. Detention is generally also a consideration, but due to the Project's proximity to the Columbia River, detention is not required. Since detention is not necessary, the Soil Conservation Service Unit Hydrograph Method was used for hydrology calculations. Standards, codes, and guidelines for conveyance are as per The City of Vancouver Engineering Services General Requirements and Details 2009 (GRD) and the American Railway Engineer and Maintenance-of-Way Association Manual for Railway Engineering 2007 (AREMA).

1.3.1 Full Build-Out

The proposed fully built-out system replaces any stormwater infrastructure that lies within the future BHPB lease and routes the trunkline around this property. Additional stormwater inlets are placed along a new perimeter access road that encircles much of the track loop. The trunkline structures are mostly WSDOT Manhole Type III with a few WDSOT Catch Basin Type II structures. WSDOT Catch Basin Type I structures are used for the lateral inlets. The pipe network consists of mostly corrugated polyethylene stormwater sewer pipes (CPSSP) with ductile iron sewer pipes and reinforced concrete pipes at a few locations. The stormwater system drains to a new wet well and pump station location outside of the track loop at the southwest portion of the Terminal. A 30-inch force main will connect the proposed pump station to the T5 lagoons.

1.3.2 Phases of the T5 Expansion: 4000A and SPL

The construction of the stormwater system needs to be completed in phases due to constructability constraints. Stone columns will be installed as part of another project at T5. This stone column work is expected to cause settlement which could damage any infrastructure nearby. Hence, these stone columns must be in place before subsurface infrastructure can be placed in their vicinity. In addition, high groundwater and the degree of contamination of the groundwater will increase the cost and duration of any construction that requires excavation. In consideration of these constraints, the stormwater conveyance system for the Project will be constructed in two phases: the 4000A Project and the SPL Project.

The proposed stormwater system has been divided into seven alignments (Alignments A through G). The 4000A Project will include construction of Alignments A, B, C, and D (See Figure 7). Alignment A drains the T5 perimeter access driveway from the intersection with Old Lower River Road to the proposed pump station. Alignment B drains a portion of the T5 perimeter access driveway to the east and a portion of T5 inside the track loop. Alignment D provides the connection to the BHPB stormwater system (which has its own, separate, water quality treatment facility) and allows it to drain directly to the existing outfall. Alignment C is a single pipe connecting the inside of the track loop to Alignment A. The components constructed in the 4000A project are discontinuous and will not be operational until the remainder of the stormwater system is completed in the next phase. The existing stormwater system will remain operational as long as is reasonably possible considering construction logistics. In addition, the Port is

prepared to pump and treat water from the non-operational system as needed while there is no connection to the T5 lagoons or the existing outfall.

The SPL Project is the second phase which will include construction of the remaining portions of the stormwater conveyance system including Alignments E, F, and G and the proposed wet well and pump station connecting the system to the T5 lagoons (see Figure 7). Alignments E and F drain portions of the T5 perimeter access driveway. Alignment G, which forms a connection between Alignments B and C, drains a portion of T5 inside the track loop. The SPL contractor will be responsible for pumping and treating water in the non-operational system as soon as they are mobilized. This contractor will also be required to complete construction of the operational stormwater system by September 30th, 2012.

The existing outfall will remain in service with the new upstream connection as part of the 4000A and SPL Projects. The outfall will be rehabilitated as part of the SPL Project. This work will include removal of a portion of the outfall pipe that extends into the Columbia River, and a new liner in the outfall pipe that will improve structural integrity while maintaining adequate conveyance capacity.

1.4 Conveyance System Analysis and Design

The Port's new tenant, BHPB, will treat their own stormwater and discharge the flows to the existing outfall through a connection to the proposed stormwater system. This accounts for approximately 40 acres of drainage area. While some additional area on the perimeter of T5 will drain to the T5 lagoons through the proposed pump station, the total contributing drainage area from T5 to the lagoons will be reduced from over 130 acres in the existing scenario to approximately 91 acres. BHPB has estimated the peak flow rate for their property to be 24 cubic feet per second (cfs) for the 25-year storm event and 30 cfs for the 100-year storm event; the downstream stormwater system has been designed with consideration of this input.

This pump station is designed to pump the water quality flow rate to the T5 lagoons. The water quality flow rate has been calculated to be 9 cfs based on the drainage area of 91 acres using MGS Flood and assumes fully impervious, fully built-out conditions (see Appendix B). The complete T5 Expansion proposed stormwater system is shown in Figure 6.

Due to the long runs of pipe and the desire to keep portions of the system elevated as high as possible (such as the pump station wet well), the system has been designed *without* the usual 0.2-foot drop per structure. Backflow prevention valves are proposed in structures just downstream of the overflow structure and where the connection is made to the BHPB storm line. These valves will be elastomer duckbill-type valves that will help reduce flooding inside the track loop during extremely high flows in the Columbia River. Due to the possibility of high groundwater and a relatively empty stormwater system because of the backflow prevention valves, all manholes and catch basin type II structures have been designed with counter buoyancy bases.

All the alignments except Alignment D (connection between the BHPB drainage system and the existing outfall) will drain to the proposed pump station which is designed to pump out the water quality flow. The pipes between the existing outfall pipe and the proposed pump station are designed to flow full before the outfall is utilized. In the event that the inflow rate of stormwater runoff into the system exceeds the pump station

pumping rate, flow in the pipeline between the pump station and the outfall will back up and discharge to the outfall while the pump station continues to pump the water quality flow rate. This allows the use of a portion of the pipe system as additional storage beyond the wet well. This reduces the number of required pump operation cycles and precludes the need for an additional storm line from the proposed pump station to the existing outfall.

1.5 Drainage to and from Adjacent Properties

The Port's facility and adjacent properties are mostly built-out and already have stormwater infrastructure installed. Offsite drainage improvements have been developed by tenants as separate projects; therefore, no offsite contributions of surface runoff are anticipated for the projects discussed here.

1.6 Downstream Boundary Condition

The two downstream boundary elements of the T5 stormwater conveyance system are the existing 36-inch outfall pipe discharging into the Columbia River and the proposed 30-inch force main between the new pump station and the T5 lagoons. The hydraulic capacity of the existing outfall pipe has been conservatively estimated to be at least 120 cfs which exceeds the maximum anticipated flow rate. The proposed pump station has been designed to pump the water quality flow rate through the 30-inch force main to the T5 lagoons.

2.0 Conveyance System Modeling

2.1 Model Development

A hydrologic and hydraulic model was developed using Bentley CivilStorm V8i to determine peak flow rates and size the conveyance system for the full build-out of the T5 Expansion. This model considers existing infrastructure that will remain in place and future infrastructure that is anticipated as part of the complete T5 Expansion project, as well as other future infrastructure that is not part of the T5 Expansion but will contribute to total runoff from the system. The model also assumes that all areas except track alignments are paved with impervious asphalt.

Civilstorm successively runs the hydrologic and hydraulic analysis. Rainfall depths for the 25-year, 24-hour and 100-year, 24-hour storm events were obtained from isopluvials for the state of Washington from the National Oceanic and Atmospheric Administration (NOAA) Atlas 2 (See Figure 2). The SCS Type-1 rainfall distribution was used for the project location. The Soil Conservation Service (SCS) Unit Hydrograph was used for the hydrology calculations. Curve numbers for the catchments were estimated using the data provided in Table 2.2 of the 2005 SMMWW Volume III; all curve numbers are 98 assuming full build out and paving for the entire terminal except on areas occupied by railroad tracks. Appendix B provides the curve number information and hydrologic modeling results for the T5 Expansion stormwater system. All times of concentration were assumed to be five minutes with the exception of two basins that have longer than typical flowpath lengths and the basin which will be occupied by the mining company. The time of concentration for this basin is adjusted such that the modeled peak flow rate matches the peak flow rate estimated by others and provided to HDR. Table B1 only

shows basin results for basins that drain to new structures and pipes constructed as part of the Terminal 5 Expansion project. Other basins shown in Figure 9 drain to existing or proposed structures and pipes.

2.2 Pipe Capacity

The 25-year storm event was used to determine if each pipe has sufficient capacity and the 100-year storm event was used to check for surcharging of structures. The modeling results presented in this report represent fully built-out conditions of the proposed stormwater conveyance system in T5 (See Appendix C).

Velocities in some of the pipes in the system may not meet flushing velocity requirements per the City of Vancouver's requirements, but the Port has been made aware of this and is prepared to increase maintenance activities as required. Due to modeling limitations in CivilStorm, the pump station has not been included in the model. This approach is conservative, as the pump station would in reality be pumping a constant 9 cfs out of the stormwater system before the flows back up in the pipe system and discharge to the existing outfall. In some cases, modeling results show that the existing pipes do not have sufficient capacity. This could be attributed to conservatism in the model or, in other cases, limitations of the model in representing the pipe systems accurately. In particular, some of the existing pipes are perforated pipes installed at a very shallow slope, and are designed to flow full. Since the model does not accommodate perforated pipes, they have been modeled as solid pipes with an inlet upstream. The lack of capacity shown in the model results is not due to insufficient downstream conveyance capacity. These pipes are designed by others and already exist at Terminal 5.

Figure C1 shows the hydrograph for the 100 year event through the outfall pipe to the Columbia River. The peak flow rate is 94 cfs. Note that this is assuming that the pump station is not in operation since the model does not account for the water quality flow rate being pumped to the T5 Lagoons. The final outfall pipe maximum capacity depends on the methods used to reline the pipe in the future. The current capacity of the pipe is estimated to be approximately 114 cfs. The pipe will be relined in the SPL Project. With a smoother interior but reduced diameter, the future maximum capacity of the pipe is estimated to be 120 cfs.

In conclusion, the modeling results indicate that the stormwater system design functions as intended to accommodate the 25- and 100-year storm events using conservative modeling techniques.

APPENDIX A

Project Figures

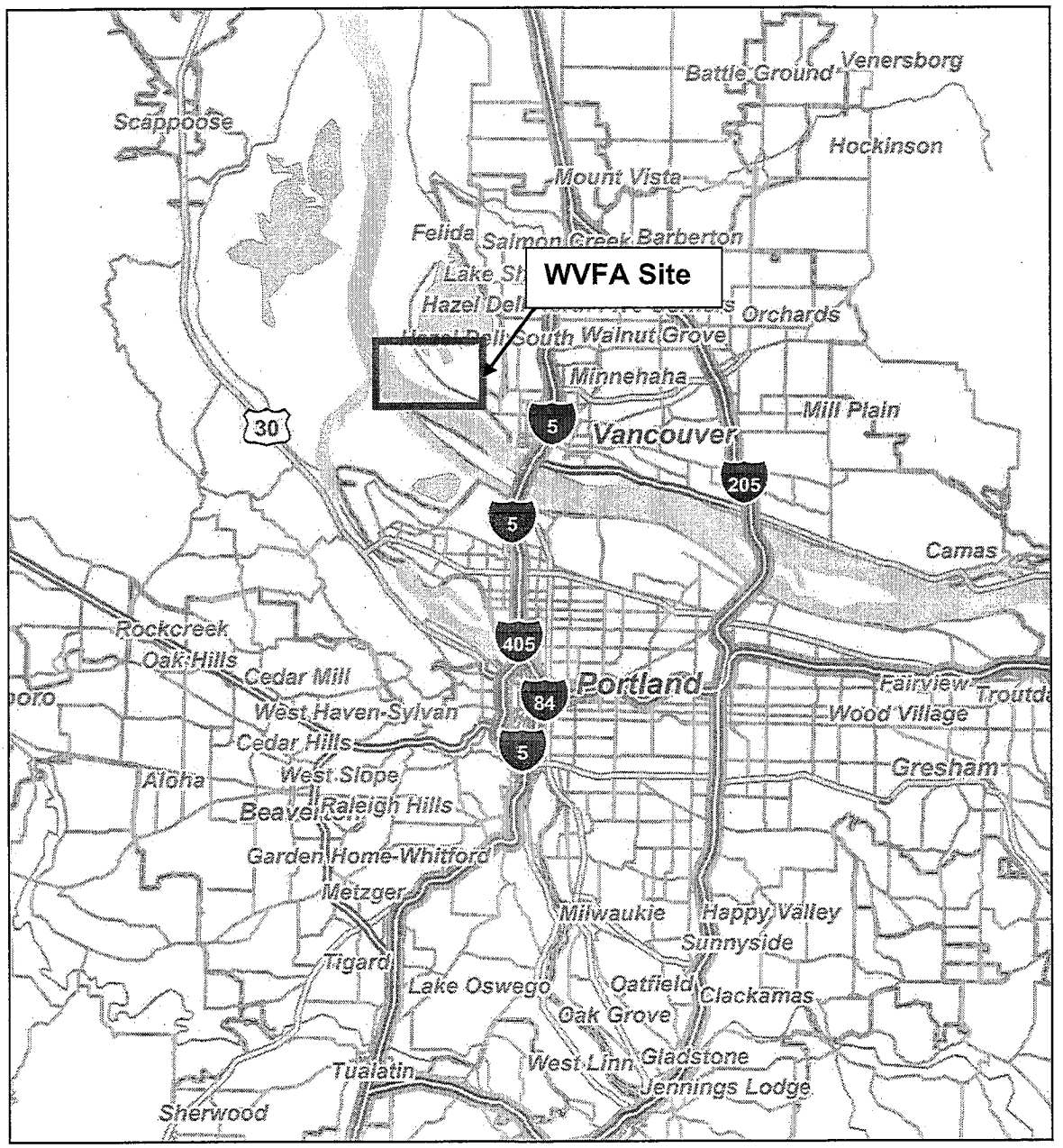
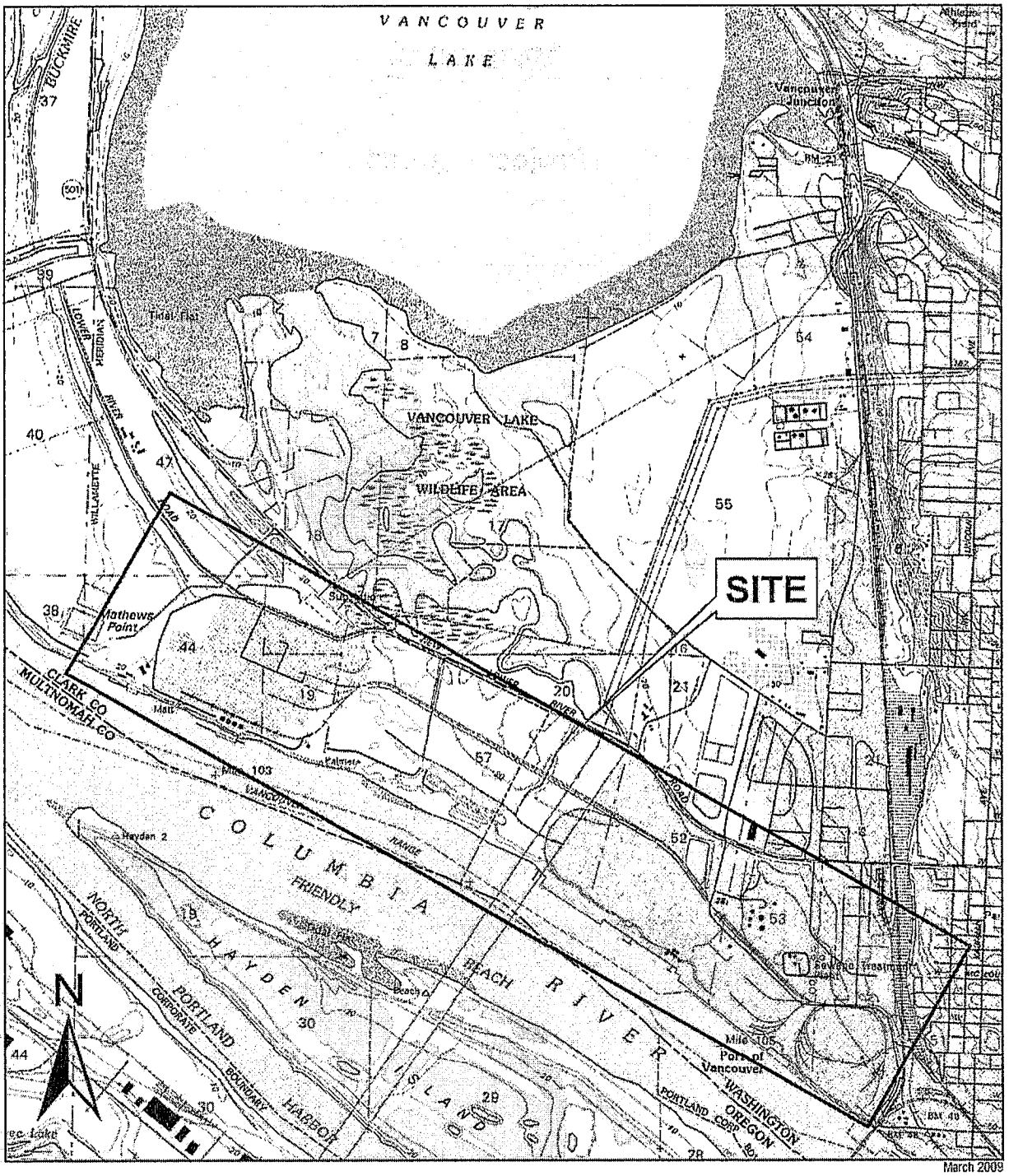


Figure 1. Vicinity Map



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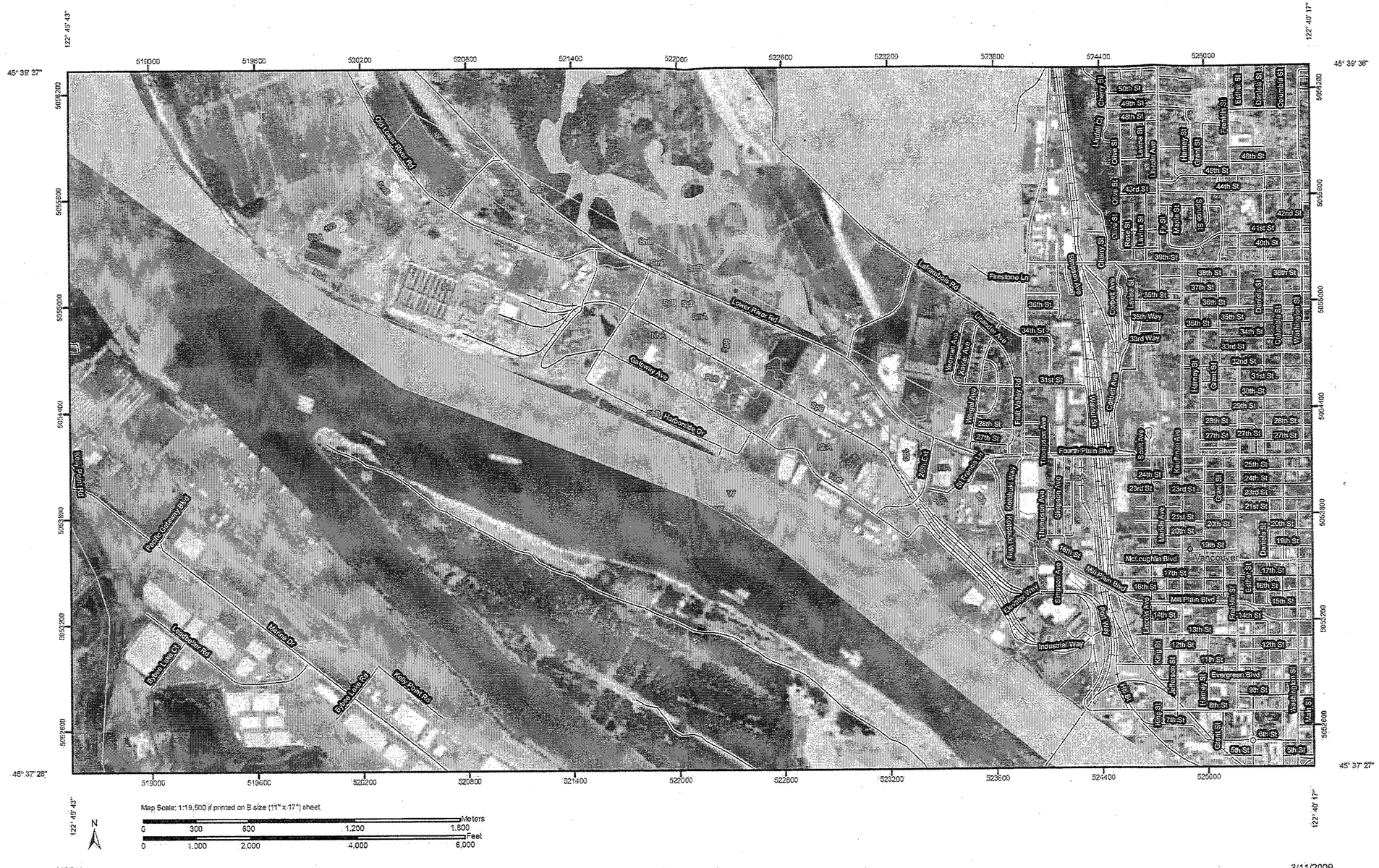
SOURCE: USGS VANCOUVER, WA
TOPOGRAPHIC QUADRANGLE

Port of Vancouver | Freight Access

Figure 2. USGS Map



USDA Natural Resources Conservation Service

Web Soil Survey 2.1
National Cooperative Soil Survey

3/11/2009

Figure 3. NRCS Soils Map

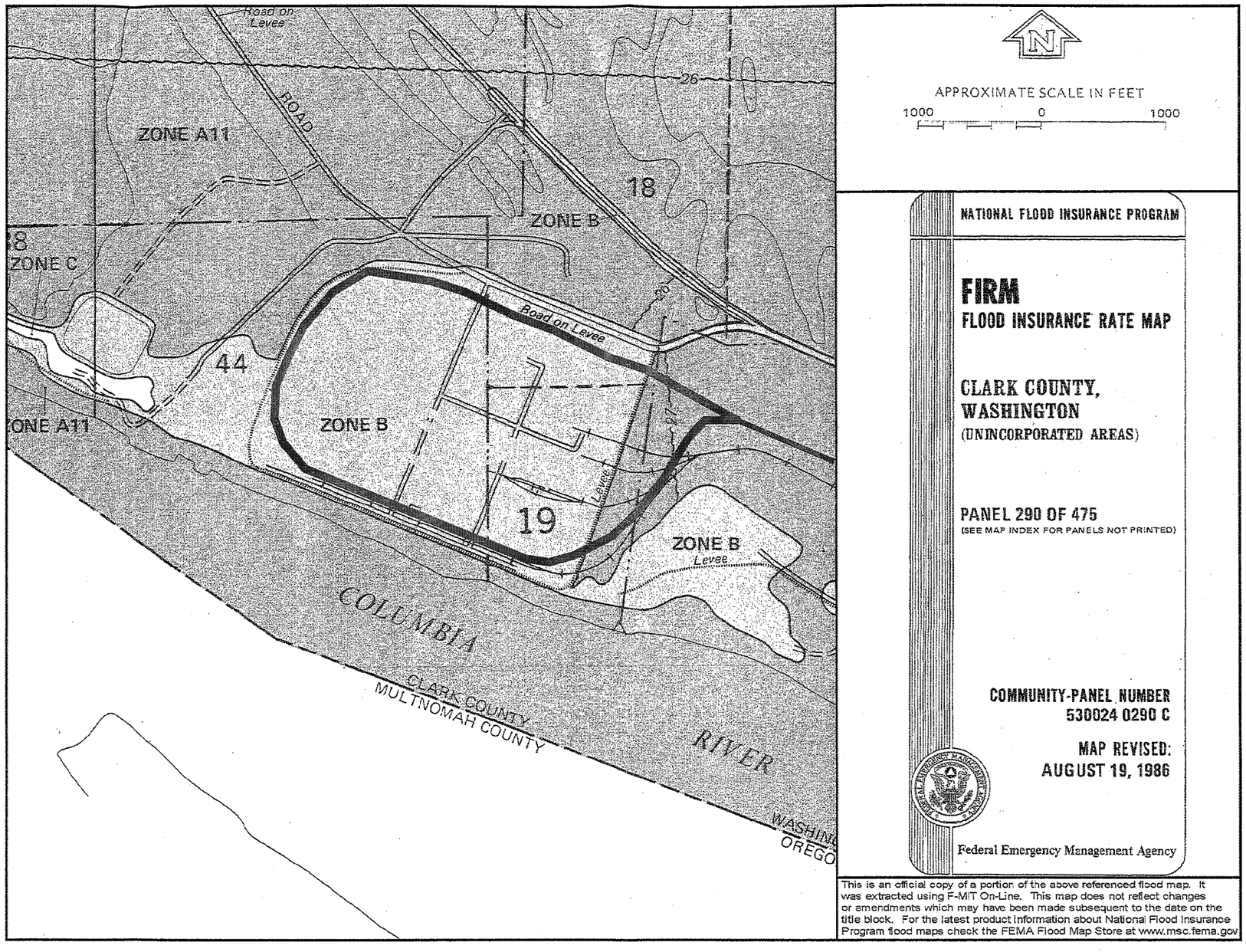


Figure 4. Port of Vancouver Terminal 5 Vicinity Floodplain Map

Key for NRCS soils map:

Clark County, Washington (WA011)	
Map Unit Symbol	**Map Unit Name**
193	Miscellaneous water
Fn	Fill land
HlA	Hillsboro silt loam, 0 to 3 percent slopes
HlB	Hillsboro loam, 3 to 8 percent slopes
HoA	Hillsboro silt loam, 0 to 3 percent slopes
MlA	McBee silt loam, coarse variant, 0 to 3 percent slopes
NbA	Newberg silt loam, 0 to 3 percent slopes
NbB	Newberg silt loam, 3 to 8 percent slopes
PhB	Pilchuck fine sand, 0 to 8 percent slopes
SmA	Sauvie silt loam, 0 to 3 percent slopes
SmB	Sauvie silt loam, 3 to 8 percent slopes
SpB	Sauvie silty clay loam, 0 to 8 percent slopes
W	Water

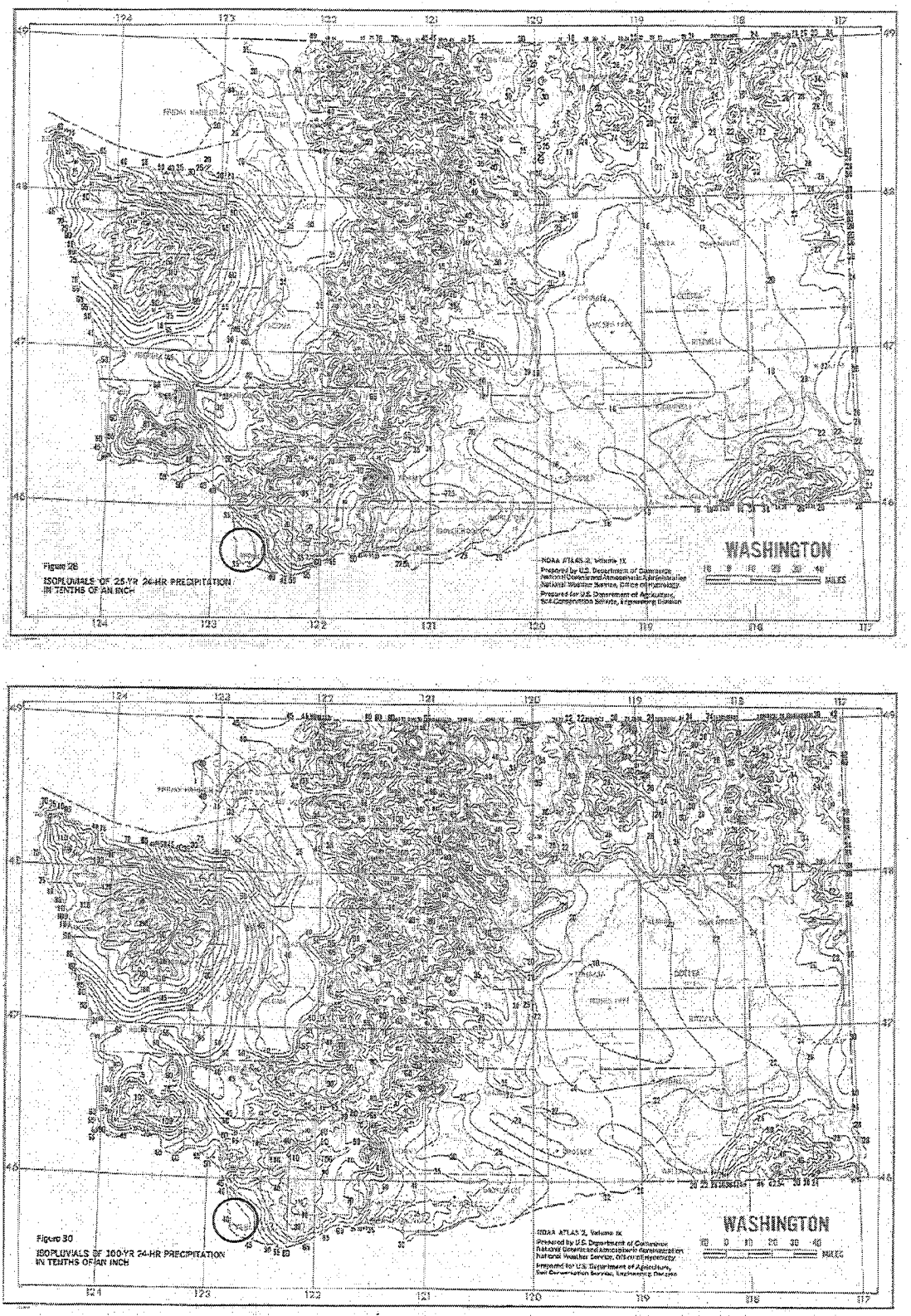


Figure 5. 25-Year and 100-Year 24-Hour Isopluvials

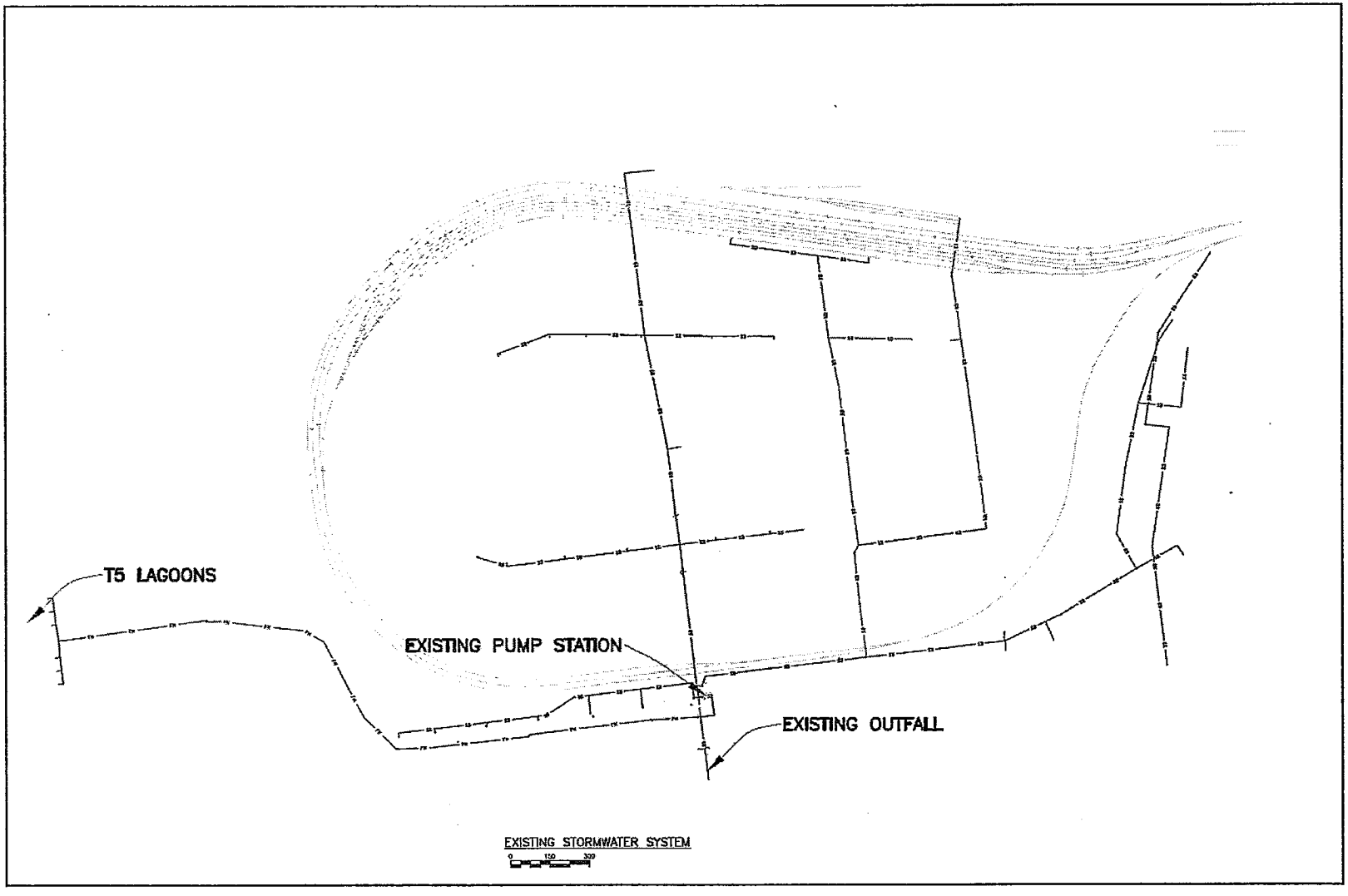


Figure 6. Existing Stormwater System

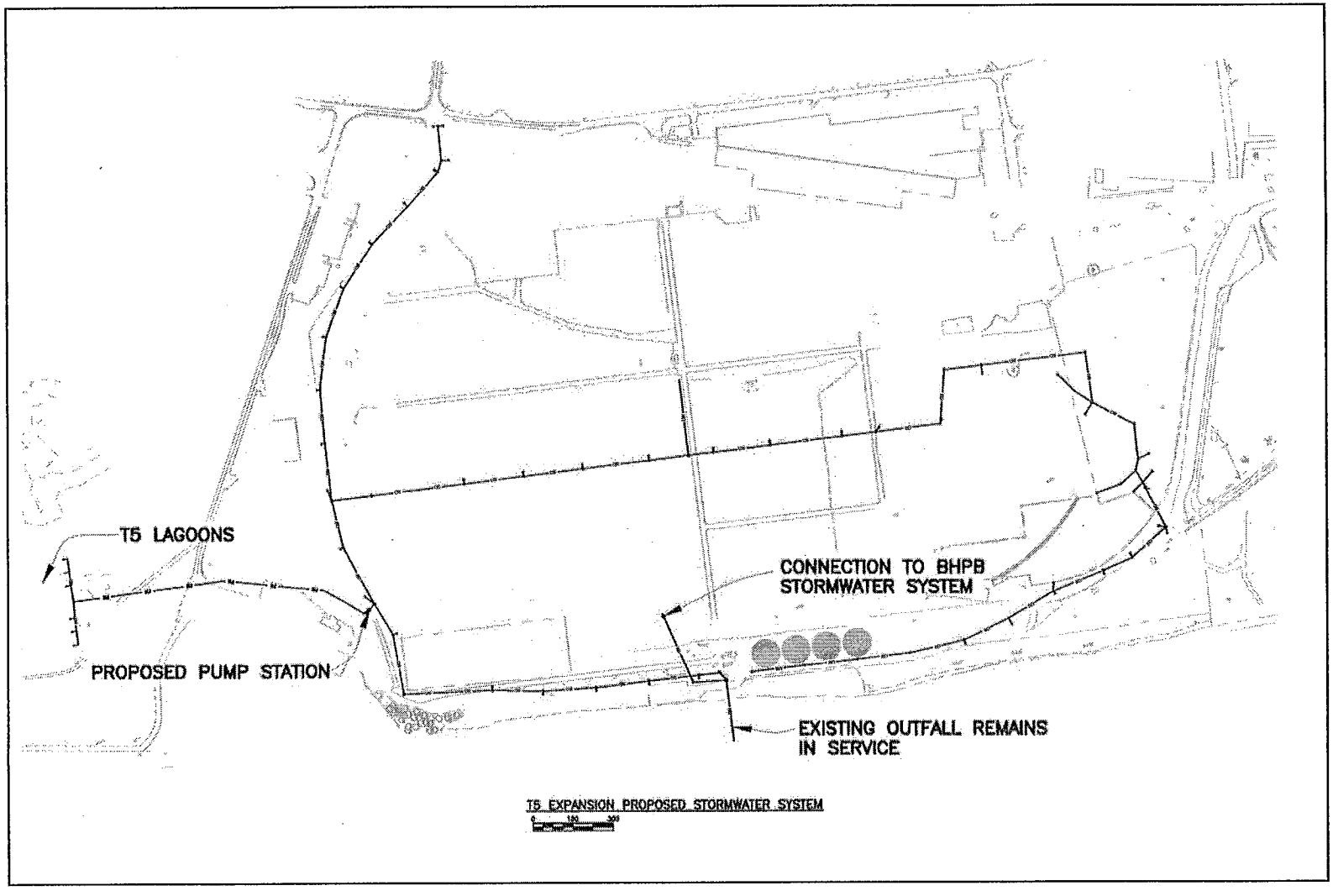


Figure 7. T5 Expansion Proposed Stormwater System

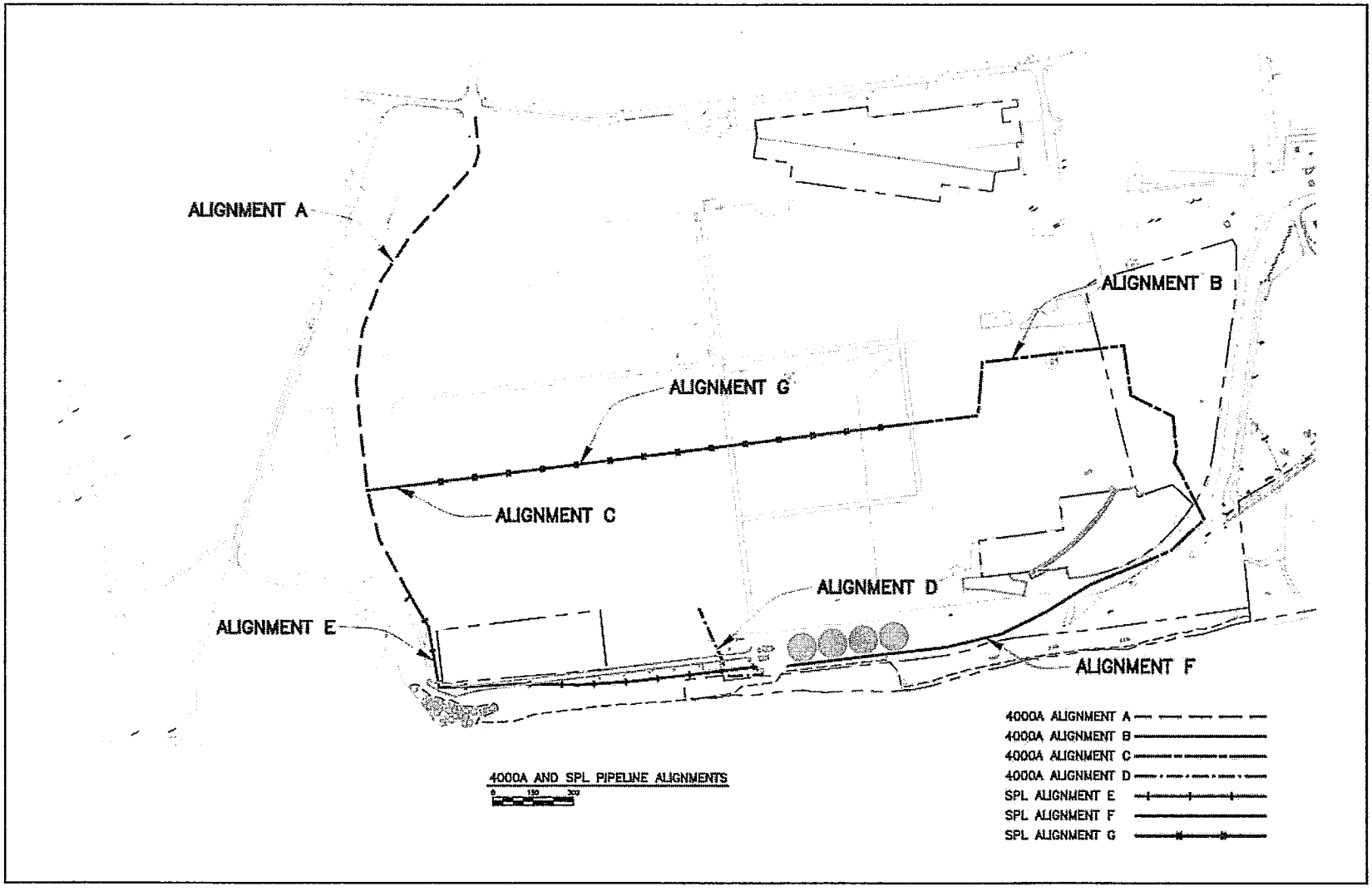


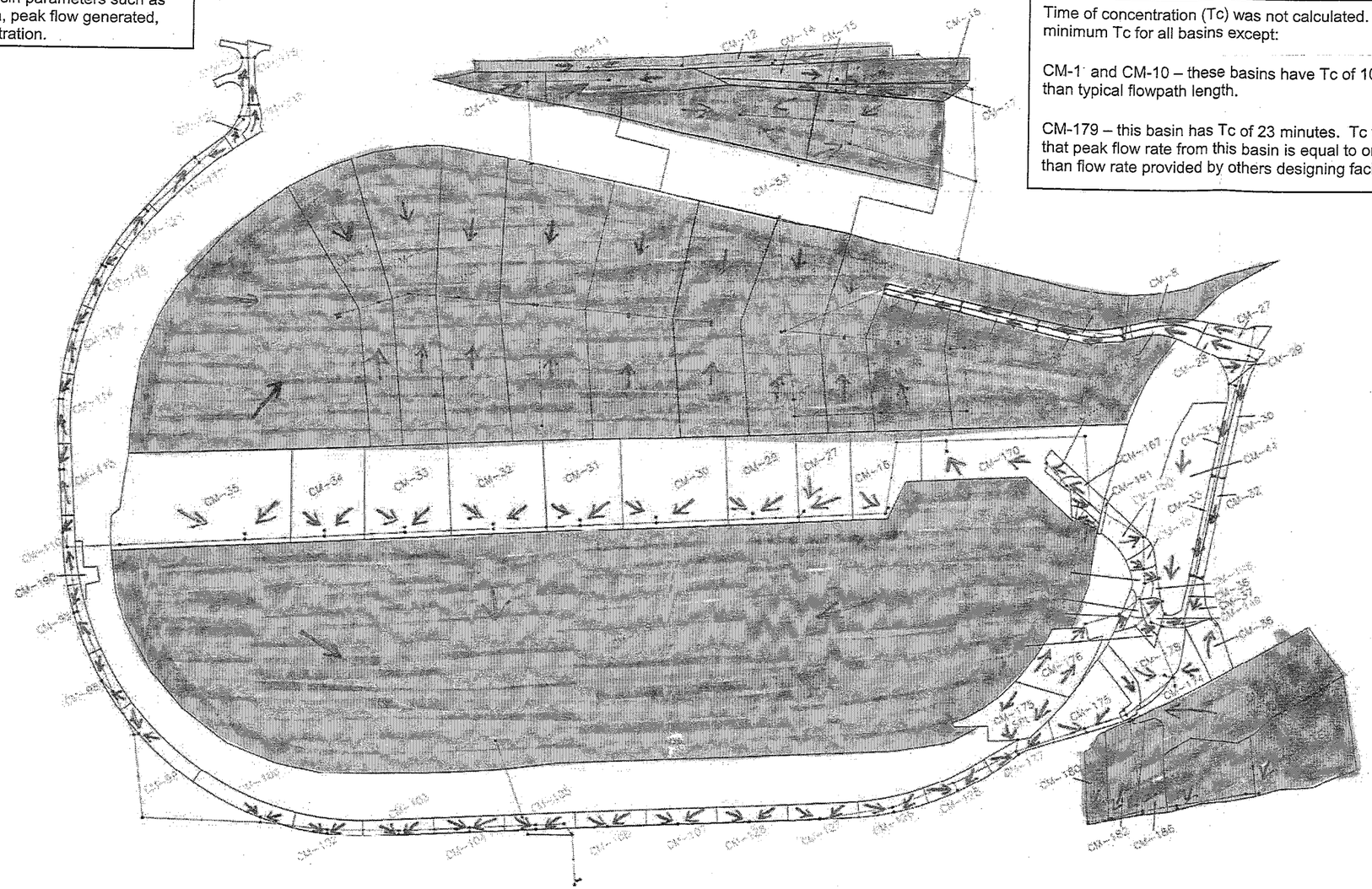
Figure 8. 4000A and SPL Pipe Alignments

See table B1 for basin parameters such as curve number, area, peak flow generated, and time of concentration.

Time of concentration (Tc) was not calculated. Assumed 5 minute minimum Tc for all basins except:

CM-1 and CM-10 – these basins have Tc of 10 mins due to longer than typical flowpath length.

CM-179 – this basin has Tc of 23 minutes. Tc was adjusted such that peak flow rate from this basin is equal to or slightly greater than flow rate provided by others designing facilities in this basin.



Highlighting indicates basins that drain to existing or proposed inlets and conveyance systems designed by others.

0 75 150 300

HDR

WEST VANCOUVER FREIGHT ACCESS

BASIN MAP FOR TERMINAL 5

DATE 5/3/12

FIGURE 1

Figure 9. Basin Map for Terminal 5

APPENDIX B

Hydrology Calculations

Curve Numbers

Curve numbers were selected for each basin based on Table 2.2 in the 2005 SMMWW Vol. III:

Table 2.2
Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Areas

(Sources: TR 55, 1986, and Stormwater Management Manual, 1992. See Section 2.1.1 for explanation)

Cover type and hydrologic condition.	CNs for hydrologic soil group A	B	C	D
Curve Numbers for Pre-Development Conditions				
Pasture, grassland, or range-continuous forage for grazing:				
Fair condition (ground cover 50% to 75% and not heavily grazed).	49	69	79	84
Good condition (ground cover >75% and lightly or only occasionally grazed)	39	61	74	80
Woods:				
Fair (Woods are grazed but not burned, and some forest litter covers the soil).	36	60	73	79
Good (Woods are protected from grazing, and litter and brush adequately cover the soil).	30	55	70	77
Curve Numbers for Post-Development Conditions				
Open space (lawns, parks, golf courses, cemeteries, landscaping, etc.)[1]				
Fair condition (grass cover on 50% - 75% of the area).	77	85	90	92
Good condition (grass cover on >75% of the area)	68	80	86	90
Impervious areas:				
Open water bodies: lakes, wetlands, ponds etc.	100	100	100	100
Paved parking lots, roofs[2], driveways, etc. (excluding right-of-way)	98	98	98	98
Permeable Pavement (See Appendix C to decide which condition below to use)				
Landscaped area	77	85	90	92
50% landscaped area/50% impervious	87	91	94	96
100% impervious area	98	98	98	98
Paved	98	98	98	98
Gravel (including right-of-way)	76	85	89	91
Dirt (including right-of-way)	72	82	87	89
Pasture, grassland, or range-continuous forage for grazing:				
Poor condition (ground cover <50% or heavily grazed with no mulch).	68	79	86	89
Fair condition (ground cover 50% to 75% and not heavily grazed).	49	69	79	84
Good condition (ground cover >75% and lightly or only occasionally grazed)	39	61	74	80
Woods:				
Poor (Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning).	45	66	77	83
Fair (Woods are grazed but not burned, and some forest litter covers the soil).	36	60	73	79
Good (Woods are protected from grazing, and litter and brush adequately cover the soil).	30	55	70	77

Single family residential[3]: Dwelling Unit/Gross Acre	Should only be used for subdivisions > 50 acres	Average Percent impervious area[3,4]	
1.0 DU/GA		15	Separate curve number
1.5 DU/GA		20	shall be selected for
2.0 DU/GA		25	pervious & impervious
2.5 DU/GA		30	portions of the site or
3.0 DU/GA		34	basin
3.5 DU/GA		38	
4.0 DU/GA		42	
4.5 DU/GA		46	
5.0 DU/GA		48	
5.5 DU/GA		50	
6.0 DU/GA		52	
6.5 DU/GA		54	
7.0 DU/GA		56	
7.5 DU/GA		58	

PUD's, condos, apartments, commercial businesses, industrial areas & & subdivisions < 50 acres	%impervious must be computed	Separate curve numbers shall be selected for pervious and impervious portions of the site

For a more detailed and complete description of land use curve numbers refer to chapter two (2) of the Soil Conservation Service's Technical Release No. 55 . (210-VI-TR-55. Second Ed., June 1986).

A curve number of 98 was used for pavement.

Table B1. Catchment Modeling Parameters and Results for the 25-year Storm Event

Catchment Name	SCS Curve Number	Scaled Area (acres)	Peak 25-year Flow (cfs)	Time of Concentration (mins)	Unit Hydrograph Method
Alignment A					
CM-121	98	0.167	0.14	5	SCS Unit Hydrograph
CM-113	98	0.161	0.13	5	SCS Unit Hydrograph
CM-110	98	0.160	0.13	5	SCS Unit Hydrograph
CM-95	98	0.168	0.14	5	SCS Unit Hydrograph
CM-98	98	0.159	0.13	5	SCS Unit Hydrograph
CM-118	98	0.100	0.08	5	SCS Unit Hydrograph
CM-119	98	0.072	0.06	5	SCS Unit Hydrograph
CM-120	98	0.082	0.07	5	SCS Unit Hydrograph
CM-117	98	0.260	0.22	5	SCS Unit Hydrograph
CM-123	98	0.114	0.09	5	SCS Unit Hydrograph
CM-115	98	0.157	0.13	5	SCS Unit Hydrograph
CM-124	98	0.158	0.13	5	SCS Unit Hydrograph
CM-114	98	0.158	0.13	5	SCS Unit Hydrograph
CM-190	98	0.100	0.07	5	SCS Unit Hydrograph
Alignment B					
CM-136	98	0.073	0.06	5	SCS Unit Hydrograph
CM-149	98	0.108	0.09	5	SCS Unit Hydrograph
CM-148	98	0.022	0.02	5	SCS Unit Hydrograph
CM-165	98	0.100	0.08	5	SCS Unit Hydrograph
CM-154	98	0.055	0.05	5	SCS Unit Hydrograph
CM-191	98	0.024	0.02	5	SCS Unit Hydrograph
CM-170	98	1.942	1.61	5	SCS Unit Hydrograph
CM-16	98	0.943	0.78	5	SCS Unit Hydrograph
CM-175	98	0.631	0.52	5	SCS Unit Hydrograph
CM-176	98	0.221	0.18	5	SCS Unit Hydrograph
CM-174	98	0.327	0.27	5	SCS Unit Hydrograph
CM-178	98	0.632	0.52	5	SCS Unit Hydrograph
CM-27	98	0.853	0.7	5	SCS Unit Hydrograph
CM-135	98	0.063	0.05	5	SCS Unit Hydrograph
CM-140	98	0.029	0.02	5	SCS Unit Hydrograph
CM-153	98	0.115	0.1	5	SCS Unit Hydrograph
CM-151	98	0.084	0.07	5	SCS Unit Hydrograph
CM-150	98	0.245	0.2	5	SCS Unit Hydrograph
CM-155	98	0.062	0.05	5	SCS Unit Hydrograph
CM-167	98	0.120	0.1	5	SCS Unit Hydrograph
CM-176	98	0.628	0.5	5	SCS Unit Hydrograph
Alignment C					
No catchments in Alignment C. Upstream basins and existing system contribute flow.					

Table B1. Catchment Modeling Parameters and Results for the 25-year Storm Event

Catchment Name	SCS Curve Number	Scaled Area (acres)	Peak 25-year Flow (cfs)	Time of Concentration (mins)	Unit Hydrograph Method
Alignment D					
CM-179	98	37.829	23.9	23	SCS Unit Hydrograph
Alignment E					
CM-105	98	0.197	0.16	5	SCS Unit Hydrograph
CM-104	98	0.197	0.16	5	SCS Unit Hydrograph
CM-103	98	0.196	0.16	5	SCS Unit Hydrograph
CM-102	98	0.193	0.16	5	SCS Unit Hydrograph
CM-100	98	0.292	0.24	5	SCS Unit Hydrograph
CM-99	98	0.265	0.22	5	SCS Unit Hydrograph
Alignment F					
CM-106	98	0.197	0.16	5	SCS Unit Hydrograph
CM-107	98	0.198	0.16	5	SCS Unit Hydrograph
CM-128	98	0.197	0.16	5	SCS Unit Hydrograph
CM-127	98	0.196	0.16	5	SCS Unit Hydrograph
CM-126	98	0.196	0.16	5	SCS Unit Hydrograph
CM-125	98	0.198	0.16	5	SCS Unit Hydrograph
CM-177	98	0.191	0.16	5	SCS Unit Hydrograph
CM-175	98	0.652	0.52	5	SCS Unit Hydrograph
Alignment G					
CM-29	98	1.111	0.83	5	SCS Unit Hydrograph
CM-30	98	1.704	1.27	5	SCS Unit Hydrograph
CM-31	98	1.254	0.92	5	SCS Unit Hydrograph
CM-32	98	1.593	1.31	5	SCS Unit Hydrograph
CM-33	98	1.418	1.17	5	SCS Unit Hydrograph
CM-34	98	1.232	1.02	5	SCS Unit Hydrograph
CM-35	98	2.970	2.46	5	SCS Unit Hydrograph

MGS Flood Water Quality Flow Rate Results

MGS FLOOD
PROJECT REPORT

Program Version: 3.13 Run Date: 01/10/2012 10:01 AM

Input File Name: mgs test.fld
Project Name: POV T5 WQ flow
Analysis Title: POV T5 WQ flow
Comments:

********** Precipitation Input**********

Extended Precipitation Timeseries Selected
Climatic Region Number: 20
Full Period of Record Available used for Routing
Precipitation Station : 970044 Vancouver 44 in MAP 10/01/1939-10/01/2060
Evaporation Station : 971044 Vancouver 44 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** Watershed Definition **********

Number of Subbasins: 1

********** Subbasin Number: 1 **********

***Tributary to Node: 1
***Bypass to Node : None

Area(Acres)

	Predeveloped	Developed To Node	Developed Bypass Node
Till Forest	0.000	0.000	0.000
Till Pasture	0.000	0.000	0.000
Till Grass	0.000	0.000	0.000
Outwash Forest	0.000	0.000	0.000
Outwash Pasture	0.000	0.000	0.000
Outwash Grass	91.320	0.000	0.000
Wetland	0.000	0.000	0.000
Impervious	0.000	91.320	0.000
Subbasin Total	91.320	91.320	0.000

**********Water Quality Facility Data **********

Node No: 2
2-Year Discharge Rate : 25.033 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 14.68 cfs
Off-line Design Discharge Rate (91% Exceedance): 8.65 cfs

APPENDIX C

Hydraulic Calculations

Table C1. Conduit Modeling Parameters and Results for the 25-year Storm Event

Conduit Name	Diameter (in)	Slope (ft/ft)	Maximum 25-year Flow (cfs)	Calculated Design Capacity (cfs)	Maximum Flow to Calculated Design Capacity Ratio
Alignment A					
CO-A5	12	0.020	0.14	5.45	0.03
CO-A10	12	0.020	0.08	5.47	0.01
CO-A15	12	0.002	0.34	1.71	0.20
CO-A20	12	0.020	0.06	5.47	0.01
CO-A25	12	0.002	0.58	1.74	0.33
CO-A30	12	0.020	0.07	5.41	0.01
CO-A35	12	0.002	0.65	1.73	0.38
CO-A40	12	0.020	0.22	5.45	0.04
CO-A45	12	0.002	0.69	1.74	0.40
CO-A50	12	0.020	0.09	5.44	0.02
CO-A55	12	0.002	0.71	1.74	0.41
CO-A60	12	0.020	0.13	5.44	0.02
CO-A65	12	0.002	0.74	1.74	0.43
CO-A70	12	0.020	0.13	5.44	0.02
CO-A75	18	0.002	0.8	5.13	0.16
CO-A80	12	0.020	0.13	5.44	0.02
CO-A85	24	0.002	0.91	11.00	0.08
CO-A90	12	0.020	0.13	5.44	0.02
CO-A95	24	0.002	1.03	10.94	0.09
CO-A100	12	0.020	0.13	5.47	0.02
CO-A105	48	0.002	57.59	69.94	0.82
CO-A110	12	0.020	0.14	5.44	0.03
CO-A115	48	0.002	57.81	66.94	0.86
CO-A120	12	0.020	0.13	5.45	0.02
Alignment B					
CO-B37	12	0.020	0.52	5.40	0.10
CO-B40	30	0.002	3.96	19.99	0.20
CO-B43	12	0.020	0.18	5.44	0.03
CO-B45	30	0.002	7.58	19.63	0.39
CO-B47	12	0.020	0.27	5.48	0.05
CO-B49	12	0.020	0.52	5.48	0.09
CO-B50	30	0.003	8.87	25.07	0.35
CO-B53/300	15	0.005	2.59	4.94	0.52
CO-B55	12	0.020	0.06	5.47	0.01

Table C1. Conduit Modeling Parameters and Results for the 25-year Storm Event

Conduit Name	Diameter (in)	Slope (ft/ft)	Maximum 25-year Flow (cfs)	Calculated Design Capacity (cfs)	Maximum Flow to Calculated Design Capacity Ratio
CO-B55	30	0.003	10.91	25.10	0.43
CO-B60	12	0.020	0.09	5.45	0.02
CO-B63	12	0.005	0.52	2.51	0.21
CO-B65	30	0.002	11.06	19.87	0.56
CO-B70	12	0.020	0.57	5.45	0.10
CO-B75	30	0.002	11.44	19.87	0.58
CO-B80	12	0.020	0.02	5.45	0.00
CO-B85	30	0.002	11.54	19.88	0.58
CO-B90	30	0.002	11.6	19.87	0.58
CO-B95	30	0.002	11.75	19.87	0.59
CO-B100	12	0.020	0.08	5.45	0.01
CO-B105	12	0.020	0.18	5.46	0.03
CO-B110	12	0.020	0.06	5.45	0.01
CO-B120	36	0.002	12.04	32.05	0.38
CO-B125	36	0.002	12.1	32.41	0.37
CO-B126	12	0.020	1.61	5.46	0.29
CO-B127	36	0.002	13.02	32.20	0.40
CO-B130	36	0.002	13.07	32.31	0.40
CO-B135	12	0.020	0.78	5.49	0.14
CO-B140	36	0.002	13.56	32.32	0.42
CO-B150	12	0.020	0.71	5.49	0.13
Alignment C					
CO-C235	48	0.002	53.54	69.69	0.77
Alignment D					
CO-D5	36	0.005	23.83	51.06	0.47
CO-D10	36	0.005	23.80	51.23	0.46
Alignment E					
CO-E1/E3	36	0.025	58.71	115.15	0.51
CO-E5	48	0.002	58.71	69.93	0.84
CO-E10	12	0.020	0.16	5.44	0.03
CO-E15	48	0.002	58.66	69.83	0.84
CO-E20	12	0.020	0.16	5.44	0.03
CO-E25	48	0.002	58.5	69.59	0.84
CO-E30	12	0.020	0.16	5.44	0.03
CO-E35	48	0.002	58.29	69.95	0.83
CO-E40	12	0.020	0.16	5.44	0.03
CO-E45	48	0.002	58.15	69.50	0.84
CO-E50	12	0.020	0.24	5.48	0.04
CO-E55	48	0.002	57.94	69.44	0.83
CO-E60	48	0.002	57.97	69.35	0.84

Table C1. Conduit Modeling Parameters and Results for the 25-year Storm Event

Conduit Name	Diameter (in)	Slope (ft/ft)	Maximum 25-year Flow (cfs)	Calculated Design Capacity (cfs)	Maximum Flow to Calculated Design Capacity Ratio
CO-E65	12	0.020	57.84	5.48	0.04
CO-E70/ A127	48	0.002	58.71	70.62	0.82
Alignment F					
CO-F5	12	0.002	0.16	1.78	0.09
CO-F10	18	0.002	0.33	4.70	0.07
CO-F15	18	0.002	0.49	4.70	0.10
CO-F20	18	0.002	0.65	4.72	0.14
CO-F23	12	0.020	0.16	5.00	0.03
CO-F25	18	0.002	0.95	4.69	0.20
CO-F27	12	0.020	0.16	5.45	0.03
CO-F30	24	0.002	1.73	10.31	0.17
CO-F32	12	0.005	0.54	2.54	0.21
CO-F33	12	0.020	0.16	5.49	0.03
CO-F35	24	0.002	2.96	10.05	0.29
Alignment G					
CO-G155	36	0.002	26.18	34.85	0.75
CO-G160	12	0.020	0.92	5.46	0.17
CO-G165	42	0.002	26.66	52.42	0.51
CO-G170	12	0.020	1.41	5.46	0.26
CO-G175	42	0.002	27.46	52.65	0.52
CO-G180	12	0.020	1.04	5.46	0.19
CO-G185	42	0.002	28.36	52.54	0.54
CO-G187	36	0.002	23.29	31.37	0.74
CO-G190	48	0.002	51.34	69.63	0.74
CO-G195	12	0.020	1.32	5.44	0.24
CO-G200	48	0.002	52.49	69.58	0.75
CO-G205	12	0.020	1.17	5.49	0.21
CO-G210	48	0.002	53.54	69.72	0.77
CO-G215	12	0.020	1.02	5.46	0.19
CO-G220	48	0.002	54.26	69.72	0.78
CO-G225	12	0.020	2.46	5.44	0.45
CO-G230	48	0.002	56.55	69.42	0.81

Table C2. Structures Modeling Results for the 100-year Storm Event

Structure Name	Structure Type	Structure surcharged for the 100-year Storm?
Alignment A		
CB1-A10	WSDOT Catch Basin Type 1	No
CB1-A100	WSDOT Catch Basin Type 1	No
CB1-A110	WSDOT Catch Basin Type 1	No
CB1-A120	WSDOT Catch Basin Type 1	No
CB1-A130	WSDOT Catch Basin Type 1	No
CB1-A20	WSDOT Catch Basin Type 1	No
CB1-A30	WSDOT Catch Basin Type 1	No
CB1-A40	WSDOT Catch Basin Type 1	No
CB1-A50	WSDOT Catch Basin Type 1	No
CB1-A60	WSDOT Catch Basin Type 1	No
CB1-A70	WSDOT Catch Basin Type 1	No
CB1-A80	WSDOT Catch Basin Type 1	No
CB1-A90	WSDOT Catch Basin Type 1	No
MH-A10	WSDOT Manhole Type 3	No
MH-A20	WSDOT Manhole Type 3	No
MH-A30	WSDOT Manhole Type 3	No
MH-A40	WSDOT Manhole Type 3	No
MH-A50	WSDOT Manhole Type 3	No
MH-A60	WSDOT Manhole Type 3	No
MH-A70	WSDOT Manhole Type 3	No
MH-A80	WSDOT Manhole Type 3	No
MH-A90	WSDOT Manhole Type 3	No
MH-A100	WSDOT Manhole Type 3	No
MH-A110	WSDOT Manhole Type 3	No
MH-A120	WSDOT Manhole Type 3	No
Alignment B		
CB1-B100	WSDOT Catch Basin Type 1	No
CB1-B110	WSDOT Catch Basin Type 1	No
CB1-B130	WSDOT Catch Basin Type 1	No
CB1-B140	WSDOT Catch Basin Type 1	No
CB1-B160	WSDOT Catch Basin Type 1	No
CB1-B170	WSDOT Catch Basin Type 1	No
CB1-B180	WSDOT Catch Basin Type 1	No
CB1-B80	WSDOT Catch Basin Type 1	No
CB1-B85	WSDOT Catch Basin Type 1	No
CB1-B87	WSDOT Catch Basin Type 1	No
CB1-B90	WSDOT Catch Basin Type 1	No
CB1-B90	WSDOT Catch Basin Type 1	No
72" STM MH 22	Existing Manhole	No

Table C2. Structures Modeling Results for the 100-year Storm Event

Structure Name	Structure Type	Structure surcharged for the 100-year Storm?
MH-B80	WSDOT Manhole Type 3	No
MH-B85	WSDOT Manhole Type 3	No
MH-B90	WSDOT Manhole Type 3	No
MH-B95	WSDOT Manhole Type 3	No
MH-B100	WSDOT Manhole Type 3	No
MH-B103	WSDOT Manhole Type 3	No
MH-B160	WSDOT Manhole Type 3	No
MH-B165	WSDOT Manhole Type 3	No
MH-B170	WSDOT Manhole Type 3	No
MH-B180	WSDOT Manhole Type 3	No
Alignment C		
MH-C260	WSDOT Manhole Type 3	No
Alignment D		
MH-D10	WSDOT Manhole Type 3	No
MHV-D10	120 Inch Manhole	No
MHV-D20	120 Inch Manhole	No
Alignment E		
CB1-E10	WSDOT Catch Basin Type 1	No
CB1-E20	WSDOT Catch Basin Type 1	No
CB1-E30	WSDOT Catch Basin Type 1	No
CB1-E40	WSDOT Catch Basin Type 1	No
CB1-E50	WSDOT Catch Basin Type 1	No
CB1-E60	WSDOT Catch Basin Type 1	No
MH-E10	WSDOT Manhole Type 3	No
MH-E20	WSDOT Manhole Type 3	No
MH-E30	WSDOT Manhole Type 3	No
MH-E40	WSDOT Manhole Type 3	No
MH-E50	WSDOT Manhole Type 3	No
MH-E60	WSDOT Manhole Type 3	No
MH-E70	WSDOT Manhole Type 3	No
MH-E80	WSDOT Manhole Type 3	No
Alignment F		
CB1-F10	WSDOT Catch Basin Type 1	No
CB1-F20	WSDOT Catch Basin Type 1	No
CB1-F30	WSDOT Catch Basin Type 1	No
CB1-F40	WSDOT Catch Basin Type 1	No
CB1-F50	WSDOT Catch Basin Type 1	No
CB1-F60	WSDOT Catch Basin Type 1	No
CB1-F70	WSDOT Catch Basin Type 1	No
MH-F50	WSDOT Manhole Type 3	No

Table C2. Structures Modeling Results for the 100-year Storm Event

Structure Name	Structure Type	Structure surcharged for the 100-year Storm?
MH-F60	WSDOT Manhole Type 3	No
MH-F65	WSDOT Manhole Type 3	No
MH-F70	WSDOT Manhole Type 3	No
Alignment G		
CB1-G200	WSDOT Catch Basin Type 1	No
CB1-G210	WSDOT Catch Basin Type 1	No
CB1-G220	WSDOT Catch Basin Type 1	No
CB1-G230	WSDOT Catch Basin Type 1	No
CB1-G240	WSDOT Catch Basin Type 1	No
CB1-G250	WSDOT Catch Basin Type 1	No
CB1-G260	WSDOT Catch Basin Type 1	No
MH-G200	WSDOT Manhole Type 3	No
MH-G205	WSDOT Manhole Type 3	No
MH-G210	WSDOT Manhole Type 3	No
MH-G215	WSDOT Manhole Type 3	No
MH-G220	WSDOT Manhole Type 3	No
MH-G230	WSDOT Manhole Type 3	No
MH-G240	WSDOT Manhole Type 3	No
MH-G250	WSDOT Manhole Type 3	No

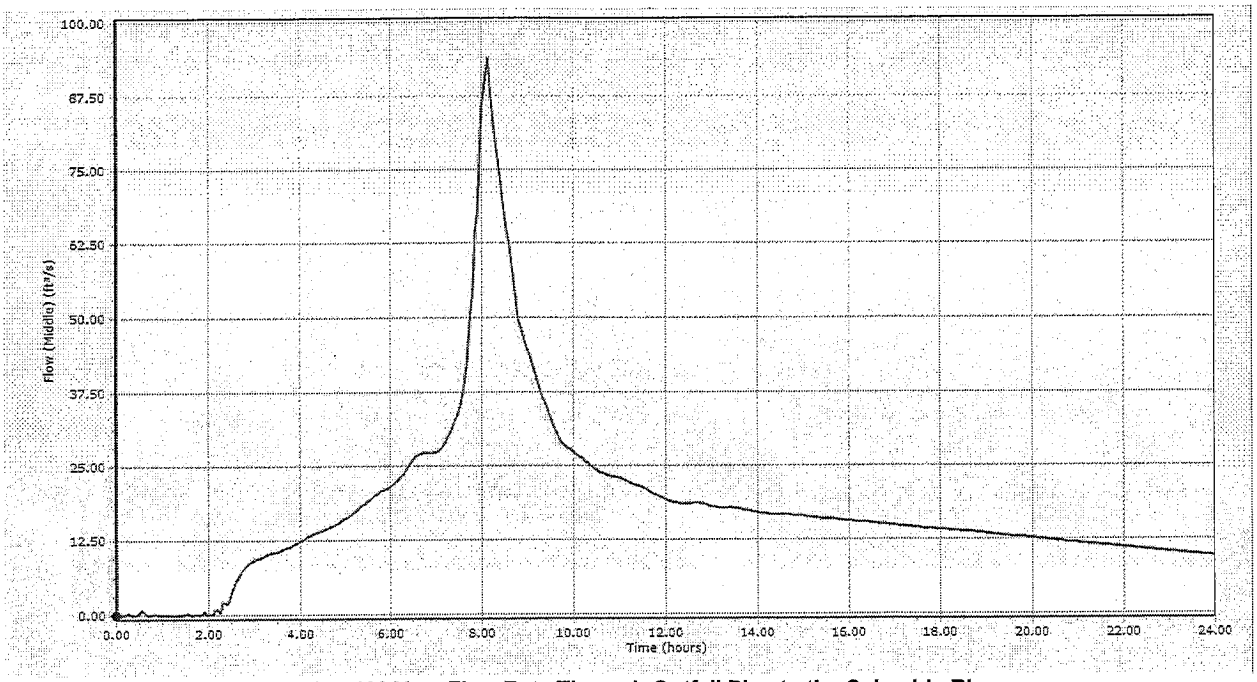


Figure C1. Hydrograph Showing 100 Year Flow Rate Through Outfall Pipe to the Columbia River

BergerABAM

700 Northeast Multnomah Street, Suite 900, Portland, Oregon 97232-4189
503/872-4100 • 503/872-4101 Fax • www.abam.com

Memorandum

Date: June 10, 2010

Subject: Port of Vancouver – West Vancouver Freight Access Project
Parcel 1A Drainage Study

From: Shawn Ellis, PE

To: Kurt Reichelt, HDR
Scott Hale, HDR

Route to: Papor-09-121 File

As requested by the Port of Vancouver, we have completed a review of drainage options for the Port's Parcel 1A property. Our understanding for the Port's desired future use of Parcel 1A and the results of our analyses based on this understanding is summarized in this memorandum.

Future Parcel 1A Sub-Basins

The purpose of this study is to determine the feasibility of providing for future drainage facilities for Parcel 1A after it is divided into three sub-basins. Two of the sub-basins will be approximately 22 acres each, and will be developed for light industrial use by outside parties or Port tenants. The balance of the parcel (15 acres) will remain Port property, and be used for rail and other Port access and as a utility corridor along the north side of the existing and future track corridor.

According to Port staff, the two 22-acre parcels will each provide on-site water quality treatment for storm water runoff. Treated storm water will be conveyed by Port-owned conveyance facilities for discharge to the Columbia River via the Port's outfall. The runoff will bypass the Port's existing water quality treatment facility (the T4 Pond). The 15-acre parcel will be conveyed for treatment in the T4 Pond.

Hydrology and Hydraulics

We have completed preliminary analyses to determine peak flows for a 25-year rainfall event from the combined 22-acre parcels and the 15-acre parcel to determine the size of the systems necessary to convey peak flows. The Santa Barbara Unit Hydrograph (SBUH) method was used for the analyses. Calculations are attached to this memo, but are summarized below. The design storm is the 25-year rainfall depth of 3.5 inches. Times of concentration are based on 100 feet of

overland flow for each system, 100 feet of concentrated flow, and the balance as pipe flow. Peak flow from the two combined parcels is predicted to be 30.8 cfs. Peak flow from the 15-acre parcel is predicted to be 9.5 cfs.

Required pipe sizes for the above peak discharges are determined from likely maximum slope requirements for each system based on the elevations for each system connection location. The 44-acre parcels will require a 36-inch pipe with a minimum slope assume to be xxx. The 15-acre parcel will require a 24-inch pipe with a minimum slope of 2.3%.

SBUH Input	44-acre Parcels	15-acre Parcel
Area (acres)	44 acres	15 acres
Percent Impervious	100%	100%
Curve Number	98	98
25-year Design Event	3.5 inches	3.5 inches
Time of Concentration	98	27.2 minutes
Peak Flow	30.8 cfs	9.5 cfs
Pipe Size	36-inch	24-inch

Grade Requirements For T4 Pond By-pass Conveyance System

The following assumptions and existing conditions have been considered to evaluate the feasibility of extending a gravity conveyance system from the western 22-acre parcel to the manhole south of the T4 pond.

- The conveyance system will be connected to the manhole just south of the T4 pond, and it has an invert elevation of 11.00 feet for the 60-inch pipe proposed from the T4 pond. The existing 60-inch outlet pipe has an invert elevation of 10.50 feet.
- Matching crowns at this manhole would require an invert elevation of 13.00 feet for the 36-inch conveyance pipe from Parcel 1A.
- Approximately 3,650 linear feet of conveyance pipe will be required to convey the two 22-acre sites runoff to the discharge at the Port's manhole south of the T4 pond. Assuming a minimum slope of 0.2% results in a 7.3-foot grade drop to this manhole.
- Approximately 900 linear feet of pipe in the westernmost 22-acre site at a slope of 0.5% will require a 4½-foot grade drop within the site.

- Site elevation in the NW corner of Parcel 1A will be at least 29 feet, based on adjacent survey data.
- The invert elevation for the upstream end of the on-site conveyance system, could be as low as 24.80 feet given the above criteria. The site elevation in the NW corner of Parcel 1A is likely to be at least 29 feet, based on adjacent survey data from Gateway Road and SR 501. Therefore, a depth of 4.2 feet for this upstream point is possible.
- Shallower depth for the on-site system may be required if water quality treatment systems selected by parcel owners/tenants require a hydraulic head to function.

It is recommended that 36-inch conveyance system be constructed as deeply as possible in order to allow for the most flexibility for design of the on-site storm water systems.

Options for Crossing the Track Corridor

An existing 42-inch pipe currently crosses the track corridor, extending towards the T4 pond from an inlet and manhole at the southeast corner of Parcel 1A. Existing Project 6 (Terminal 3 Rail Access) plans show modifications to this pipe system to provide access from Parcel 1A to the T4 pond. This pipe can be used for either the 44-acre conveyance or the 15-acre conveyance, although conditions for each are not ideal (see option discussions below).

For whichever system the 42-inch pipe is used, we recommend that a second storm pipe be installed as part of Project 6 (or partially during Project 6 with completion as part of Project 11). The second pipe will be either for conveyance of the 44-acre parcel or the 15-acre parcel.

Options for providing conveyance for the parallel pipe systems are described below:

- *Existing 42-inch Pipe for 44-acre Conveyance.* The existing 42-inch pipe could be used for conveyance of the 44-acre parcel. However, the pipe does not provide the same upstream or downstream elevations listed in the Grade Requirements above. The downstream end of the pipe on the south side of the track corridor is at elevation 15.31 feet. Approximately 1270 feet of pipe would be required to extend the system to the manhole south of the T4 pond. At a slope of 0.2% the invert at the manhole would be 12.77 feet. This would function hydraulically, but would not allow for matching pipe crowns.

  If the existing 42-inch pipe is proposed for conveyance of the 44-acre sites, a second storm crossing (24-inch pipe) should be installed for conveyance of the 15-acre parcel. The Project 6 plans should be modified to complete the connection as part of the project 6 project, so that future modification to the system won't be necessary, and to ensure that the required configuration of the both systems can function in the limited space available near the northwest corner of the pond.

- *Existing* **42-inch Pipe for 15-acre Conveyance.** The current Project 6 plans provide for extension of the 42-inch to the T4 Pond. However, the existing pipe is below the pond water surface elevation of 16.65 feet, and is generally partially filled with water except when the pond's water surface drops due to evaporation during very dry periods. If the 15-acre parcel is used by this existing pipe, a second 36-inch storm crossing should be installed for the 44-acre parcel future conveyance.

Conveyance Calculations & Pipe Sizing

Project: West Vancouver Freight Access Project - Project 9
PAPOR-11-127
Date: 4/18/2011

Storm Drain A

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
Gateway Ave	MH P9-A1	238	2.030	0.9	1.83	1.83	6.5		6.5	2.31	4.22	18	0.0028	0.013	5.57	3.15	0.76
MH P9-A1	MH P9-A2	300	1.670	0.9	1.50	3.33		1.3	7.8	2.11	7.03	24	0.002	0.013	10.14	3.23	0.69
MH P9-A2	MH P9-A3	300	1.670	0.9	1.50	4.83		1.5	9.3	1.92	9.28	24	0.002	0.013	10.14	3.23	0.92
MH P9-A3	MH P9-A4	300	1.670	0.9	1.50	6.34		1.5	10.9	1.77	11.24	30	0.0015	0.013	15.92	3.24	0.71
MH P9-A4	MH P9-A5	300	1.670	0.9	1.50	7.84		1.5	12.4	1.66	12.99	30	0.0015	0.013	15.92	3.24	0.82
MH P9-A1	MH P9-A6	300	1.670	0.9	1.50	9.34		1.5	13.9	1.56	14.58	30	0.0015	0.013	15.92	3.24	0.92
MH P9-A5	MH P9-A7	300	1.670	0.9	1.50	10.85		1.5	15.5	1.48	16.03	36	0.0012	0.013	23.16	3.28	0.69
MH P9-A1	MH P9-A8	300	1.670	0.9	1.50	12.35		1.5	17.0	1.41	17.39	36	0.0012	0.013	23.16	3.28	0.75
MH P9-A1	MH P9-A9	241	1.670	0.9	1.50	13.85		1.5	18.5	1.35	18.66	36	0.0012	0.013	23.16	3.28	0.81
MH P9-A9	Exisiting MH	358	1.670	0.9	1.50	15.35		1.2	19.8	1.30	20.02	36	0.0012	0.013	23.16	3.28	0.86
		Total Area	17.06														

Storm Drain B

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
Farwest	MH P9-B1	5	22.000	0.9	19.80	19.80	98.0		98.0	0.57	11.32	30	0.0015	0.013	15.92	3.24	0.71
MH P9-B1	MH P9-B2	203	0.000	0.9	0.00	19.80		0.0	98.0	0.57	11.31	30	0.002	0.013	18.38	3.75	0.62
MH P9-B2	MH P9-B3	300	5.250	0.9	4.73	24.53		0.9	98.9	0.57	13.95	36	0.002	0.013	29.89	4.23	0.47
MH P9-B3	MH P9-B4	254	5.250	0.9	4.73	29.25		1.2	100.1	0.57	16.53	36	0.0015	0.013	25.89	3.66	0.64
MH P9-B4	MH P9-B5	279	5.250	0.9	4.73	33.98		1.2	101.3	0.56	19.09	42	0.0015	0.013	39.05	4.06	0.49
MH P9-B5	MH P9-B6	279	5.250	0.9	4.73	38.70		1.1	102.4	0.56	21.62	42	0.0015	0.013	39.05	4.06	0.55
MH P9-B6	Existing MH	50	1.000	0.9	0.90	39.60		1.1	103.6	0.56	22.00	42	0.0012	0.013	34.93	3.63	0.63
		Total Area	44.00														

Intensity (I)
From the WSDOT Hydraulics Manual, $I = m/Tc^n$
where m = 6.06 and n = 0.515 for the 25-year return period

Gateway Avenue Contribution to Storm Drain A taken from Project 19 calculations.
Farwest Steel contribution to Storm Drain B taken from Farwest Steel calculations.

Conveyance Calculations & Pipe Sizing

Project: West Vancouver Freight Access Project - Gateway Avenue Grade Separation
PAPOR-11-127
Date: 4/18/2011

Gateway Avenue From Lower River Road to MH-13

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I* (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
MH-15	MH-14	294	0.180	0.9	0.16	0.16	5.0		5.0	2.65	0.43	12	0.005	0.013	2.52	3.22	0.17
MH-14	MH-13	109	0.295	0.9	0.27	0.43		1.5	6.5	2.31	0.99	12	0.005	0.013	2.52	3.22	0.39
		Total Area	0.48														

Gateway Avenue From High Point at Station G22+48.47 to MH-13

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
MH-7	MH-8	125	0.390	0.9	0.35	0.35	5.0		5.0	2.65	0.93	12	0.0534	0.013	8.25	10.51	0.11
MH-8	MH-9	170	0.000	0.9	0.00	0.35		0.2	5.2	2.59	0.91	12	0.0537	0.013	8.27	10.54	0.11
MH-9	MH-10	134	0.374	0.9	0.34	0.69		0.3	5.5	2.53	1.74	12	0.0446	0.013	7.54	9.60	0.23
MH-10	MH-11	122	0.000	0.9	0.00	0.69		0.2	5.7	2.47	1.70	12	0.019	0.013	4.92	6.27	0.35
MH-11	MH-12	53	0.386	0.9	0.35	1.04		0.3	6.0	2.40	2.49	12	0.0049	0.013	2.50	3.19	0.99
MH-12	MH-13	101	0.262	0.9	0.24	1.27		0.3	6.0	2.40	3.05	15	0.005	0.013	4.58	3.73	0.67
		Total Area	1.41														

Gateway Avenue From MH-13 to Discharge to Conveyance at Parcel 1A Tract

Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
MH-13	Parcel 1A	238	0.141	0.9	0.13	1.83	6.5		6.5	2.31	4.21	18	0.0028	0.013	5.57	3.15	0.76
		Total Area	2.03	Includes areas from two tables above													

Gateway Avenue From High Point at Station G22+48.47 to discharge into the Terminal 5 System

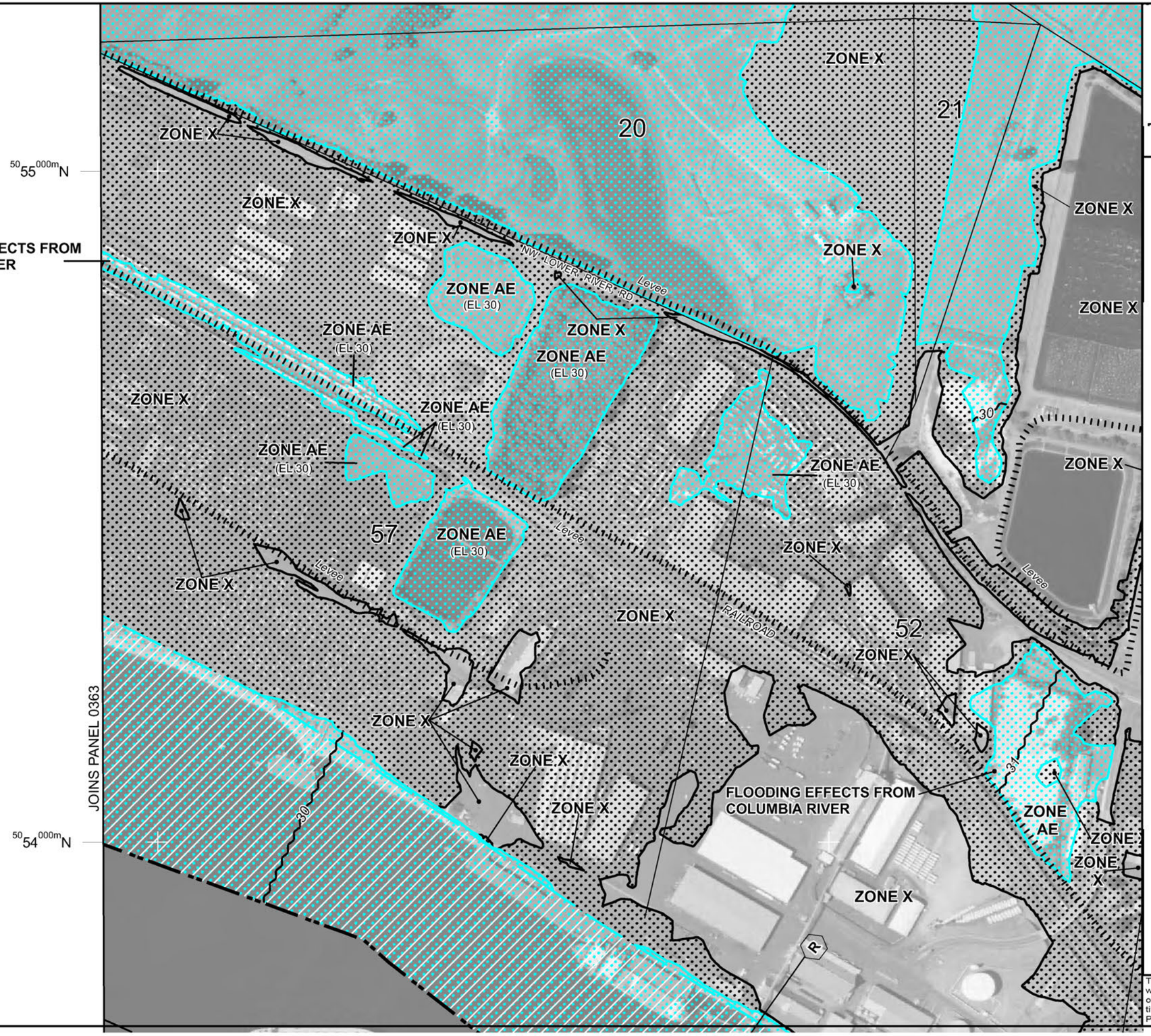
Upstream	Downstream	Length	Peak Discharge Calculation									Pipe Design					
			Area (acres)	C	CA	Sum Ca	Tc (min)	Pipe Tc (min)	Sum Tc (min)	I* (in/hr)	Q (cfs)	Dia (in)	Slope (ft/ft)	Mannings n	Capacity (cfs)	Velocity (fps)	Q/Qcap
MH-6	MH-5	93	0.512	0.9	0.46	0.46	5.0		5.0	2.65	1.22	12	0.0322	0.013	6.40	8.16	0.19
MH-5	MH-4	260	0.215	0.9	0.19	0.65		0.2	5.2	2.60	1.70	12	0.0396	0.013	7.10	9.05	0.24
MH-4	MH-3	285	0.363	0.9	0.33	0.98		0.5	5.7	2.48	2.43	12	0.0391	0.013	7.06	8.99	0.34
MH-3	MH-2	119	0.319	0.9	0.29	1.27		0.5	6.2	2.37	3.00	12	0.0172	0.013	4.68	5.96	0.64
MH-2	MH-1	69	0.440	0.9	0.40	1.66		0.3	6.5	2.31	3.84	15	0.0077	0.013	5.68	4.63	0.68
MH-1	T5		0.132	0.9	0.12	1.78		0.2	6.8	2.26	4.03	15	0.005	0.013	4.58	3.73	0.88
		Total Area	1.98														

* Intensity (I)
From the WSDOT Hydraulics Manual, $I = m/Tc^n$
where m = 6.06 and n = 0.515 for the 25-year return period

Construction Stormwater Pollution Prevention Plan

Vancouver Energy
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix C
FEMA FIRM Maps



MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

PANEL 0364D

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 364 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	530024	0364	D
VANCOUVER, CITY OF	530027	0364	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

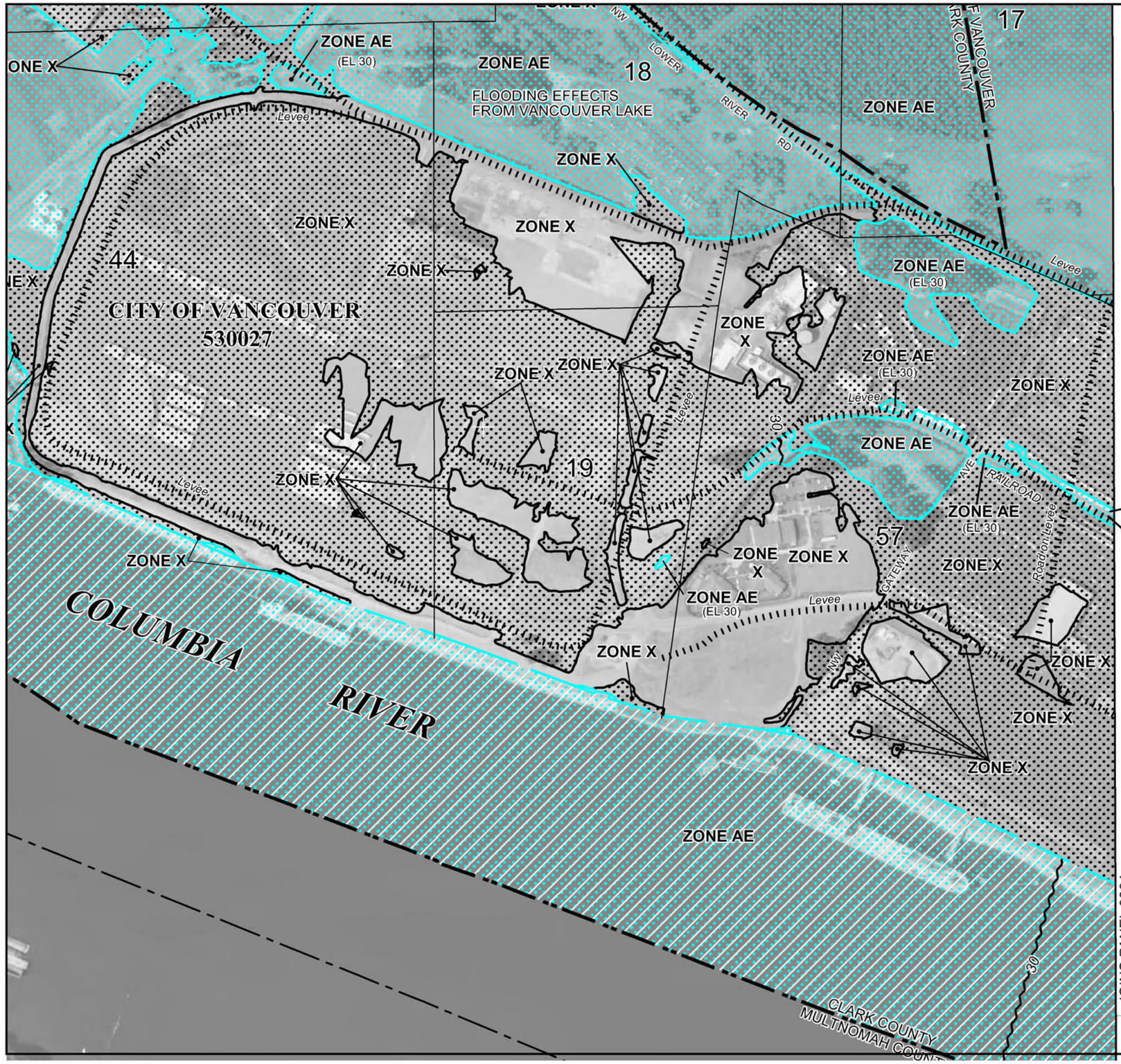
MAP NUMBER
53011C0364D

EFFECTIVE DATE
SEPTEMBER 5, 2012

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



ZONE AE
(EL 30)
FLOODING EFFECTS FROM
COLUMBIA RIVER

JOINS PANEL 0364

120000 FT

MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0363D

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 363 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	530024	0363	D
VANCOUVER, CITY OF	530027	0363	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53011C0363D

EFFECTIVE DATE
SEPTEMBER 5, 2012

Federal Emergency Management Agency

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Construction Stormwater Pollution Prevention Plan

Vancouver Energy
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix D
Geotechnical Investigation Report

Geotechnical Investigation

BergerABAM
1111 Main Street, Suite 300
Vancouver, WA 98660-2958

Tesoro Savage Vancouver Energy Distribution Terminal - Upland Facility Port of Vancouver, USA

Prepared by

GRI
Oregon & Washington

December 20, 2013

TABLE OF CONTENTS

Page

INTRODUCTION 1
PROJECT DESCRIPTION 1
- Overview 1
- Areas 200 and 600 (Unloading, Office and West Boiler) 2
- Areas 300 (Storage Tanks) 2
- Area 400 (Marine Terminal) 2
- Area 500 (Transfer Pipelines) 2

SITE CONDITION AND BACKGROUND 3
- Topography and Site Background 3
- Geology 4

SUBSURFACE CONDITIONS 4
- General 4
- Soils 5
- Groundwater 6

CONCLUSIONS AND RECOMMENDATIONS 7
- General 7
- Seismic Considerations 8
- Areas 200 Unloading and Office Structures and Area 600 West Boiler 12
- Area 300 Storage Tanks 14
- Area 300 Lightly Loaded Structures Foundation Support 17
- Area 400 Marine Terminal 17
- Area 500 Transfer Pipelines 18
- Spread Footings (Areas 200, 300, 400, 500, and 600) 18
- Driven Piles (Areas 200, 300, 400, 500, and 600) 19
- Site Preparation and Earthwork 23
- Structural Fill 24
- Utilities 25
- Design Review and Construction Services 25

LIMITATIONS AND CONCLUDING REMARKS 26
References 27

Figures

Figure 1 Vicinity Map
Figure 2 Project Layout Plan
Figure 3 Site Plan (Areas 200 and 600 - Unloading and Office / West Boiler)
Figure 4 Site Plan (Area 300 - Storage)
Figure 5 Site Plan (Area 400 - Marine Terminal)
Figure 6 Summary of Piezometers (Area 300)
Figure 7 Settlement Plate Detail
Figure 8 Estimated Footing Settlement

Tables

1 Tank Settlement Estimates
2 Settlement Due to Tank Preloading
3 Ultimate Pile Capacities
4 Soil Properties for L-Pile Analysis
5 P-Modifiers for Group Effects

Appendix A: Field Explorations and Laboratory Testing

Appendix B: Site-Specific Seismic Hazard Study

INTRODUCTION

At your request, GRI has completed a geotechnical investigation for the proposed petroleum-by-rail handling facility at the Port of Vancouver (Port) in Vancouver, Washington. The vicinity map, Figure 1, shows the general location of the project, which includes the northwest corner of Terminal 5 (T-5), Parcel 1A, Berths 13 and 14 in Terminal 4 (T-4), and pipeline areas that connect these three areas. This report addresses the upland portion of the facility. The supplemental investigation addressing the dock modifications and portions of the terminal along the riverbank is in progress.

The investigation was conducted to evaluate subsurface conditions at the site and provide our conclusions and recommendations for design and construction of the proposed facility. Our investigation has included a review of available geologic information, subsurface explorations, laboratory testing, and engineering analyses. This report describes the work accomplished and provides our conclusions and geotechnical recommendations for the design and construction of the proposed facility.

Preliminary design recommendations for Area 300 storage tanks were provided to you in our July 18, 2013, memorandum entitled, "Progress Memorandum and Preliminary Conclusions and Recommendations, Petroleum Tank Support and Performance, Tesoro Savage Petroleum Terminal, Port of Vancouver, USA." Preliminary design recommendations for Area 200 unloading and structure areas were provided in our July 25, 2013, memorandum entitled, "Progress Memorandum and Preliminary Conclusions and Recommendations, Area 200 – Unloading and Building Areas, Tesoro Savage Petroleum Terminal, Port of Vancouver, USA."

The following geotechnical information has been reviewed for this investigation:

> Dames and Moore, March 31, 1993, Geotechnical Investigation, Proposed T-Docks/Dolphins, Port of Vancouver, Washington; prepared for URS Consultants.
>
> GRI, May 18, 2011, Geotechnical Report, NW Gateway Avenue Rail Bridge and Access to Terminal 5, Port of Vancouver, USA; prepared for HDR Inc.
>
> GRI, August 23, 2007, Draft Geotechnical Investigation, Columbia Gateway Rail Improvements, Port of Vancouver, Washington; prepared for Jones & Stokes Environmental Specialist.
>
> GRI, December 20, 2006 (issued July 31, 2007), Geotechnical Investigation, Columbia Gateway Rail Expansion, Port of Vancouver, Washington; prepared for Jones & Stokes.

PROJECT DESCRIPTION

Overview

The Project Layout Plan, Figure 2, shows the proposed layout of the new petroleum-by-rail bulk handling facility. The facility will occupy portions of Terminals 4 and 5, and Parcel 1A at the Port. The project includes specific areas that have been designated Areas 200 through 600, as shown on Site Plans, Figures 3 through 5. Crude oil will be transported to the Port by unit railcar trains and unloaded in a railcar unloader located in Area 200. A boiler structure in Area 600, located adjacent to the west end of the unloader structure will heat the crude oil for transport through above- and below-ground pipes to up to six storage tanks located in Area 300. A boiler structure located near the storage tanks will heat the crude oil for transport from the storage tanks to ships at Berth 13 in Area 400. Additional site improvements will

include a vapor combustion structure in Area 400 located near the dock to burn off excess vapor generated during transport of the crude oil through the pipeline. In addition, a modular office structure and two changing room structures (Area 200) will be located north of the unloader structure. The pipeline is referred to as Area 500 on Figure 2. The site improvements will be designed to meet the 2013 Washington State Building Code.

Areas 200 and 600 (Unloading, Office and West Boiler)

The site layout for the rail unloading area, west boiler, and administration and support structures is shown on Figure 3. The rail unloading area will allow the simultaneous unloading of tank cars on three rail lines and will be covered by a 90-ft-wide by 1,800-ft-long, relatively light, single-bay metal framed structure. The oil transport piping will be housed in embedded reinforced concrete trenches that are 5 to 7 ft deep and 9 ft wide. The rail unloading piping racks and piping trenches will be structurally independent of the unloader structure.

A small control room and fire pump and foam structure will be located on the south side of the unloading structure, together with transformer pads and pump pit. An office structure (48 by 70 ft) and two change rooms (48 by 70 ft and 36 by 70 ft) together with employee parking areas and six small holding tanks for rail car spill containment will be located north of the unloading area and north of the existing rails. Pedestrian bridges will span the rail lines and extend from the south side of the unloading area to near the planned office structure.

The west boiler is an approximate 6,600 sq ft, lightly loaded structure located west of the unloader structure.

Areas 300 (Storage Tanks)

The site layout for the product storage tanks, secondary containment berm, boiler structure, pump basin, control room/E-house and fire pump and foam structure is shown on the Area 300 Site Plan, Figure 4. Up to six product storage tanks will be constructed in Area 300. The tanks will be 240 ft in diameter, 48 ft high, and will be spaced 120 ft apart (wall to wall). The tanks will be of steel construction with a floating roof. The 50- by 60-ft boiler structure is located west of the tank farm. A small control room, fire pump and foam structure, transformer pads, and maintenance parking stalls are planned north of the boiler. A pump basin is planned adjacent to the south side of the boiler structure.

Area 400 (Marine Terminal)

The site layout for the marine terminal is shown on Figure 5. The area includes transfer pipeline, an E-house structure, fire pump and foam structure, dock transformer, vapor control unit, and maintenance parking planned near the riverbank near berths 13 and 14. The transfer pipeline is located within about 80 ft of the riverbank and will extend west from vapor control unit for approximately 1,050 ft before turning north. In addition, modifications to the existing docks and moorage dolphins are planned. Modifications to the docks and moorage dolphins and other Area 400 elements are not part of the scope of this geotechnical report and will be addressed in a supplemental report.

Area 500 (Transfer Pipelines)

The layout for the transfer pipelines is shown on Figure 2. The pipeline will consist of three, 24-in.-diameter steel pipelines extending from the rail unloading area to the product storage tanks. A 36-in.-

diameter steel pipeline with 6-in.-diameter return pipeline will run from the product storage tanks to the dock. Outside of the rail unloading area, the pipeline will typically be built above ground and rest on concrete cradles. Portions of the pipeline will be below ground where crossing beneath existing roadways and rail tracks. Based on conversations with the design team, underground portions of the 24- and 36-in.-diameter transfer pipelines will be housed inside 36-and 48-in.-diameter steel pipes, respectively.

SITE CONDITION AND BACKGROUND

Topography and Site Background

Areas 200 and 600. Existing topographic information indicates the ground surface in the area of planned improvements typically ranges from elevation +28 to +35 ft based on the National Geodetic Vertical Datum of 1929 (NGVD 29). All elevations in this report are reported in NGVD. The ground surface in the area of the planned unloader and boiler structure is typically mantled with crushed rock. The ground surface in the area of the office and changing room structure is mantled with sand fill or crushed rock. At the time of our investigation, the Port was placing and compacting additional sand fill in the area of the office and changing room structures. Up to eight rail tracks are located immediately north of the planned unloader structure. There are asphaltic-concrete (AC) paved roads around the planned boiler structure and north of the office and changing room structures.

T-5 was formerly occupied by an aluminum smelting facility owned and operated by Aluminum Company of America (Alcoa), Vancouver Aluminum Company (Vanalco), and Evergreen Aluminum at various periods beginning in 1940. Alcoa, in conjunction with Vanexco, also operated an aluminum rod and wire extrusion facility at T-5 until 1991. Soils in the area of the aluminum facility were contaminated with hazardous materials during the years of the aluminum facilities operations (ICF Jones and Stokes, 2009). As a result of the contamination, Alcoa and Evergreen Aluminum conducted a cleanup effort throughout T-5 that included construction of engineered landfills and caps that include the Vanexco concrete cap located adjacent to the north edge of the unloader structure. Soils in the Vanexco cap are impacted with polychlorinated biphenyls (PCBs). Based on current plans, the majority of the improvements are outside the area of the Vanexco cap except for a small portion of the unloader facility and the pedestrian bridge that provides access to the unloader rack from the facility offices.

Area 300. Existing topographic information indicates the ground surface of Area 300 typically ranges from elevation +27 to +30 ft and is mantled with crushed rock over the western half and sand fill over the eastern half. The northeast corner of the area contains a partially filled stormwater retention pond with the bottom at approximate elevation +12 ft and side slopes of about 2H:1V or flatter. It is our understanding the Port will complete filling of the remnant of the stormwater pond with compacted structural fill to match the surrounding site grades. A large scrap-metal stockpile is located in the southeast portion of the tanks site. The scrap metal piles are in the area of the southeast and middle south tank footprints, see Figure 4. Several stockpiles of concrete rubble were located on the western portion of the site and have subsequently been removed by the Port. Several rail lines are located adjacent to the south boundary of Area 300.

Area 400. Area 400 consists of two existing dock structures, identified as Berths 13 and 14, consisting of 250-ft-long pile-supported T-docks. Existing topographic information indicates the ground surface at the trestle abutments for the docks is relatively flat at about elevation +27 ft and is typically mantled with AC pavement, gravel, or grass. Two stormwater infiltration swales with the ground surface ranging from

elevation +23 to +25 ft are located north of the paved areas and are mantled with grass and shrubs. A 2H:1V riprap protected slope extends from the trestle abutment down to the sandy beach at about elevation 17 ft. The dredge line at the face of the dock is at about elevation -38 ft. It is our understanding the berths will be dredged to elevation -41 ft.

Area 500. The pipeline alignment is relatively flat with the ground surface ranging from about elevation +22 to +32 ft. The ground is typically mantled with crushed rock with portions of the pipeline along AC-paved NW Gateway Avenue and NW Harborside Drive.

The pipeline alignment is adjacent to the N/N2 landfill east of the unloader structure, near the East Landfill south of the intersection of NW Gateway Avenue and NW Harborside Drive. The N/N2 landfill and East Landfill areas were impacted by contamination during the Alcoa operations and are considered part of the Department of Ecology restricted covenant.

Geology

Based on our understanding of the geology at the site, our experience with nearby sites, and the available exploration data, the project area is mantled by fill that is underlain by recent alluvial soils to depths of 50 to 90 ft below the existing ground surface. The manmade fills typically consist of fine to coarse granular soils, with silt, silty sand, and sandy silt. The alluvial soils typically consist of very soft to medium stiff silt with varying percentages of clay interbedded with layers of sandy silt and sand that are underlain by sand with a trace of silt. The recent alluvial soils are typically underlain by alluvial gravels that range from gravel in a matrix of sand to open-graded gravel. Recent geologic investigations near the Interstate 5 bridge about 3 miles upstream from the project site indicate the alluvial gravels on the Washington side of the Columbia River can be up to 100 ft thick near the project site.

Available geologic information indicates the alluvial gravels are underlain by the Troutdale Formation, a Pliocene-age unit of well-consolidated or cemented conglomerate and sandstone (Beeson, et al., 1991).

SUBSURFACE CONDITIONS

General

Subsurface materials and conditions at the site were investigated between June 5 and October 29, 2013, with 26 borings, designated B-1 through B-26, and six cone penetration test (CPT) probes, designated CPT-1 through CPT-6. The borings were advanced to depths of 21.5 to 104.2 ft, and the probes were advanced to depths of about 54 to 83 ft.

The locations of borings and probes performed for this investigation are shown on Figures 2 through 5. Referring to Figure 4, note that explorations have not been completed for the southeast and middle south tank footprints. Access to this area was not permitted due to the presence of a large stockpile of scrap metal. The field exploration and laboratory testing programs completed for this investigation are described in Appendix A. Logs of the borings and CPT probes are shown on Figures 1A through 32A. The terms used to describe the soils encountered in the borings and CPTs are defined in Tables 1A and 2A.

In addition to the borings and CPT probes made for this investigation, GRI also reviewed and utilized the logs of previous explorations made by GRI and others in the site vicinity for other projects. Overall, the

results of the explorations recently completed for this investigation are in good agreement with previous work.

Soils

For the purpose of discussion, the materials disclosed by the explorations have been grouped into four units based on their physical characteristics, geologically significant features, and engineering properties. Listed as they were encountered from the ground surface downward, the units are:

1. **FILL**
2. **SILT**
3. **SAND**
4. **GRAVEL**

1. FILL. Fill was encountered at the ground surface in all explorations except B-26 and extends to depths ranging from about 5 to 25 ft (elevation +24.5 to +2 ft). The fill was thinnest near the northeast area of Parcel 1A (Area 300), where the Port plans to place additional fill, and near the northwest boundary of the unloader structure. The fill is thickest at the top of the riverbank in the dock area, where it is typically 20 to 25 ft thick.

The fill consists of layers of silt, sand, and gravel. Based on N-values and CPT tip resistances that vary widely across the site, the relative consistency of the sand and gravel fill varies from very loose to very dense, and the relative consistency of the silt fill ranges from very soft to hard. The fill in Area 300 is typically sand and gravel and medium dense to dense. The fill in Area 200 and 600 typically consists of layers of sand and gravel, is typically medium dense to dense, and grades to loose to medium dense below depths of 5 to 12.5 ft in several borings in the area. The fill in Area 400 consists primarily of sand and is typically loose to medium dense. The moisture content of sand fill ranges from 7 to 33% and increases with increasing silt content. The moisture content of silty fill ranges from 15 to 48%.

2. SILT. Silt was encountered in all explorations except borings B-10, B-23, and B-26. The silt was encountered beneath the fill in all borings and CPTs, except B-11, B-12, B-16, B-17, B-20, and B-25, where the silt was encountered beneath a layer of native sand that ranges from 2.5 to 15 ft thick. The silt extends to depths of 15 to 26 ft, and to the maximum depth explored in borings B-9, B-12 through B-14, and B-19. The silt ranges from 4-in.-thick interbedded layers to 19-ft-thick zone in Area 200 and 600; from 4 to 17 ft thick in Area 300; from 4 in. to 5 ft thick in Area 400; and from 12.5 to 17.5 ft thick in Area 500. Sand layers ranging from 3 to 4.5 ft thick are interbedded in the silt in Area 200. Based on N-values, Torvane shear strengths, and CPT side friction, the relative consistency of the silt ranges from very soft to stiff. Based on Atterberg limits testing, the liquid limit (LL) of the silt ranges from 27 to 76%, and the plasticity index (PI) ranges from 5 to 33%, indicating the soil has a low to high plasticity. The results of the Atterberg limits testing are shown on the Plasticity Charts, Figures 33A and 34A. The silt in Area 300 is typically very soft to medium stiff and has a medium to high plasticity with a PI greater than 16%. The silt in Area 200 and 600 is typically very soft to medium stiff and has a relatively low plasticity with a PI ranging from 5 to 15% and more typically 5 to 6%. The silt in Area 500 is very soft of medium stiff. The silt in Area 400 is medium stiff. An approximately 1-ft-thick layer of silt with varying gravel content was encountered above the gravel in the explorations in Area 400.

Consolidation test data for selected samples of silt obtained from borings B-4, B-5, B-7, B-8, B-11, and B-19 at depths of 10 to 32 ft indicate the silt is slightly preconsolidated and displays a relatively low compressibility in the preconsolidated range and a moderate compressibility in the normally consolidated range of stresses. Consolidation test results are shown on Figures 35A to 40A. Secondary compression testing was completed on selected samples and is shown on Figures 41A and 42A in the form of curves showing dial reading versus the log of time.

3. SAND. Sand was encountered at the ground surface in boring B-26 and beneath the silt in the remaining borings and CPTs and extends to the underlying gravel at depths ranging from 40 to 64 ft. Borings B-10, B-11, B-15, B-17, B-18, and B-20 were terminated in sand. The sand is fine to coarse grained and contains varying percentages of silt, ranging from a trace of silt to silty. A trace of gravel was present in some of the sand. The thickness of the sand ranges from 20 to 67 ft. Interbedded layers of silt ranging from 1 to 14 ft thick are present in the sand in Area 200 and 600. N-values recorded in the borings in Areas 200 and 600 indicate the relative density of the sand is typically loose from 10 to 20 ft and medium dense below a depth of about 30 ft. In Area 300, the sand is typically loose in the upper 5 to 10 ft of the sand layer and typically grades to medium dense below depths of 25 to 40 ft. In Area 400, the sand is typically loose to a depth of 35 ft and medium dense below a depth of 35 ft. In Area 500, the sand is typically loose in the upper 5 to 10 ft of the sand layer and grades to medium dense below a depth of 30 to 40 ft.

4. GRAVEL. Gravel was encountered beneath the sand in borings B-1 through B-8, B-16, B-21 through B-26, and probes CPT-1 through CPT-6. Gravel was encountered at about elevation -24 to -30 ft in Area 300, elevation -64.5 ft in Area 200, elevation -25.5 ft in Area 500, and elevations -43.5 to -60 ft in Area 400. The gravel is typically in a matrix of sand and silt and contains scattered cobbles and possible boulders. Layers of relatively open-graded gravels were noted in Area 300. Interbedded layers of sand ranging from 4 in. to 4.5 ft thick occur in the gravel in Area 300. Based on N-values, the relative density of the gravel ranges from medium dense to very dense.

Groundwater

Groundwater levels in the project area fluctuate in response to seasonal river levels, precipitation, and daily tidal fluctuations in the river. Shallow perched groundwater conditions can develop above the less-permeable silty deposits at the site and approach the ground surface during periods of prolonged or intense rainfall.

The Columbia River level is lowest in late summer and early fall. Historical low water in the last 20 years is about elevation +2.5 ft. The 100-year flood level is about elevation +28 ft. The ordinary high water level (OHW) is about elevation 17 ft. The higher river levels typically occur during storm events and the spring freshet, when snowmelt runoff causes high river flows.

Vibrating-wire piezometers were installed in borings B-4 and B-7 in Area 300. The piezometers are connected to data logger systems that automatically record the groundwater level. Installation details for the piezometers are described in Appendix A. The groundwater elevations between June 7 and July 10, and August 2 through 23, 2013, were recorded at up to 2-hour intervals and are shown on Figure 6. The piezometer data indicate the groundwater elevation fluctuated between elevation +4 and +10 ft over the recorded period. Hydrograph river levels recorded at a nearby station on the Columbia River during the same period were converted to NGVD elevations and are shown on the figure. Comparison of the

recorded groundwater and river levels suggests the groundwater is typically near or slightly higher than the river elevation. In this regard, it should be anticipated the groundwater level at the site could rise to or very near the ground surface during flood events. The groundwater elevations shown on Figure 6 are based on survey data provided to GRI by McKay Sposito. The batteries in the data loggers recording piezometer data in borings B-4 and B-7 stopped working on June 19 and July 10, 2013, respectively, and were replaced on August 2, 2013. It should be anticipated the groundwater level in the project area will reflect the water levels in the Columbia River.

CONCLUSIONS AND RECOMMENDATIONS

General

The borings and CPT probes completed for this investigation indicate the site is mantled with 5 to 25 ft of silt, sand, and gravel fill that is underlain by alluvial silt and sand. Explorations for previous work at the port indicate a lesser thickness of fill is present along the proposed pipeline alignment between Gateway Avenue and the new Gateway Avenue bridge. Where there is less fill, the native silt soils are present near the ground surface. Boring B-26, completed on the beach near Berth 13 encountered sand at the ground surface. Dense gravel is present below depths of 40 to 95 ft. Groundwater levels at the site will fluctuate in response to precipitation and levels in the nearby Columbia River. Shallow perched groundwater conditions may develop in the fill and approach the ground surface during periods of prolonged precipitation.

Our studies indicate that during the design level earthquake, the loose to medium dense sands and layers of low-plasticity, soft to medium stiff silt and sandy silt that are present below the groundwater level in all areas of the site could liquefy to the top of the gravel layer. Liquefaction results in settlement, a reduction of soil strength, and significant lateral spreading deformations near the riverbank. Ground improvement, such as stone columns, vibro-compaction, jet-grouted columns, and soil mixing, can be designed to mitigate liquefaction-induced settlement and lateral spreading deformations. Ground improvement will likely be necessary in Area 400 and portions of Area 500 to limit lateral spreading along the riverbank. The section of the Area 500 pipeline adjacent to the riverbank is also close to the East Landfill. Geotechnical borings were not allowed in the landfill.

A compressible layer of silt is present in Area 300. The heavy product storage loads will induce significant consolidation (static) settlement beneath the tanks that will likely need to be mitigated with ground improvement.

Due to the static and seismic settlement considerations and lateral spread due to seismic loading, conventional spread footings may not be able to support some of the structures during the design seismic event. In this regard, portions of the improvements may be supported on driven steel piles or ground improvement to limit static and seismic deformations.

The following sections of this report provide our conclusions and recommendations for design and construction of the site improvements. Static settlements will be in addition to liquefaction-induced settlements following a strong earthquake.

Seismic Considerations

General. We understand seismic design of the project elements, except the dock structure, will be in accordance with the 2012 International Building Code (2012 IBC), which was recently adopted by the Washington State Building Code and incorporates recommendations from the ASCE 7-10, Minimum Design Loads for Building and Other Structures (ASCE 7-10). The 2012 IBC and ASCE 7-10 seismic hazard levels are based on a Risk-Targeted Maximum Considered Earthquake (MCE_R). The ground motion associated with the probabilistic MCE_R represents a targeted risk level of 1% in 50 years probability of collapse in the direction of maximum horizontal response. In general, these risk-targeted ground motions are developed by applying adjustment factors of directivity and risk coefficients to the 2% probability of exceedance in 50 years, or a 2,475-year return period hazard level ground motion developed from the 2008 U.S. Geologic Survey (USGS) probabilistic seismic hazard maps. The maximum horizontal direction spectral response accelerations were obtained from the USGS Seismic Design Maps for the coordinates of 45.65° N latitude and 122.71° W longitude. The S_S and S_1 values identified for the site are 0.94 and 0.41 g, respectively. These bedrock spectral ordinates are adjusted for Site Class with the short- and long-period site coefficients, F_a and F_v, based on subsurface conditions or with a site-specific response analysis. The design-level response spectrum is calculated as two-thirds of the Site Class-adjusted MCE_R-level spectrum.

Our analysis has identified a potential risk of liquefaction throughout the site. In accordance with ASCE 7-10, sites with subsurface conditions identified as vulnerable to failure or collapse, such as liquefied soils, shall be classified as Site Class F. For Site Class F sites, ASCE 7-10 section 20.3 requires completion of a site-specific ground motion analysis unless the structures have a fundamental period of vibration less than or equal to 0.5 second. The design response spectrum for sites with structures of fundamental period less than 0.5 second can be derived using the non-liquefied subsurface profile.

We expect the large storage tanks in Area 300 will have fundamental periods of vibration that exceed 0.5 second. Due to these anticipated longer periods, a site-specific seismic ground motion analysis is required due to the presence of liquefiable soils. For Areas 300 and 400, a site-specific ground motion analysis was completed with the aid of the computer software D-MOD, a non-linear seismic soil response software developed by GeoMotions, LLC. The D-MOD analyses are further discussed in the site-specific ground motion analysis in Appendix B. The site-specific seismic ground motion analysis completed for Area 400 was completed as part of a separate scope of work to assist with evaluating the existing dock.

The recommended spectra with no ground improvement are summarized below by Area. Depending on the final type and extent of ground improvement selected, the Site Class assumption should be confirmed during final design.

Areas 200, 500, and 600. For Areas 200, 500, and 600, we understand the structures have a fundamental period of vibration less than or equal to 0.5 second. Based on the site conditions and no ground improvement, we recommend using Site Class E, soft soil profile, and the corresponding code site coefficients to develop the design spectra for those areas. The subsurface conditions in Area 500 within about 300 ft of the riverbank are more sandy than the rest of the area and are similar to the Area 400 site conditions (i.e., more sand). Therefore, we recommend the design spectrum for the section of pipeline within 300 ft of the river be developed based on the recommendations for Area 400.

Area 300. For Area 300, the results of the site-specific modeling indicates the 2012 IBC code-based Site Class D spectrum provides an appropriate estimate of the spectral accelerations in Area 300 for short periods. For longer periods, a response spectrum consisting of the site-specific spectral response values and the spectral values corresponding to 80% of the Site Class E response spectrum is appropriate. The recommended design-level spectral acceleration for Area 300, based on the site-specific ground motion analysis with no ground improvement, is shown on Figure 12B.

Area 400. For Area 400, the results of the site-specific modeling indicate the 2012 IBC code-based Site Class D spectrum provides an appropriate estimate of the spectral accelerations at short periods, while a response spectrum encompassing the site-specific spectral values and 80% of Site Class E is considered to be appropriate at longer periods. The design-level spectral acceleration spectrum for Area 400 is shown on Figure 12B.

Liquefaction. Liquefaction is a process by which saturated, granular materials, such as sand, and to a somewhat lesser degree, non-plastic silts, temporarily lose strength during and immediately after a seismic event. Liquefaction occurs as seismic shear stresses propagate through a saturated soil and distort the soil structure causing loosely packed groups of particles to contract or collapse. If drainage is impeded and cannot occur quickly, the collapsing soil structure increases the porewater pressure between the soil grains. If the porewater pressure increases to a level approaching the weight of the overlying soil, the granular layer temporarily behaves as a viscous liquid rather than a solid. As strength is lost, there is an increased risk of settlement, lateral spread, and/or slope instability, particularly along waterfront areas. Liquefaction-induced settlement occurs as the elevated porewater pressures dissipate and the soil consolidates after the earthquake.

The potential for liquefaction is typically estimated using the simplified method which compares the cyclic shear stresses induced within a soil profile during an earthquake to the ability of the soils to resist these stresses. The stresses induced within the profile are estimated on the basis of earthquake magnitude and the accelerations within the profile. The ability of the soils to resist these stresses are based on their strength as characterized by SPT N-values and CPT cone tip resistances normalized for overburden pressures and corrected for factors, such as fines content. Bray and Sancio (2006) provide additional screening criteria regarding the liquefaction susceptibility of silty soils that are not addressed by the simplified method. According to Bray and Sancio, soils with a water content to liquid limit ratio greater than 0.85 and a plasticity index (PI) less than 12% are susceptible to liquefaction.

The potential for liquefaction at the site was evaluated with the simplified method based on two methodologies. The first methodology was utilized for all areas and is based on the simplified procedure by Youd, et al (2001). The analysis was completed with the aid of the computer software LiquefyPro, a seismically induced liquefaction and settlement analysis software developed by CivilTech Corporation. The Youd, et al., methodology utilizes the peak ground acceleration (PGA) to predict the cyclic shear stresses experienced by the soil. The second methodology is based on the simplified procedure by Idriss and Boulanger (2008) and was utilized for Area 300. The Idriss and Boulanger (2008) analysis was used to evaluate the liquefaction potential of soils based on cyclic shear stresses and increased pore pressures estimated by the site response analysis output from the computer program D-MOD. In accordance with ASCE 7-10 Section 11.8.3, the PGA used in liquefaction hazard evaluation is the Maximum Considered Earthquake Geometric Mean (MCE_G) PGA adjusted for site amplification and is determined either through

site-specific ground motion analyses or is the mapped MCE_G PGA determined from ASCE 7-10, Figure 22-7. The mapped MCE_G is based on the 2008 USGS SDM and reflects a seismic hazard of 2% probability of exceedance in 50 years. The mapped bedrock MCE_G PGA for the site is 0.41 g.

It should be emphasized that the hazard level (MCE_G) used to estimate liquefaction hazards based on the new ASCE 7-10 document is approximately 50% larger than in previous code cycles. This new requirement results in much larger ground deformation estimates.

Based on the 2008 USGS interactive deaggregations, the subduction, subcrustal, and local crustal earthquakes all provide a significant contribution to the probabilistic seismic hazard at the site. We have considered magnitude M6.8 and M9.0 earthquakes, corresponding to a local crustal and subduction zone earthquake, respectively, with a PGA of 0.37 g and 0.45 g for Site Class E and D, respectively, for our liquefaction studies. These analyses indicate the crustal and subduction zone earthquake control the seismic hazard and contribute similar liquefaction hazards to the site. For the purpose of liquefaction studies, we have assumed a groundwater level at elevation 12 ft, corresponding to a seasonally averaged daily high river level.

The results of the liquefaction hazard analysis indicate the loose to medium dense sands and layers of low-plasticity, soft to medium stiff silt and sandy silt present below the groundwater level could liquefy to the top of the gravel layer at depths of up to 60 to 80 ft. Laboratory testing indicates the PI of the silt samples obtained from Area 300 ranges from 16 to 33%, which indicates the silt has a low risk of liquefaction based on the Bray and Sancio criteria. Our laboratory testing indicates the PI of the silt samples obtained from Areas 200 and 600 ranges from 5 to 15% and is typically 5 to 6% and has a moderate risk of liquefaction based on the Bray and Sancio criteria. For the purpose of estimating liquefaction-induced settlements, we have estimated the silt soils in Areas 200 and 600 are susceptible to liquefaction, and the silt soils in Area 300 are not susceptible to liquefaction. Based on these assumptions and on the new MCE_G ground motions, we estimate liquefaction-induced settlements will be on the order of 10 to 16 in. in Areas 200 and 600, 6 to 10 in. in Area 300, 3 to 15 in. in Area 500, and 12 to 24 in. in Area 400.

Lateral Spreading. Lateral spreading involves the horizontal displacement of large volumes of soil as a result of the liquefaction of underlying layers. The ground displacement occurs in response to the combination of gravitational forces and inertial forces generated by an earthquake acting upon the soil mass. Lateral spread can develop on shallow sloping ground or as a flow slide moving toward a moderately to steeply sloping free face, such as a river channel or lake bottom. Differential internal movements within the spreading mass usually create surface features, such as ground cracks or fissures, scarps, and grabens, in overlying unsaturated or non-liquefied soils. Lateral displacement may range from a few inches to many feet depending on soil conditions, the steepness of the slope, and the magnitude and epicentral distance of the earthquake. Associated differential vertical movements, or ground surface subsidence, may range up to about half of the total horizontal movement.

The method of analysis developed by Youd, et al. (2002), can be used to estimate lateral spread for both free-face and continuous slopes in free-field conditions. Calculations were completed assuming a subduction zone earthquake with a moment magnitude M9.0 at an epicentral distance of about 86 km and a crustal earthquake with a moment magnitude M6.8 at an epicentral distance of about 7 km to represent the MCE_G hazard level defined in ASCE 7-10. The 2008 USGS interactive deaggregations indicate these

magnitude-distance pairs provide the highest contribution to the seismic hazard at the site for subduction zone and crustal earthquake scenarios, respectively. The analysis indicates a potential for tens of feet of horizontal deformation 100 ft from the top of the riverbank, 4 to 9 ft of movement 650 ft from the riverbank, and 0 ft of horizontal deformation 1,150 ft from the riverbank.

The methods used to estimate the seismically induced horizontal and vertical ground displacement at the site are largely based on empirical methods and, consequently, do not provide a precise estimate of the actual ground movement that may occur. Seismic events of a lesser magnitude, or of the same magnitude but occurring at a greater epicentral distance from the site, would be expected to produce lesser horizontal and vertical ground displacements. As discussed in the liquefaction section the hazard level required by the current code is much greater than previous codes. For estimating lateral spreading deformations, the greater hazard level results in lateral spreading displacement estimates that can be larger by an order of magnitude.

In summary, at the new MCE_G hazard level, it is estimated that lateral spreading can occur within about 1,150 ft of the riverbank. Lateral spreading causes horizontal displacement of structures and additional lateral structural loads on piles and walls if not mitigated. Based on the lateral spreading estimates provided above, the pipeline and other structures may not be able to accommodate the estimated horizontal movement or lateral spreading loads, if ground improvement is not completed, in particular near the riverbank.

Ground Improvement. A ground improvement program can be designed to improve the existing subsurface soils and reduce potential seismic-induced settlement and lateral spreading. We anticipate ground improvement, if used for Areas 200, 300, 500, and 600, would be designed by a specialty ground improvement contractor to meet specified performance criteria. Ground improvement design to reduce lateral spreading near the river could be designed by the project team or a contractor to limit seismic deformation to tolerable levels.

Lateral spreading is often mitigated by constructing a zone, or buttress, of improved soil along the riverbank that will not liquefy. The buttress needs to be of sufficient width and extend to adequate depth to maintain stability following ground shaking and minimize or prevent lateral displacement toward the river of the upland portion of the site behind the buttress.

Several ground improvement alternatives, including vibro-compaction, vibro-replacement (stone columns), displacement piles, soil mixing and jet grouting are feasible to mitigate seismically induced settlement and lateral spreading. Vibro-compaction is a ground improvement technique that densifies clean granular soils, such as clean sand, using a vibratory probe. The probe is vibrated and jetted into the ground until reaching the bottom of the improvement zone. The soils are densified by the vibratory process as the probed is removed. Stone columns are similar to vibro-compaction, except stone aggregate is added to the void created by the probe after reaching the bottom of the treatment zone. The aggregate is densified by lowering the probe into the aggregate in small lifts until reaching the ground surface, creating columns of compacted aggregate. Stone columns are typically used in sand that contains a significant portion of fine-grained soils (silt or clay) or in low-plasticity, fine-grained soils with risk of liquefaction.

Vibro-compaction is most effective in sands with fines contents (percentage passing the No. 200 sieve) of less than 15%, and stone columns are more effective for soils with a fines content greater than 15%. Due to the silt layers and relatively high fines content over most of the upland portion of the project site, ground improvement by vibro-replacement with stone columns is more appropriate than vibro-compaction over most of the site to limit liquefaction-induced settlement. However, subsurface conditions near the Area 400 riverbank are predominantly sand, which could be modified using vibro-compaction methods.

Soil mixing and jet grouting are ground improvement methods that mix cement into the in situ soils to create columns of soil with improved strength and stiffness. The soil mixing method mixes wet or dry cement by use of a mechanical paddle that is advanced similar to a drill. The diameter of the soil-mixed column is dependent on the diameter of the paddle tool. Jet grouting makes soil/cement columns by injecting cement grout through high-velocity grout jets. The jets erode the in situ soil and mix it with cement and sometimes air and water. Jet grouting can be used to construct improved soil/cement columns or overlapped to create continuous panels.

Other Seismic Considerations. In our opinion, the potential for earthquake-induced fault displacement and ground rupture at the site is low unless occurring on a previously unknown or unmapped fault, and the risk of tsunami at the site is absent. Due to the topography of the site, it is our opinion the risk of damage by seiche is low.

Areas 200 Unloading and Office Structures and Area 600 West Boiler

General. As previously mentioned, the site layout for the rail unloading area, administrative and support structures, and west boiler are shown on Figure 3. It is our understanding the unloader structure, boiler structure, trenches, office, changing rooms, control room, and fire pump and foam structure, and transformer pads will be lightly loaded. As discussed in the Seismic Considerations section of this report, we estimate 10 to 16 in. of liquefaction-induced settlement in Areas 200 and 600 during a design seismic event. It is reasonable to assume that differential settlement could be half of the total liquefaction-induced settlement over horizontal distances of about 50 ft.

Foundation Support. Spread footings for support of Area 200 and 600 units can be designed using the criteria summarized in the Spread Footings section of this report. Liquefaction-induced settlement of structures founded on spread footings is estimated to be the same as noted in the previous paragraph. Seismic settlement of structures can be reduced to less than 1 in. by using driven pipe pile foundations. Pile support for structures in Areas 200 and 600 can be designed using the criteria provided in Table 3 of the Driven Piles section of this report. LPILE criteria are provided in Table 4 of the Pile Lateral Load section of this report. Alternatively, a foundation system consisting of spread footings following ground improvement could likely be designed to limit seismic settlements to acceptable levels.

Unloading Trenches. The oil will be pumped from rail cars into transport pipelines supported in two embedded concrete trenches located adjacent to the rails for the length of the unloader structure. The unloader trench will have a reinforced concrete bottom and sidewalls and an open top. The floor will be established 5 to 7 ft below the ground surface.

For design of the unloader trench, it is prudent to assume the groundwater level could rise to the ground surface during periods of heavy rainfall, together with river flooding.

Design lateral earth pressures for retaining walls depend on the type of construction, i.e., the ability of the wall to yield. Possible conditions are 1) a wall that is laterally supported at its base and top and, therefore, is unable to yield (at rest condition), and 2) a conventional cantilevered retaining wall that yields (active condition) by tilting about its base.

Assuming groundwater at the ground surface, non-yielding walls should be designed using a lateral earth pressure based on an equivalent fluid having a unit weight of 90 pcf. Walls that are allowed to yield by tilting about their base can be designed using a lateral earth pressure based on an equivalent fluid having a unit weight of 80 pcf. These design lateral earth pressures assume the grade adjacent to the trenches is horizontal. We understand additional lateral loading on the embedded trench walls induced by nearby rails will be evaluated by the project designer.

Assuming the design-level earthquake and 100-year flood event will not occur concurrently, our analyses indicate the above design criteria result in larger lateral earth forces than a design-level earthquake with groundwater below the bottom of the trench. Our analyses indicate the critical lateral earth pressures for design of the vault walls are associated with groundwater at the ground surface, rather than the seismic loading conditions.

Resistance to buoyant forces, if necessary, is typically provided by increasing the weight/volume of concrete and/or by extending the base slab beyond the walls. The buoyant unit weight of backfill over the slab extension can be taken as 53 pcf.

The unloader trench excavation can be backfilled with excavated sand compacted to 95% of the maximum dry density as determined by ASTM D 698 (Standard Proctor). To avoid buildup of excessive lateral earth pressures, overcompaction of backfill within 5 ft of the walls should be avoided.

Based on review of the logs of borings along the unloader, the bottom of the excavation will expose sand and silt. We recommend placing a minimum 8-in. thickness of compacted crushed rock to prevent disturbance of the subgrade and provide a firm working surface. Areas of soft or unsuitable material exposed in the subgrade should be overexcavated and backfilled with compacted crushed rock. The crushed rock should be installed in a single lift and compacted by at least four passes with a vibratory roller. For the support of point loads on the trench bottom slab, we recommend using a modulus of subgrade reaction of 125 pci. We estimate the static settlement of the unloader trench will be less than 1 in. for a relatively uniform net bearing pressure of 1,500 psf.

As noted previously, liquefaction could induce an additional 10 to 16 in. of settlement in Area 200. It is reasonable to assume that differential settlement could be one-half of the total liquefaction-induced settlement over horizontal distances of about 50 ft.

Although the unloader trench is a stiff structure, we understand the estimated liquefaction-induced settlements are excessive. To mitigate seismic-induced settlements, the unloading trench can be supported on ground modified by ground improvement methods or on driven steel pipe piles. If used, piles can also provide uplift resistance to buoyancy.

Ground Improvement. We understand ground improvement is being considered as an alternative to limit liquefaction-induced settlements beneath the structures. If used, ground improvement would be designed by a specialty contractor to meet performance criteria developed by the design team. Vibro-compaction, vibro-replacement (stone columns), soil mixing, and jet grouting are typical ground improvement types that can be used to mitigate seismically induced settlement.

Area 300 Storage Tanks

General. The site layout for the storage tanks, boiler structure, pump basin, control room, and fire pump and foam structure is shown on Figure 4. As discussed in the Seismic Considerations section of this report, we estimate 6 to 10 in. of liquefaction induced settlement in Area 300 during a design seismic event. In addition, the storage area is underlain by compressible silt soils that will induce non-seismic consolidation settlement due to the weight of the storage tanks.

Steel Storage Tanks. The steel tanks will be 240 ft in diameter, 48 ft high, and have a floating roof. Based on conversations with the project structural designer, R&M Structural Engineering (R&M), the tanks can tolerate 8 in. of settlement at the center of the tanks. The perimeter of the tanks can tolerate up to 2 in. of total settlement and differential settlement of 1/2 in. over 32 ft.

Static Tank Settlement. Assuming a product unit weight of 52 pcf, we estimate the bearing pressure of the full tank filled with crude oil will be about 2,500 psf. Estimated total settlements at the center of tanks established at grade with no ground improvement under static conditions are summarized in Table 1 below. The range of settlements between tank locations is due primarily to the variable thickness of compressible silt soil in the tank area, which ranges from about 3 to 17 ft.

TABLE 1: TANK SETTLEMENT ESTIMATES

Location	Estimated Settlement, in. *
Northwest Tank	3 to 5.5
Middle North Tank	2 to 4.5
Northeast Tank	2 to 4.5
Southwest Tank	3.5 to 7
Middle South Tank	No Exploration Data
Southeast Tank	No Exploration Data

* Inner two-thirds of tank footprint

Settlements at the perimeter of the tanks are estimated to be about two-thirds of the settlement in the inner two-thirds of the tank. Subsurface explorations for the middle south and southeast tanks were not completed due to the presence of large stockpiles of scrap steel. Areas under the steel stockpiles will experience less consolidation settlement. Depending on the locations of the middle south and southeast tanks, the preloading by the stockpiles may result in significant differential settlement of the tanks. Additional field explorations and settlement analysis are planned for the middle south and southeast tanks when the area is accessible.

We anticipate 90% of the estimated settlement will occur over a timeframe of about 1 to 2 months. The estimated rate of settlement is based on available laboratory data and one-dimensional time-rate of

consolidation theory, and compares well with settlement data from recent projects completed at the Port. The actual time to achieve the settlement may vary from the theoretical estimates depending on natural variations in the compressibility of the underlying soils, the time that may be required for the load to be applied, and variations in seasonal groundwater levels. The maximum amount of settlement will occur after a period where the groundwater levels are at their lowest, which typically corresponds to the seasonally lowest levels of the Columbia River in the late summer and early fall. The settlement estimates in Table 1 are based on a low groundwater level of elevation 2.5 ft.

In addition to the settlement discussed above, it is likely the tank loads will result in a small amount of secondary compression, which typically occurs over a long period of time. We estimate less than 1 in. of secondary compression over 20 years.

As an additional consideration, a portion of the northeast tank footprint is currently occupied by a remnant of a former stormwater facility. It appears that 17 ft or more of fill will be needed to match existing grades. Because the fill will induce settlement, we recommend installing the fill at least 3 months prior to final grading of the tank pad so the fill-induced settlement can occur prior to tank construction.

Ground Improvement. Ground improvement methods will likely be required to limit consolidation (static) and liquefaction-induced settlements beneath the tanks. Preliminary evaluation of combined ground improvement by vibro-replacement (stone columns) and soil mixing is being completed by a foundation specialty contractor to meet static and seismic deformation criteria. Ground improvement methods to improve drainage, such as wick drains, can also be designed to reduce the timeframe for static settlement of the tanks to occur.

Water Testing. We understand the tanks will be filled with water to test for leaks and allow the tanks to settle prior to attaching exterior piping to the tanks. We estimate the tanks completely filled with water will induce a bearing pressure of about 3,000 psf. Surcharging the tanks to 3,000 psf and allowing sufficient time for consolidation to occur will reduce post-construction settlement. Although water testing the tanks will not reduce liquefaction-induced settlements, it may reduce the amount of overall ground improvement required to meet the foundation performance criteria.

Based on conversations with R&M Engineering Consultants, filling the tanks in approximate one-quarter capacity or greater increments to allow re-leveling of the tank at each stage is being considered as an alternative to mitigate static settlement. Estimates of the total settlement for each loading increment are tabulated below.

TABLE 2: SETTLEMENT DUE TO TANK PRELOADING

	Estimated Total Settlement, in. *			
Location	**1/4 Full of Water**	**1/2 Full of Water**	**3/4 Full of Water**	**Full of Water**
Northwest Tank	< 1	1 to 2.5	2.5 to 5.5	4 to 7.5
Middle North Tank	< 1	1 to 2	2.5 to 4.5	3 to 5.5
Northeast Tank	<1	1 to 2	1 to 4.5	3 to 5.5

	Estimated Total Settlement, in. *			
Location	**1/4 Full of Water**	**1/2 Full of Water**	**3/4 Full of Water**	**Full of Water**
Southwest Tank	< 1	1.5 to 3.5	3.5 to 7	5 to 9.5
Middle South Tank	No Exploration Data			
Southeast Tank	No Exploration Data			

* Inner two-thirds of tank footprint

The estimated settlements tabulated above are total settlement for a given loading. Incremental settlement is the difference between one load increment and another. We anticipate 90% of the settlement at each stage will occur over a timeframe of about 1 to 2 months.

As an alternative to filling the tanks with water, the tank footprints may be preloaded or surcharged with a temporary fill to reduce post-construction settlement. We estimate 25- to 30-ft-thick temporary fill placed above finished floor elevation will be necessary to induce a load equivalent to a full tank of water, depending somewhat on the material used to construct the temporary fill. The top edge of the temporary preload fill should extend a minimum of 5 ft beyond the limits of the planned tanks. The sides of the preload fill can be sloped at about 1.5H:1V. We estimate 90% of the preload or surcharge settlement will occur over a timeframe of about 1 to 2 months.

For areas surcharged with a full tank of water or an equivalent stockpile of fill and with no ground improvement, we estimate the subsequent post-construction static settlement resulting from the 2,500-psf tank service bearing pressure will be reduced to about 0.5 to 2 in. The estimates of the magnitude and rate of settlement in this section assume no ground improvement. As noted previously, ground improvement will reduce the magnitude and timeframe of settlement and would be designed by a specialty contractor.

Settlement Monitoring. We recommend monitoring settlement during water testing or preloading. The monitoring data will serve as the basis for evaluating the rate of filling and settlement, when additional stages can be completed, and the duration of the water testing or preloading. In our opinion, settlement plates will provide the most direct and effective method of monitoring movement during and following preloading if a stockpile fill is used. Survey markers on the side of the tanks will be the most effective if preloading the tanks with water is used. For water testing, settlement in the central portion of each tank can be measured by installing electronic settlement transducers beneath the tanks. We recommend installing at least three settlement plates or transducers within the central portion of each tank. In addition, we recommend at least three additional vibrating-wire piezometers installed beneath the tank locations to allow collection of available groundwater/piezometric data. Piezometric data can be used to estimate the degree of consolidation completed. Depending on the rate of fill construction, the settlement plates or survey markers should be surveyed twice a week during preloading or water testing. A typical settlement plate detail is shown on Figure 7.

It is important to collect groundwater level data during the course of preloading the tank. As mentioned in the Groundwater section of this report, vibrating-wire piezometers were installed in borings B-4 and B-7. Care should be taken to protect these piezometers to allow accurate recording of groundwater levels at the site, important for monitoring settlement during the preload or water testing period.

The settlement monitoring program should be further developed during final design of the tanks once the foundation preparation and support details are known.

Driven Piles. As an alternative to ground improvement and surcharging the site, the tanks could be supported on driven steel piles. Pile support can be designed using the criteria provided in Table 3 of the Driven Piles section of this report. LPILE criteria for Area 300 are provided in Table 4 of the Pile Lateral Load section of this report.

Area 300 Lightly Loaded Structures Foundation Support

It is our understanding the boiler structure, pump basin, control room, and fire pump and foam structure will be lightly loaded. The ancillary structures in the tank area can be supported on spread footings; however, without ground improvement, the structures could settle up to about 10 in. due to liquefaction. Spread footings could be designed using the criteria summarized in the Spread Footings section of this report. Seismic settlements of structures can be reduced to less than 1 in. by using driven pipe pile foundations. Pile support for the structures in Area 300 can be designed using the criteria provided in Table 3 in the Driven Piles section of this report. LPILE criteria for Area 300 are provided in Table 4 in the Pile Lateral Load section of this report. Alternatively, a foundation system consisting of spread footings following ground improvement could likely be designed to limit seismic settlements to acceptable levels.

Area 400 Marine Terminal

General. Area 400 includes about 1,050 ft of transfer pipeline, a transformer pad, E-house structure, fire pump and foam structure, and vapor control unit. The layout is shown on Figure 5. Improvements planned for the existing dock structure and moorage dolphins are outside the scope of this report and will be addressed in a supplemental report. It is our understanding the transfer pipeline, structures, and transformer pad will be lightly loaded. As discussed in the Seismic Considerations section of this report, we estimate 12 to 24 in. of liquefaction-induced settlement in Area 400 and tens of feet of lateral spread within 100 ft of the riverbank slope. As shown on the Figure 5, approximately 1,050 ft of the transfer pipeline will be located within about 100 ft of the riverbank, including a section that extends into Area 500. Due to the potential for large lateral spreading deformations, it is our opinion that ground improvement will likely be required to mitigate the impact of large seismic lateral displacements on the proposed pipeline and structures located near the river.

We anticipate foundation support can be designed using the criteria provided in the Spread Footing or Pile Foundation sections of this report. However, foundation support for the Area 400 structures will depend on the ground improvement design, including the type of ground improvement and the performance criteria. Recommendations for support of structures in Area 400 should be evaluated concurrently with design of the ground improvement during final design of the facility.

Ground Improvement. Ground improvement, such as vibro-compaction or stone column methods, can be designed to reduce lateral spreading deformations and liquefaction-induced settlements within Area 400. Lateral spreading is typically mitigated by the construction of a zone, or buttress, of densified (improved) soil along the riverbank. We anticipate the ground improvement buttress for Area 400 will be constructed by a specialty contractor in accordance with plans and performance specifications developed by the design team.

The design of ground improvement (type, depth, width, and length) depends on the project performance criteria, such as allowable deformations and lateral loads on structures. The design will require detailed discussions with the project team to develop the performance criteria. For preliminary planning and cost estimating, we estimate a ground improvement buttress will be on the order of 90 ft deep, 100 ft wide, and extend about 100 ft beyond the upstream and downstream ends of the project improvements (about 1,200 ft along the river). The dimensions of the buttress could vary significantly based on the type of ground improvement used. It should be noted that portions of the transfer pipeline are located adjacent to the East Landfill Cap. Due to restrictions associated with the landfill, geotechnical borings were not completed within the landfill boundaries.

Area 500 Transfer Pipelines

General. Based on discussions with the design team, foundation support for the pipeline will consist of spread footings or driven pipe piles. In Area 500, for unimproved ground conditions, we estimate the liquefaction-induced settlement of spread footings will be in the range 3 to 15 in., and lateral spreading deformations may occur within about 1,100 ft of the river based on the MCE_G hazard level. As noted in the discussion above for Area 400, we anticipate a ground improvement buttress will be installed along the riverbank to mitigate lateral spreading deformations that could affect the pipeline. In our opinion, a ground improvement buttress would also mitigate lateral spreading of upland areas behind the improved zone, including the north-south run of pipeline that extends from the river north along Gateway Avenue.

Foundation Support. It is our understanding the pipeline will be lightly loaded. We estimate up to 15 in. of liquefaction-induced settlement of the pipeline if supported on spread footings. Spread footings can be designed using the criteria summarized in the Spread Footings section of this report. Seismic settlements of structures can be reduced to less than 1 in. by using driven pipe pile foundations. Pile support for the pipeline in Area 500 can be designed using the criteria provided in Table 3 of the Driven Piles section of this report. LPILE criteria for Area 500 are provided in Table 4 of the Pile Lateral Load section of this report. Alternatively, a foundation system consisting of spread footings following ground improvement could likely be designed to limit seismic settlements to acceptable levels. As previously noted, a portion of the Area 500 pipeline is located adjacent to the riverbank and may require ground improvement. Foundation support for that section should be developed in conjunction with the design of the ground improvement as discussed for Area 400.

Spread Footings (Areas 200, 300, 400, 500, and 600)

The lightly loaded structures in Areas 200, 300, 400, 500, and 600 can be supported on conventional spread footings established in medium dense sand fill, undisturbed silt, or new structural fill. However, as noted in the above report sections regarding specific project areas, relatively large seismic-related settlements are estimated for spread footings unless ground improvement is undertaken.

Based on the borings completed for this project and for past projects at the Port, most of the project area is mantled by at least 5 to 10 ft of medium dense sand fill. However, explorations for previous work at the Port indicate a lesser thickness of fill is present along the proposed pipeline alignment between Gateway Avenue and the new Gateway Avenue bridge. Where there is less fill, silt subgrade may be present at the bottom of the footings. Footings should be established in firm, undisturbed soil or compacted structural fill at a minimum depth of 18 in. below the lowest adjacent finished grade. The width of footings should not be less 24 in. All foundation subgrade should be observed by a qualified geotechnical engineer. Soft,

loose, or unsuitable soils encountered at footing subgrade should be overexcavated and backfilled with granular structural fill. Excavations for all footings should be made using a smooth-edged bucket and evaluated by a geotechnical engineer. For spread footings established in silt or silty sand during wet weather conditions, we recommend placing a minimum 3 in. of crushed rock over the subgrade to prevent disturbance and softening by construction activities.

Settlement estimates for square and continuous/rectangular spread footings founded on silt subgrade in accordance with the above criteria are shown on Figure 8. The figure summarizes settlement as a function of column load, bearing pressure, and footing dimensions. As previously noted, we anticipate that most of the footings will be underlain by medium dense sand fill, and the settlement estimates for footings underlain by at least 2 ft of sand can be reduced by about 20%.

The bearing pressures apply to the total of dead load plus permanently and/or frequently applied live load and can be increased to 2,500 psf for the total of all loads; dead, live, and wind or seismic. For seismic conditions, the 2,500-psf seismic allowable bearing capacity includes a factor of safety of about 2 and assumes the footings are underlain by at least 2 ft of medium dense to dense sand subgrade. The minimum 2-ft thickness of granular fill should be verified during construction, and some overexcavation and backfilling with granular structural fill should be anticipated. The ultimate bearing capacity for seismic loading depends somewhat on the amount of foundation soil that is submerged and susceptible to soil strength reduction due to liquefaction of soils during the design earthquake. We have assumed a groundwater elevation of +12 ft during seismic loading.

Horizontal shear forces can be resisted partially or completely by frictional forces developed between the base of the spread footing foundations and the underlying soil and by soil passive resistance. The total frictional resistance between the footing and the soil is the normal force times the coefficient of friction between the soil and the base of the footing. We recommend using an ultimate value of 0.35 for the coefficient of friction; the normal force is the sum of the vertical forces (dead load plus real live load). If additional lateral resistance is required, passive earth pressures against embedded footings can be computed on the basis of an equivalent fluid having a unit weight of 250 pcf. This design passive earth pressure value assumes that backfill around footings will be placed as granular structural fill.

If ground improvement is used to mitigate seismic settlement of lightly loaded structures, the allowable bearing pressure could likely be increased accordingly depending upon the type and design of the ground improvement.

Driven Piles (Areas 200, 300, 400, 500, and 600)

As discussed in the above report sections for Areas 200 through 600, elements of the improvements that cannot tolerate the estimated static and/or liquefaction-induced settlements can be supported on driven steel piles. Although pile structural loads are not available at this time, we anticipate that with the exception of Area 300 the piles will be relatively lightly loaded. However, due to potential loss of support and downdrag loading as a result of liquefaction and seismic settlement, the piles will need to be driven to the underlying gravel to minimize the risk of pile settlement during the design earthquake. To develop sufficient end bearing capacity and minimize penetration into the gravel, we recommend driving the piles closed end with a flush-fitting end plate. Recommended ultimate capacities for potential pipe pile sizes driven into the gravel are provided for each Area in the table below for the static and seismic cases. As

previously indicated, pile foundation recommendations for Area 400 should be developed after ground improvement has been designed for the Area.

TABLE 3: ULTIMATE PILE CAPACITIES

AREAS 200, 500, AND 600

Pile Size	Ultimate Capacity, kips		Seismic Downdrag Load, kips
	Static	Seismic *	
PP 12.75 x 0.500-in.	420	325	90
PP 16 x 0.500-in.	650	525	110

* Includes downdrag reduction

Assumed gravel elevation for pile design:

Area 200 and 600 = below elevation -60 ft
Area 500 = below elevation -34 ft

AREA 300

Pile Size	Ultimate Capacity, kips		Seismic Downdrag Load, kips
	Static	Seismic *	
PP 12.75 x 0.500-in.	420	375	60
PP 16 x 0.500-in.	650	500	80
PP 24 x 0.500-in.	1,000	910	120

* Includes downdrag reduction

Assumed gravel elevation for pile design:

Area 300 = below elevation -28 ft

The ultimate capacities in the above table are based on soil-support considerations and may be limited by structural properties. Based on soil support properties, a factor of safety (FS) of 2 is recommended for the static case, and a FS of 1.5 is recommended for the seismic case. The ultimate capacities assume piles will have a minimum center-to-center spacing of at least three diameters (3D). The seismic capacity includes a reduction due to liquefaction and downdrag loading. Estimated seismic downdrag loads should be included in the structural design of piles. However, downdrag loads do not have to be included in determining the allowable seismic capacity because the seismic capacity includes a reduction for downdrag. For piles embedded at least 5 ft into dense gravel, we estimate that static and seismic settlements will be limited to about the elastic shortening of the piles. We conservatively estimate that the piles may penetrate up to 10 to 15 ft into the gravel. Structural loads on the piles are not available at this time, and we acknowledge that other pile types or sizes may be used to support the structural loads. The use of driven grout piles as an alternative pile type is discussed in our July 18, 2013, progress memorandum for Area 300 referenced on page 1. Larger pile capacities, if needed, may be feasible. Steel pipe piles driven to practical refusal in the gravel with a sufficiently large pile-driving hammer can essentially develop the allowable structural capacity of the pile section.

The appropriate size of impact hammer to drive the piles into the gravel and develop sufficient end-bearing resistance will depend on the actual design pile capacities. The appropriate hammer size should be evaluated on a preliminary basis with a wave equation analyses using the computer program GRLWEAP published by Pile Dynamics, Inc. We recommend completing widely spaced Pile Dynamic Analyzer (PDA) testing during the initial pile installation to evaluate the appropriate terminal driving criteria. Restrike testing after a 24-hour waiting, or set-up, period can also be used to evaluate the ultimate pile capacity using the Modified Gates equation.

Pile Lateral Loads. For conditions of lateral loading, we anticipate the piles will be evaluated using the computer software L-Pile Plus developed by Ensoft, Inc. of Austin, Texas. For lateral load analysis, we have assumed the water table is at elevation +12 ft (NGVD) to correspond to seasonally averaged high water levels for the nearby Columbia River.

Recommended input parameters for the various soil units for L-Pile analysis are tabulated below for static and seismic conditions. The parameters for use in L-pile for liquefied soil conditions were calculated using the residual undrained shear strength evaluated using the relationship between clean-sand corrected N-values (SPT test) and residual strength described by Idriss and Boulanger (2007). Residual undrained shear strength and effective overburden pressure were then used to estimate a reduced soil friction for liquefied conditions and a corresponding initial modulus, k_i.

TABLE 4: SOIL PROPERTIES FOR L-PILE ANALYSIS

AREAS 200 AND 600

				Soil Properties				
Soil Unit	**Elevation, ft (NGVD 29)**	**L-Pile Soil Type**	**Condition**	**K, pci**	**γ′, pci**	**ϕ′**	**c, psi**	**ε_{50}**
Fill	Above +24	Sand (Reese)	Static & Seismic	60	0.067	34	N/A	N/A
SILT	+12 to +24	Soft Clay	Static	N/A	0.06	N/A	2.1	0.02
		Soft Clay	Seismic	N/A	0.06	N/A	1.7	0.02
Submerged SILT[1]	-3 to +12	Soft Clay	Static	N/A	0.025	N/A	2.1	0.02
		Sand (API)	Seismic	10	0.025	4	N/A	N/A
Submerged SAND[1]	-60 to -3	Sand (Reese)	Static	60	0.030	35	N/A	N/A
		Sand (API)	Seismic	10	0.030	12	N/A	N/A
Submerged GRAVEL[1]	Below -60	Sand (Reese)	Static & Seismic	125	0.04	40	N/A	N/A

AREA 300

				Soil Properties				
Soil Unit	**Elevation, ft**	**L-Pile Soil Type**	**Condition**	**K, pci**	**γ′, pci**	**ϕ′**	**c, psi**	**ε_{50}**
Fill	Above +12	Sand (Reese)	Static & Seismic	150	0.07	36	N/A	N/A
Submerged SILT[1]	+12 to -4	Soft Clay	Static	N/A	0.025	N/A	3.5	0.02
		Soft Clay	Seismic	N/A	0.025	N/A	2.8	0.02
Submerged SAND[1]	-4 to -30	Sand (Reese)	Static	60	0.030	35	N/A	N/A
		Sand (API)	Seismic	10	0.030	12	N/A	N/A

Submerged GRAVEL[(1)]	Below -30	Sand (Reese)	Static & Seismic	125	0.04	40	N/A	N/A

AREA 500 (NORTH OF HARBORSIDE DRIVE [3])

				Soil Properties				
Soil Unit	**Elevation, ft**	**L-Pile Soil Type**	**Condition**	**K, pci**	**γ′, pci**	**ϕ′**	**c, psi**	**ε50**
Fill	Above +24	Sand (Reese)	Static & Seismic	60	0.07	35	N/A	N/A
Sand and Silt	+24 to +12	Soft Clay	Static & Seismic	N/A	0.064	N/A	3.2	0.02
Submerged Sand and Silt	+12 to -16	Soft Clay	Static	N/A	0.028	N/A	3.2	0.02
		Soft Clay	Seismic	N/A	0.028	N/A	0.6	0.02
Submerged SAND	-16 to -34	Sand (Reese)	Static	60	0.030	35	N/A	N/A
		Sand (API)	Seismic	10	0.030	12	N/A	N/A
Submerged GRAVEL	Below -34	Sand (Reese)	Static & Seismic	125	0.04	40	N/A	N/A

AREA 500 (SOUTH OF HARBORSIDE DRIVE [3])

				Soil Properties				
Soil Unit	**Elevation, ft**	**L-Pile Soil Type**	**Condition**	**K, pci**	**γ′, pci**	**ϕ′**	**c, psi**	**ε50**
Fill	Above +21	Sand (Reese)	Static & Seismic[4]	60	0.07	35	N/A	N/A
Sand and Silt	+21 to +12	Sand (Reese)	Static & Seismic[4]	25	0.064	32	N/A	N/A
Submerged Sand and Silt	+12 to -7	Sand (Reese)	Static	20	0.028	32	N/A	N/A
		Sand (API)	Seismic[4]	10	0.028	6	N/A	N/A
Submerged SAND	-7 to -57	Sand (Reese)	Static	60	0.030	35	N/A	N/A
		Sand (API)	Seismic[3,5]	10	0.030	12	N/A	N/A
Submerged GRAVEL	Below -57	Sand (Reese)	Static & Seismic	125	0.04	40	N/A	N/A

Notes:

1) Submerged soils are below the groundwater level.
2) Groundwater table assumed at elevation +12 ft NGVD.
3) Harborside Drive is identified on Project Layout Plan, Figure 2.
4) Assumes no lateral spreading due to ground improvement in Area 400.

The soil properties provided in Table 4 will be affected by ground improvement. If piles are installed through areas where ground improvement is used to mitigate liquefaction, the static soil properties are appropriate for use in the seismic case to the depth of the ground improvement.

It should be noted that L-pile provides isolated single-pile capacities. Depending on the direction of the loading and layout of the piles, group effects may need to be considered. Group effects can be modeled in L-pile by applying an appropriate p-modifier in non-liquefiable soils. The p-modifier is a function of the center-to-center spacing and tabulated below.

TABLE 5: P-MODIFIERS FOR GROUP EFFECTS

Center-to-Center Pile/Shaft Spacing	P-Modifiers for Rows 1, 2, and 3+
3D	0.8, 0.4, 0.3
5D	1.0, 0.85, 0.7

For liquefied conditions the p-modifier is 1.0

If additional lateral resistance is required, passive earth pressures against embedded pile caps can be computed on the basis of an equivalent fluid having a unit weight of 325 pcf. This passive earth pressure would be applicable only if the backfill for the pile caps is placed as granular structural fill and above the groundwater level.

Site Preparation and Earthwork

Demolition of improvements within the limits of the new structures and pipelines should include removal of existing pavements; floor slabs; foundations and walls; underground utilities, and associated unsuitable backfill. Where fine-grained subgrade soils are present, we recommend using hydraulic excavators equipped with smooth cutting edges for site stripping and excavation. Excavations made during demolition to remove existing improvements should be backfilled with structural fill.

In previously unimproved areas, the ground surface within areas of mass grading or within the limits of proposed pathways or structures should be stripped of vegetation, surface organics, and loose surface soils. We estimate that stripping will generally be necessary to a depth of about 4 to 6 in. in the lightly vegetated areas. Strippings should be removed from the site or used in landscaped areas. Following stripping and prior to filling, the resulting subgrade should be evaluated by the geotechnical engineer for the presence of soft areas. If present, soft areas should be overexcavated and replaced with compacted structural fill as described below. During and following stripping and excavation, the contractor must use care to protect the subgrade from disturbance by construction traffic.

The borings, CPT probes, and existing geotechnical information indicate the site is typically surfaced with sand fill or crushed rock base course. These materials will generally provide a good working surface; however, the contractor will need to use care during wet conditions to avoid disturbing and loosening the subgrade. Sand subgrade should be moisture conditioned and compacted with a medium- to large-size vibratory roller to meet the compaction criteria of structural fill immediately prior to fill placement. Recommendations for structural fill are provided in the Structural Fill section below.

Due to the variable nature of the fill at the site, it should be anticipated that silty soils will be encountered near the ground surface in localized areas. Silty soil is fine grained and sensitive to moisture content. During wet conditions, silty soils are easily disturbed, rutted, and weakened by construction activities. If silty subgrade is encountered during site stripping, haul roads or work pads constructed of imported granular fill will be needed to provide access and protect areas of fine-grained subgrade from damage due to construction traffic during wet conditions. In our opinion, a 12-in.-thick granular work pad should be sufficient to prevent disturbance of the silt subgrade by lighter construction equipment and limited traffic by dump trucks. Haul roads and other high-density traffic areas will require at least 18 to 24 in. of crushed rock to prevent subgrade deterioration. Any subgrade soils that are disturbed by construction activity should be overexcavated to firm soil and backfilled with structural fill placed and compacted as

recommended in the Structural Fill section of this report. Haul road requirements will be minimized if work is accomplished during the driest months of the year. The performance of haul roads can usually be improved by placing a geotextile fabric over the fine-grained subgrade soils prior to placing the rock.

Temporary cut and fill slopes should be 1H:1V or flatter. Permanent cut and fill slopes should be constructed at 2H:1V or flatter. Containment berms will be constructed around the tank farm in Area 300. The berms will likely be constructed of sand obtained within the project limits or imported materials. Sand can be placed as structural fill and maintain 2H:1V side slopes. However, the surface of the berm slopes may experience shallow sloughing due to wetting/drying and freeze/thaw cycles. Periodic maintenance may be required and can be minimized by initially overbuilding the structural fill and subsequently trimming back to the neat slope lines, or by constructing the berms with a flatter slope.

Structural Fill

On-site soils that are free of organics and other deleterious materials and debris are suitable for construction of compacted structural fill. As noted above, it should be anticipated that near-surface, silty soils will be encountered locally. Silty soils are sensitive to moisture content and can be placed and adequately compacted only during the dry, summer months. For construction during the wet, winter and spring months, fills should be constructed using granular materials that are relatively clean, i.e., less than about 7% passing the No. 200 sieve (washed analysis), such as on-site surficial sand fill material.

In general, approved on-site or imported, organic-free, fine-grained sand and silty soils used to construct structural fills within areas of mass filling, structures, and pathways should be placed in 9-in.-thick lifts (loose) and compacted to at least 95% of the maximum dry density as determined by ASTM D 698. Pieces of rock or concrete larger than about 6 in. should be removed from the fill prior to compaction. Fill placed in landscaped areas should be compacted to a minimum of about 90% of the maximum dry density as determined by ASTM D 698. The moisture content of structural fill soils at the time of compaction should be controlled to within 3% of optimum. Some moisture conditioning of fine-grained sand and silty soils may be required to achieve the recommended compaction criteria. All structural fills should extend a minimum horizontal distance of 5 and 2 ft beyond the limits of structures and pavement areas, respectively. Vibratory equipment is most effective for compacting the on-site sand and imported granular materials.

On-site or imported granular material used to construct structural fills or work pads during wet weather can consist of relatively clean granular material, such as sand, sand and gravel, or crushed rock with a maximum size of about 4 in. and with not more than about 7% passing the No. 200 sieve (washed analysis). The first lift of granular fill material placed over silt subgrade should be in the range of 12 to 18 in. thick (loose). Subsequent lifts should be placed 12 in. thick (loose). All lifts should be compacted to at least 95% of the maximum dry density as determined by ASTM D 698 using a medium-weight (48-in.-diameter drum), smooth, steel-wheeled, vibratory roller. Generally, a minimum of four passes with the roller are required to achieve compaction.

Backfill placed in utility trench excavations within the limits of the roadways, pavements, or structures should consist of sand, sand and gravel, or crushed rock with a maximum size of up to $1^1/_2$ in. and not more than 7% passing the No. 200 sieve (washed analysis). The granular backfill should be compacted to

at least 95% of the maximum dry density as determined by ASTM D 698. Flooding or jetting the backfilled trenches with water to achieve the recommended compaction should not be permitted.

Utilities

In our opinion, there are three major considerations associated with design and construction of new utilities.

1) Provide stable excavation side slopes or support for trench sidewalls to minimize loss of ground.
2) Provide a safe working environment during construction.
3) Minimize post-construction settlement of the utilities and ground surface.

The method of excavation and design of trench support is the responsibility of the contractor and subject to applicable local, state, and federal safety regulation, including the current OSHA excavation and trench safety standards. The means, methods, and sequencing of construction operations and site safety are also the responsibility of the contractor. The information provided below is for the use of our client and should not be interpreted to mean that we are assuming responsibility for the contractor's actions or site safety.

According to current OSHA regulations, the majority of the sand, fine-grained soils, and gravelly materials encountered in the explorations may be classified as Type C. In our opinion, trenches less than 4 ft deep that do not encounter groundwater or sandy soils may be cut vertically and left unsupported during the normal construction sequence, i.e., assuming trenches are excavated and backfilled in the shortest possible sequence, and excavations are not allowed to remain open longer than 8 hours. Excavations more than 4 ft deep or through sandy soils should be laterally supported or alternatively provided with stable side slopes of 1H:1V or flatter. In our opinion, adequate lateral support may be provided by common methods, such as the use of a trench shield or hydraulic shoring systems.

Groundwater seepage, running soil conditions, and unstable trench sidewalls or soft trench subgrades, if encountered, will require dewatering of the excavation and trench sidewall support. The impact of these conditions can be minimized by completing trench excavation during the summer months when groundwater levels are lowest and by minimizing the depth of the trenches. All excavation sidewalls should be properly sloped or shored to conform to applicable local, state, or federal regulations. The design of dewatering systems is the responsibility of the contractor. However, we anticipate that groundwater inflow, if encountered, can be controlled by pumping from sumps.

Design Review and Construction Services

We welcome the opportunity to review and discuss construction plans and specifications for this project as they are being developed. In addition, GRI should be retained to review all geotechnical-related portions of the plans and specifications to evaluate whether they are in conformance with the recommendations provided in our report. Additionally, to observe compliance with the intent of our recommendations, design concepts, and the plans and specifications, we are of the opinion that all construction operations dealing with earthwork, ground improvement and pile installation should be observed by a GRI representative. Our construction-phase services will allow for timely design changes if site conditions are encountered that are different from those described in our report. If we do not have the opportunity to

confirm our interpretations, assumptions, and analyses during construction, we cannot be responsible for the application of our recommendations to subsurface conditions that are different from those described in this report.

LIMITATIONS AND CONCLUDING REMARKS

This report has been prepared to aid the project team in the design of the project. The scope is limited to the specific project and location described herein, and our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of the earthwork and foundations. In the event that any changes in the design and location of the project elements as outlined in this report are planned, we should be given the opportunity to review the changes and to modify or reaffirm the conclusions and recommendations of this report in writing.

The conclusions and recommendations submitted in this report are based on the data obtained from the borings and probes made at the locations indicated on Figures 2 through 5 and from other sources of information discussed in this report. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is acknowledged that variations in soil conditions may exist between exploration locations. This report does not reflect any variations that may occur between these locations. The nature and extent of variation may not become evident until construction. If, during construction, subsurface conditions different from those encountered in the explorations are observed or encountered, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Submitted for GRI,

(12/20/13) *Expires 4/2014*

Dwight J. Hardin, PE Principal	Matthew S. Shanahan, PE Associate	Brian J. Bayne, PE Project Engineer

This document has been submitted electronically.

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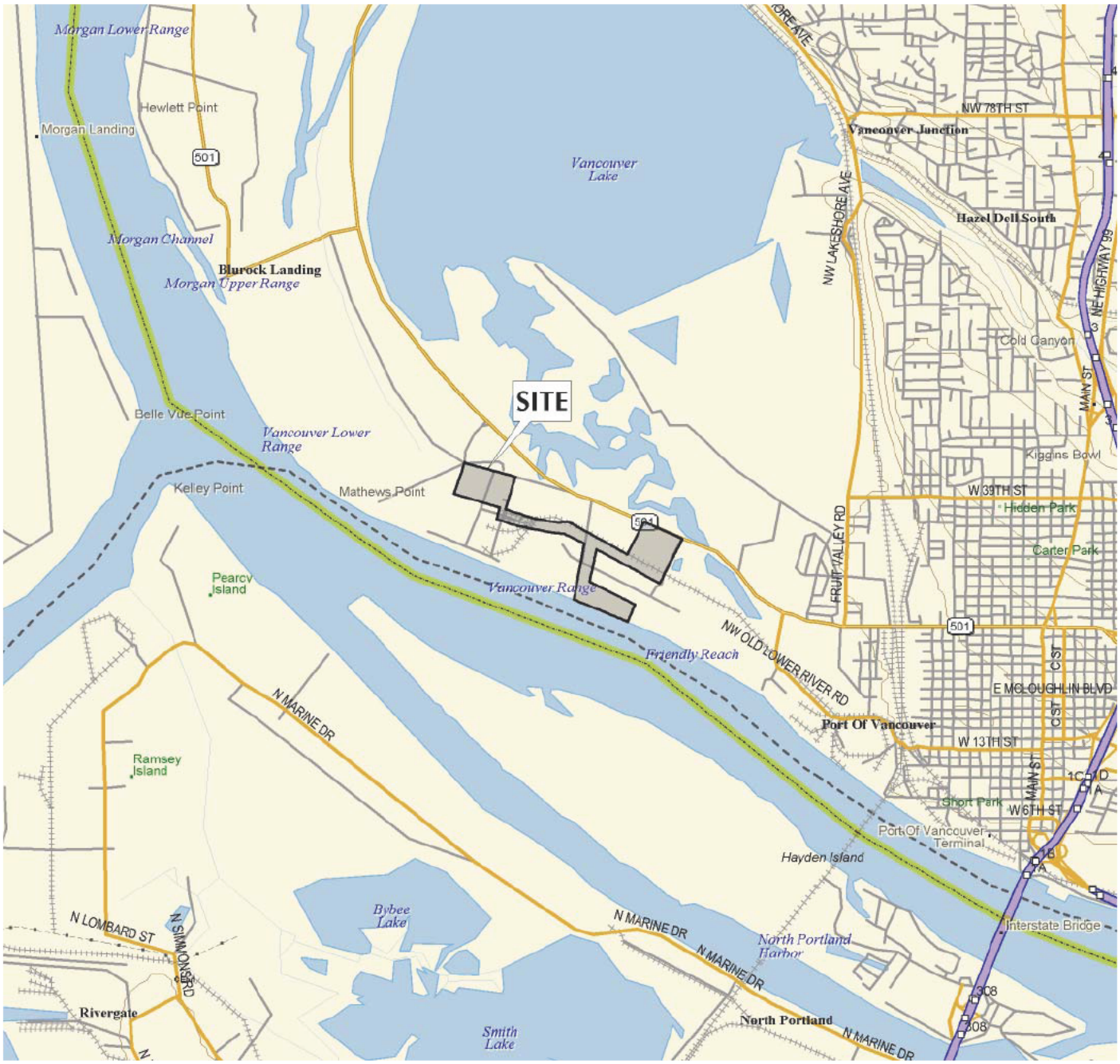

DELORME 3-D TOPOQUADS, WASHINGTON
VANCOUVER, WASH. (3cb, 3ca, & 3db) 2004

North

0 1 2 MILES

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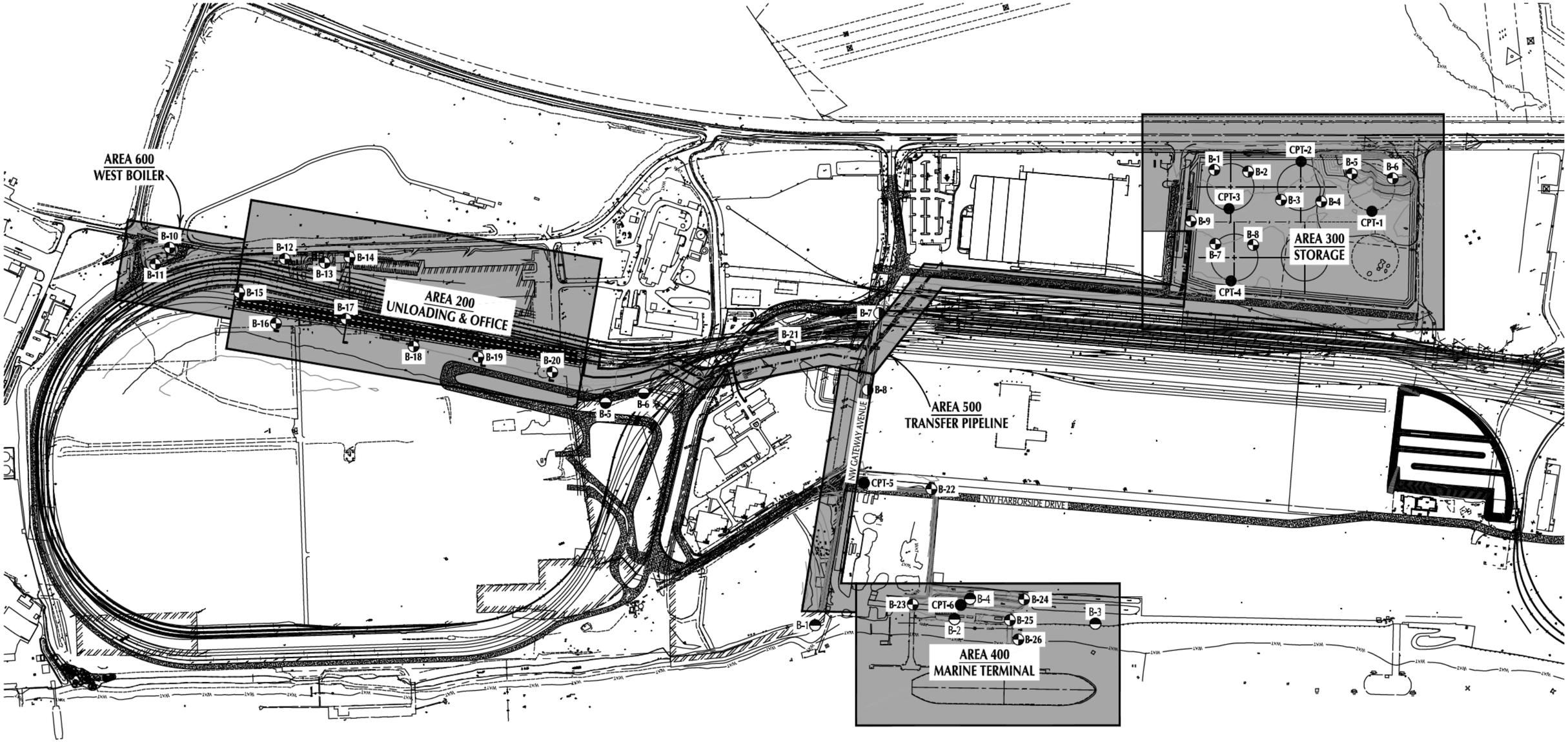
TSVEDT-UPLAND FACILITY

VICINITY MAP

DEC. 2013 JOB NO. W1114-T2 FIG. 1



BORING MADE BY GRI
(JUNE 5 - OCTOBER 29, 2013)

CONE PENETRATION TEST MADE BY GRI
(JUNE 6, - AUGUST 5, 2013)

BORING MADE BY GRI
(JANUARY 18 - 19, 2011)

BORING MADE BY GRI
(SEPTEMBER 6 - 11, 2006)

BORING MADE BY DAMES & MOORE
(1993)

SITE PLAN FROM FILE BY MACKAY + SPOSITO

North

0 500 1,000 FT

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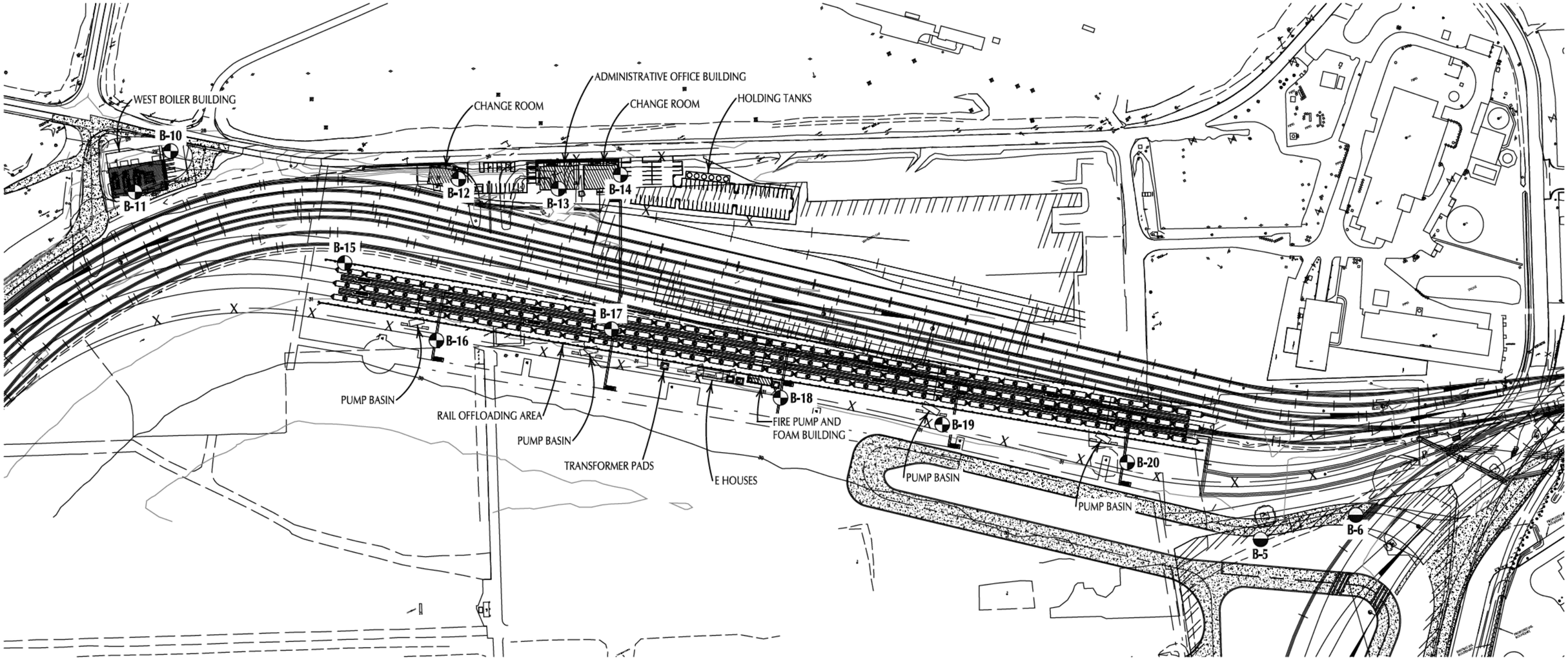
PROJECT LAYOUT PLAN

DEC. 2013 JOB NO. W1114-T2 FIG. 2



BORING MADE BY GRI
(JULY 1 - 9, 2013)

BORING MADE BY GRI
(JANUARY 18 - 19, 2011)

SITE PLAN FROM FILE BY MACKAY + SPOSITO

North

0 200 400 FT

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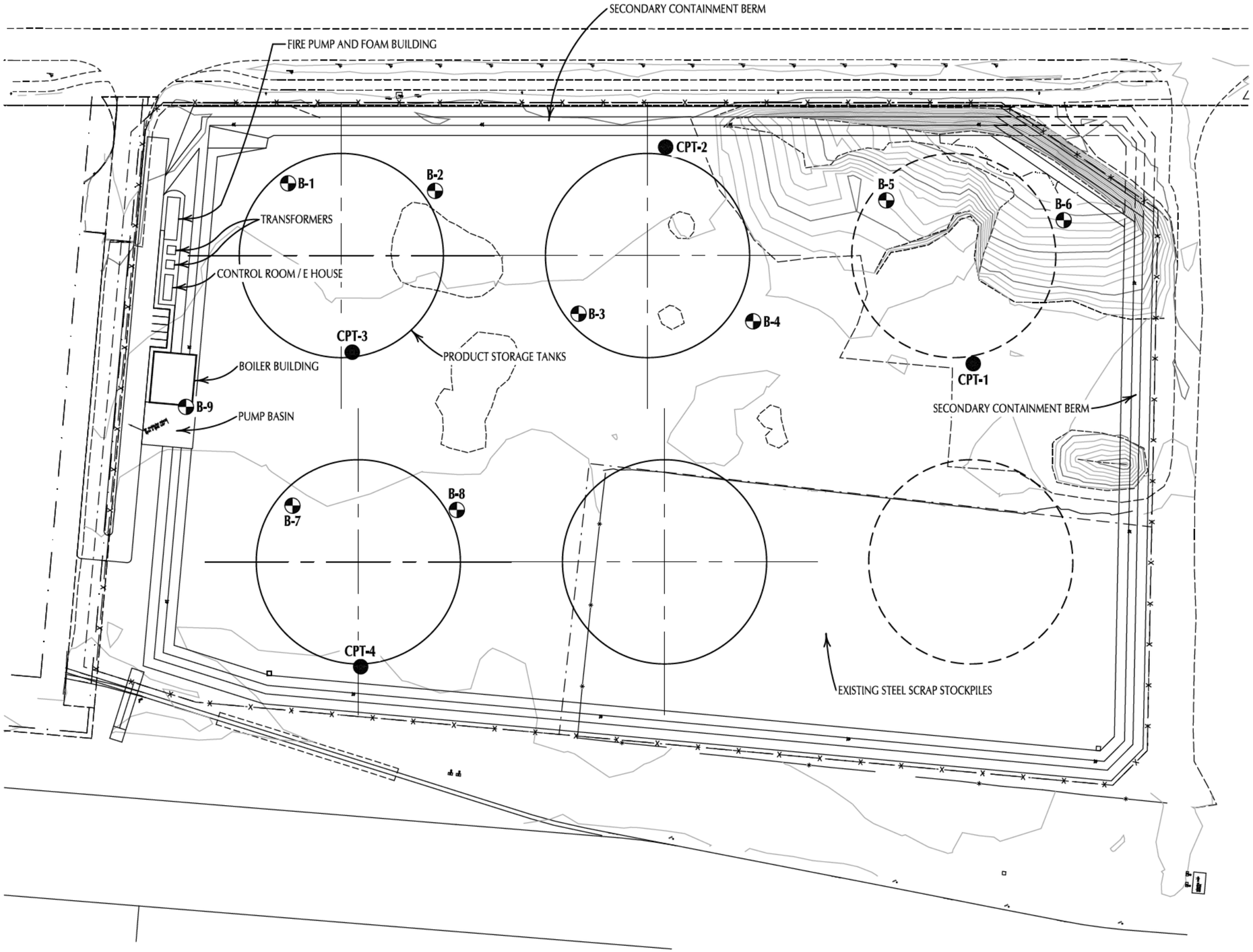
SITE PLAN

(AREAS 200 AND 600 - UNLOADING AND OFFICE / WEST BOILER)

DEC. 2013 JOB NO. W1114-T2 FIG. 3



BORING MADE BY GRI
(JUNE 5 - 11, 2013)

CONE PENETRATION TEST MADE BY GRI
(JUNE 6 - 10, 2013)

SITE PLAN FROM FILE BY MACKAY + SPOSITO

North

0 120 240 FT

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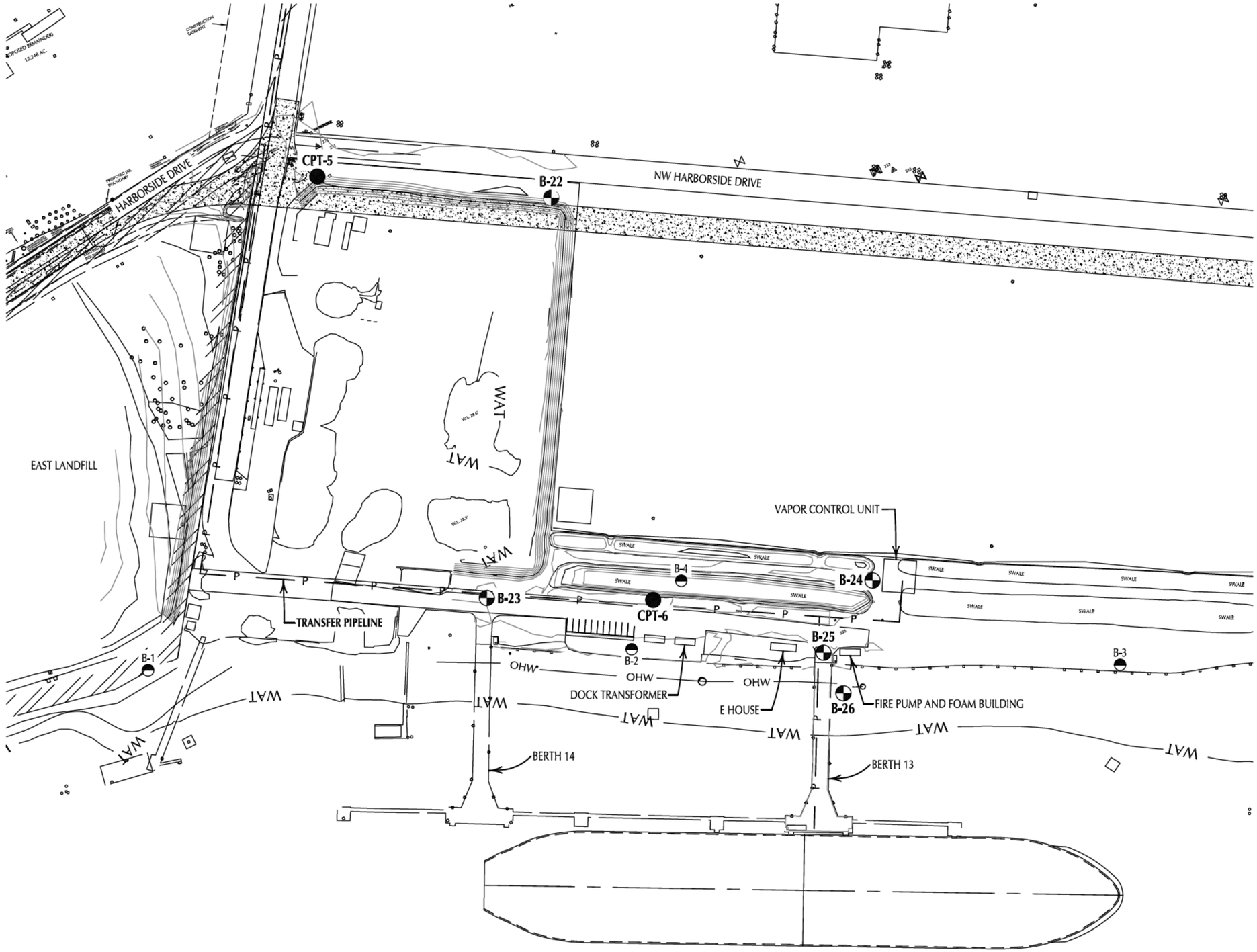
SITE PLAN
(AREA 300 - STORAGE)

DEC. 2013 JOB NO. W1114-T2 FIG. 4



BORING MADE BY GRI
(JULY 29 - OCTOBER 29, 2013)

CONE PENETRATION TEST MADE BY GRI
(JULY 29 - AUGUST 5, 2013)

BORING MADE BY DAMES & MOORE
(1993)

SITE PLAN FROM FILE BY MACKAY + SPOSITO

North

0 150 300 FT

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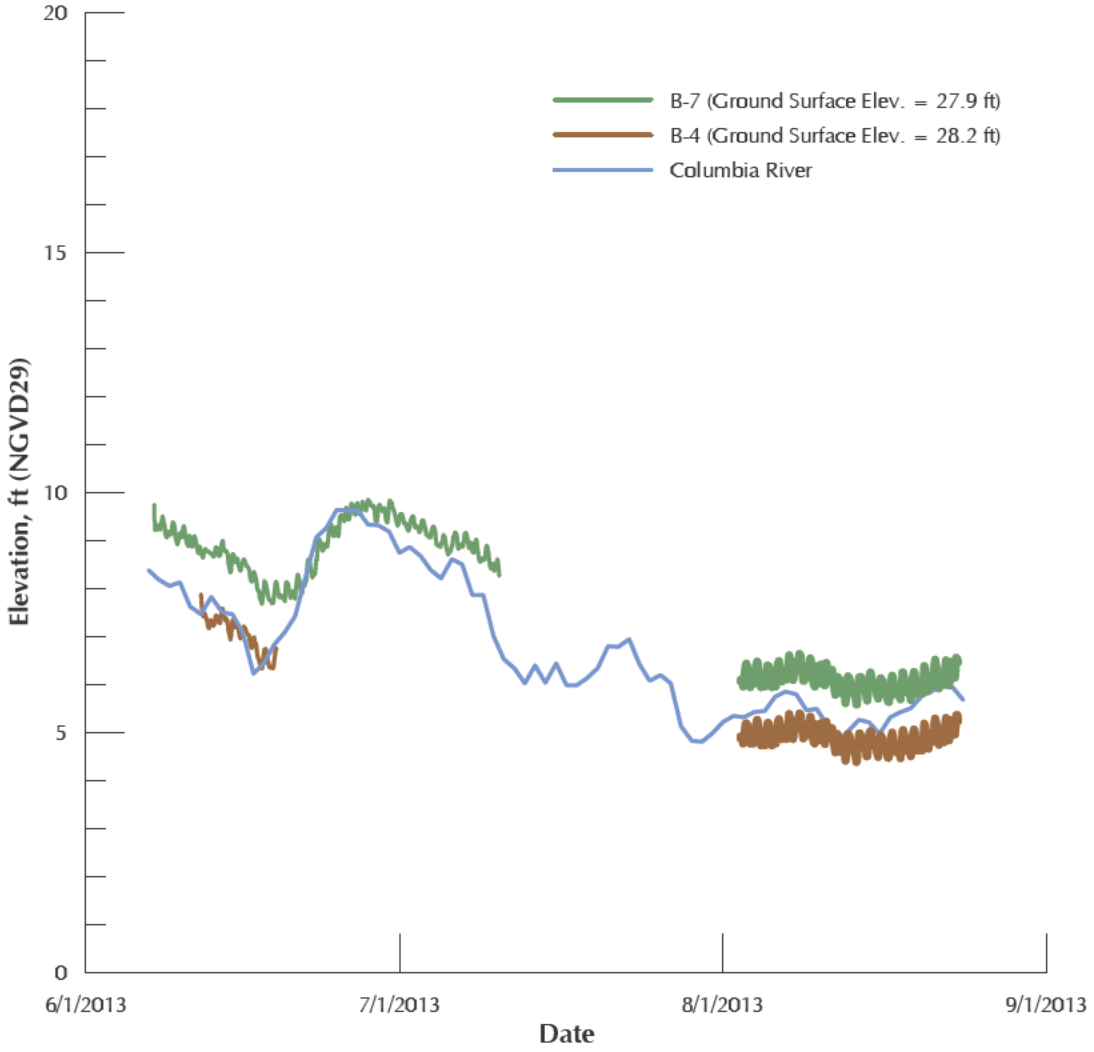
SITE PLAN

(AREA 400 - MARINE TERMINAL)

DEC. 2013 JOB NO. W1114-T2 FIG. 5



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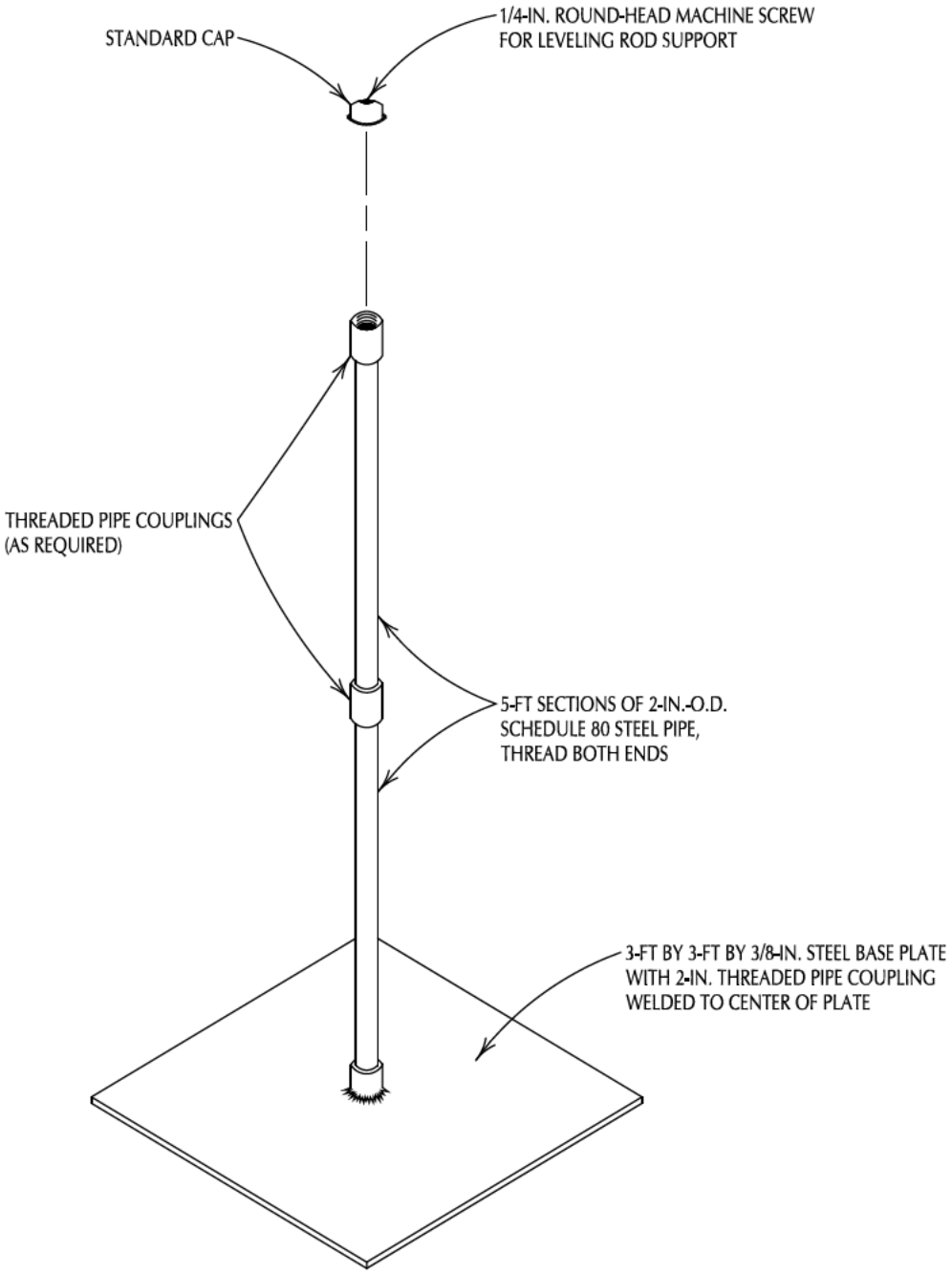
SUMMARY OF PIEZOMETERS

(AREA 300)

DEC. 2013 JOB NO. W1114-T2 FIG. 6



NOT TO SCALE

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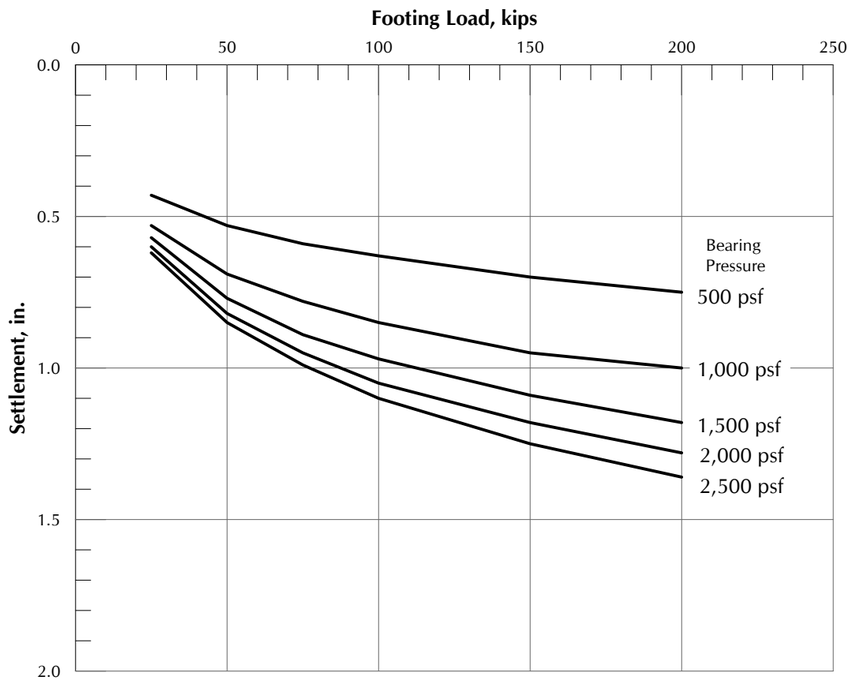
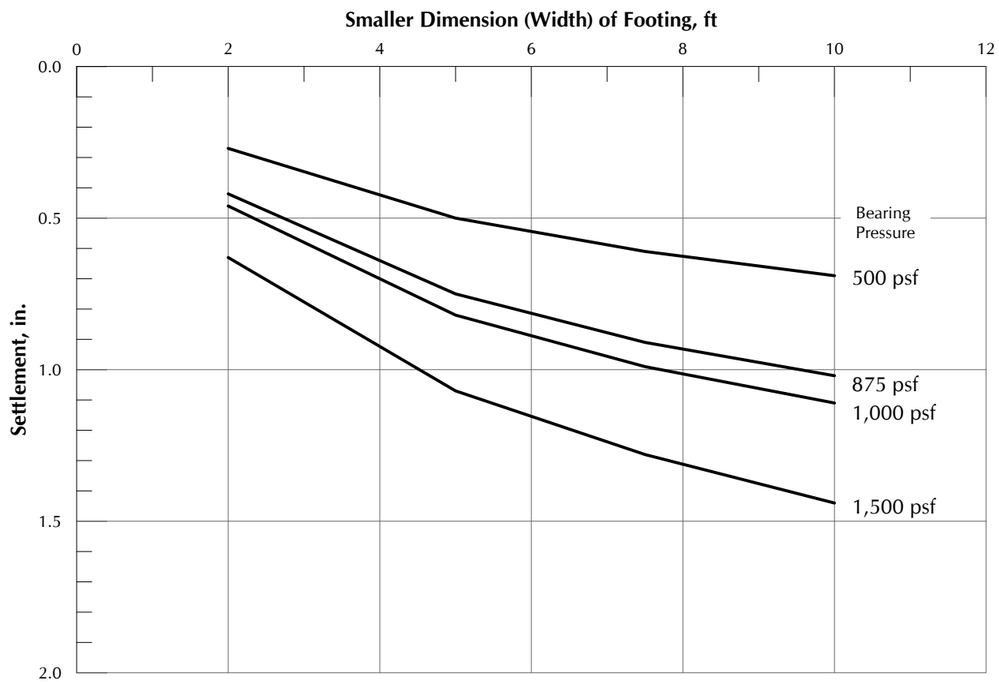
SETTLEMENT PLATE DETAIL

DEC. 2013 JOB NO. W1114-T2 FIG. 7

Square Footing Bearing Chart



Continuous/Rectangular Footing Bearing Chart



Settlement estimates are for footings established on silt subgrade. As noted in the text of this report, the majority of the footings will be founded in medium dense sand fill, and settlement estimates for footings underlain by at least 2 ft of sand can be reduced by 20%

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ESTIMATED FOOTING SETTLEMENT

DEC. 2013 JOB NO. W1114-T2 FIG. 8

APPENDIX A

Field Explorations, Instrumentation, and Laboratory Testing

APPENDIX A

FIELD EXPLORATIONS, INSTRUMENTATION, AND LABORATORY TESTING

FIELD EXPLORATIONS

General

Subsurface materials and conditions in the upland project area were investigated with 26 borings and six cone penetration test probes (CPTs). The approximate locations of the explorations are shown on Figures 2 through 5. An experienced geotechnical engineer from GRI directed the drilling and maintained a detailed log of the materials and conditions disclosed during the course of the work. The locations of the borings with respect to areas of the proposed facility are discussed below.

Borings

Disturbed and undisturbed samples were typically obtained from the borings at 2.5-ft intervals of depth in the upper 15 ft and at 5-ft intervals below this depth. Disturbed samples were obtained using a standard split-spoon sampler. At the time of sampling, the Standard Penetration Test was conducted. This test consists of driving a standard split-spoon sampler into the soil a distance of 18 in. using a 140-lb hammer dropped 30 in. The number of blows required to drive the sampler the last 12 in. is known as the standard penetration resistance, or N-value. The N-values provide a measure of the relative density of granular soils, such as sand or gravel, and the relative consistency, or stiffness, of cohesive soils, such as silt or clay. The split-spoon samples were carefully examined in the field and representative portions were saved in airtight jars. All samples were returned to our laboratory for further examination and physical testing.

Relatively undisturbed samples of fine-grained, cohesive soils were obtained by pushing 3-in.-O.D. Shelby tubes into the undisturbed soil a maximum distance of 24 in. using the drill rig. The soils exposed in the ends of the Shelby tubes were examined and classified in the field. After classification, the ends of the tubes were sealed with plastic end caps and tape to preserve the natural moisture content of the soils. All samples were returned to our laboratory for further examination and testing.

Logs of the borings are provided on Figures 1A through 26A. Each log presents a descriptive summary of the various types of materials encountered in the boring and notes the depth at which the materials and/or characteristics of the materials change. To the right of the descriptive summary, the depth to groundwater and the numbers and types of samples are indicated. Farther to the right, N-values are shown graphically, along with natural moisture contents and percent passing the No. 200 sieve. The terms used to describe the soils encountered in the borings are defined in Table 1A.

Details regarding the drilling in the various areas of the proposed facility are provided below.

Area 300. Borings in Area 300 were completed between June 5 and July 1, 2013, with nine borings, designated B-1 through B-9. The borings were advanced to depths of 50.9 to 82.0 ft with mud-rotary drilling methods using a truck-mounted CME drill rig provided and operated by Western States Soil Conservation of Hubbard, Oregon.

Areas 200 and 600. Borings in Areas 200 and 600 were completed between July 1 and 9, 2013, with 11 borings, designated B-10 through B-20. The borings were advanced to depths of 21.5 to 96.0 ft with mud-

rotary drilling methods using a truck-mounted CME drill rig provided and operated by Western States Soil Conservation of Hubbard, Oregon.

Area 400. Borings in Area 400 were completed between July 29 and October 31, 2013, with four borings, designated B-23 through B-26. The borings were advanced to depths of 80 to 104.2 ft with mud-rotary drilling methods using a truck- or- track-mounted CME drill rig provided and operated by Cascade Drilling LP of Clackamas, Oregon.

Area 500. Borings in Area 500 were completed between July 31 and August 2, 2013, with two borings, designated B-21 and B-22. The borings were advanced to depths of 60.5 and 75.5 ft with mud-rotary drilling methods using a truck-mounted CME drill rig provided and operated by Cascade Drilling LP of Clackamas, Oregon.

Electric Cone Penetration Test (ECPT) Probes

Six CPT probes, designated CPT-1 through CPT-6, were advanced to practical refusal at depths of 54 to 84 ft below the ground surface using a truck-mounted Dutch Cone Unit provided and operated by Vandehey Exploration, Inc. of Banks, Oregon. Probes CPT-1 through CPT-4 were advanced to depths of about 54 to 56 ft in Area 300, CPT-5 was advanced to a depth of about 78 ft in Area 500, and CPT-6 was advanced to a depth of about 83 ft in Area 400.

The equipment is mounted on a truck and operated from within an enclosure on the back of the truck that houses the electrical equipment. The electrical cone probe has a cone and a sleeve that are similar to a mechanical probe, but the forces are measured electronically. In addition to the cone and sleeve transducers, a piezometer is fitted between the cone and the sleeve, which allows measurement porewater pressure and rate of dissipation as the probe is advanced. An accelerometer can also be fitted within the electrical probe. The accelerometer is used to measure the arrival times of shear waves produced at the ground surface as the exploration is advanced. Using these measurements, the shear wave velocity of the soils penetrated can be estimated. The shear wave velocities characterize the soils for the purpose of seismic studies. Shear wave measurements were made during advancement of probes CPT-1 and CPT-6. The terms used to describe the soils encountered in the CPT probes are defined in Table 2A. Logs of the CPT probes are provided on Figures 27A through 32A.

INSTRUMENTATION

Vibrating-Wire Piezometers

Geokon Model 4500 ALV low-pressure, vented vibrating-wire piezometers were installed in borings B-4 and B-7 at about elevation -22 and -17 ft, respectively. The piezometers are equipped with a Geokon Model 8002 (LC-2) single-channel data logger programmed to record data at 2-hr intervals. At the time of installation, the piezometers were saturated with water, taped to a 1-in.-O.D. PVC grout pipe in an inverted position to maintain saturation, and inserted into the open borehole to the desired depth. The borings were then filled with cement-bentonite grout to near the ground surface. The performance of each piezometer was verified before installation and immediately after insertion to design depth with a manual readout box. Each of the installations is equipped with a steel monument casing that was cement grouted into the borehole collar to protect the data logger and readout cables from vandalism and the elements. The data loggers are being downloaded periodically to evaluate the data. The piezometer data with the Columbia River hydrograph data are summarized graphically on Figure 6. The Columbia River

hydrograph data are provided by the USGS station "14144700 Columbia River at Vancouver, WA" located about 3 miles upstream from the site.

LABORATORY TESTING

General

All samples obtained from the field were returned to our laboratory where the physical characteristics of the samples were noted, and the field classifications were modified where necessary. At the time of classification, the natural moisture content of each sample was measured. Additional testing included Torvane shear strength, Atterberg limits, washed sieve analysis, sieve analysis, dry unit weight determinations, and one-dimensional consolidation testing. The following sections describe the testing program in more detail.

Natural Moisture Content

Natural moisture content determinations were made in conformance with ASTM D 2216. The results are provided on Figures 1A through 26A.

Dry Unit Weight

The dry unit weight of 32 undisturbed samples was determined in the laboratory in accordance with ASTM D 2937 by cutting a cylindrical specimen of soil from a Shelby tube sample. The dimensions of the specimen were carefully measured, the volume calculated, and the specimen weighed. After oven-drying, the specimen was reweighed and the moisture content calculated. The dry unit weight was then computed. The dry unit weights are summarized below.

SUMMARY OF DRY UNIT WEIGHT DETERMINATIONS

Boring	Sample	Depth, ft	Natural Moisture Content, %	Dry Unit Weight, pcf	Soil Type
B-1	S-8	21.5	32	90	SILT; some clay, trace fine-grained sand, scattered gravel
B-2	S-8	21.5	34	80	SILT; trace to some clay and fine-grained sand
	S-11	31.5	26	91	Sandy SILT; fine grained sand, trace to some clay, trace organics
B-4	S-7	16.5	31	67	SILT; some clay, trace fine-grained sand and organics
	S-10	27.5	28	92	SAND; fine to medium grained, some silt
B-5	S-6	14.7	36	84	SILT: some clay, trace fine-grained sand
B-6	S-2	5	40	76	SILT; trace to some clay, trace fine-grained sand
	S-5	11.5	30	91	SAND; fine to medium grained, trace to some silt, trace subrounded gravel
B-7	S-12	31.5	21	87	Silty SAND; fine-grained
B-8	S-9	23.5	30	69	SILT; trace to some clay, trace fine-grained sand
B-9	S-7	20	38	82	SILT; some fine-grained sand, trace organics
B-11	S-4	10	28	89	Silty SAND; fine grained
B-12	S-6	15	33	88	Silty SAND; fine grained
	S-9	21.5	35	85	Sandy SILT: fine-grained sand
B-14	S-8	21.5	32	87	SILT; trace clay, fine-grained sand, and organics
B-15	S-4	10	30	84	Silty SAND; fine grained
	S-8	23	37	82	SILT; some fine-grained sand

Boring	Sample	Depth, ft	Natural Moisture Content, %	Dry Unit Weight, pcf	Soil Type
B-16	S-7	20	22	96	Silty SAND; fine grained
	S-11	33	28	88	Sandy SILT; fine-grained sand
B-17	S-7	18	24	92	SILT; some fine-grained sand
B-18	S-5	12.5	34	86	Silty SAND; fine grained
	S-8	23	21	95	SILT; trace fine-grained sand
B-19	S-5	12.5	18	102	Sandy SILT; fine-grained sand
	S-8	21.5	26	76	Sandy SILT; fine-grained sand
B-20	S-4	10	14	89	FILL: SAND; fine to medium grained, trace to some silt
	S-7	20	33	86	Silty SAND; fine grained
B-21	S-7	20	42	78	SILT; trace to some clay and fine grained sand
B-22	S-6	15	36	85	SILT; some sand
B-24	S-18	70	29	88	SAND; fine grained, trace silt
B-26	S-12	40	39	80	SAND; some silt, scattered wood debris
	S-14	45	34	81	SAND; some silt,
	S-16	50	31	90	SAND; some silt

Torvane Shear Strength

The approximate undrained shear strength of relatively undisturbed fine-grained soil samples was determined using a Torvane shear device. The Torvane is a hand-held apparatus with vanes that are inserted into the soil. The torque required to fail the soil in shear around the vanes is measured using a calibrated spring. The results of the Torvane shear tests are summarized on Figures 1A through 22A.

Atterberg Limits

Atterberg limits determinations were completed on nine representative soil samples in substantial conformance with ASTM D 4318. The test data are summarized on Figures 33A and 34A.

One-Dimensional Consolidation

Consolidation testing was performed in accordance with ASTM D 2435 to obtain data on the compressibility characteristics of six samples of relatively undisturbed fine-grained soil. Test results are summarized on Figures 35A through 40A in the form of a curve showing effective stress versus percent strain. The initial and final moisture content and unit weight of the sample are provided at the top of the figure.

Secondary compression was recorded in substantial conformance to ASTM D 2434 Test Method B during the one-dimensional consolidation tests. Compression was recorded at select compressive loads between 1 and 2 tsf for a minimum of 1,200 minutes following application of a compressive load increment. The results are summarized on Figures 41A and 42A in the form of curves showing dial reading versus the log of time.

Grain Size Analysis

Washed-Sieve Method. Washed sieve analyses were performed on representative soil samples to assist in their classification. The test is performed by taking a sample of known dry weight and washing it over a

No. 200 sieve. The material retained on the sieve is oven-dried and weighed, and the percentage of material passing the No. 200 sieve is calculated. The test results are shown on the Boring Logs, Figures 1A through 26A.

Dry Sieve Method. Sieve analyses were performed on five representative samples of sand in substantial conformance with ASTM D 6913. The test is performed by taking a sample of known dry weight and washing it over a No. 200 sieve. The material retained on the sieve is oven-dried and weighed, and the percentage of material passing the No. 200 sieve is calculated. The soil retained on the No. 200 sieve is then screened through a series of sieves of various sizes using a sieve shaker. The weight of each sieve is measured prior to and after the soil has been run through the shaker. The weight of the soil retained on each sieve is recorded and expressed as a percentage of the total sample weight. The test data are summarized on Figures 43A and 44A in the form of curves showing the percent of the total soil sample by weight finer versus sieve number or grain size in millimeters.

Table 1A

GUIDELINES FOR CLASSIFICATION OF SOIL

Description of Relative Density for Granular Soil

Relative Density	Standard Penetration Resistance (N-values) blows per foot
very loose	0 – 4
loose	4 – 10
medium dense	10 – 30
dense	30 – 50
very dense	over 50

Description of Consistency for Fine-Grained (Cohesive) Soils

Consistency	Standard Penetration Resistance (N-values) blows per foot	Torvane Undrained Shear Strength, tsf
very soft	2	less than 0.125
soft	2 - 4	0.125 - 0.25
medium stiff	4 - 8	0.25 - 0.50
stiff	8 - 15	0.50 - 1.0
very stiff	15 - 30	1.0 - 2.0
hard	over 30	over 2.0

Sandy silt materials which exhibit general properties of granular soils are given relative density description.

Grain-Size Classification

Boulders
12 - 36 in.

Cobbles
3 - 12 in.

Gravel
1/4 - 3/4 in. (fine)
3/4 - 3 in. (coarse)

Sand
No. 200 - No. 40 sieve (fine)
No. 40 - No. 10 sieve (medium)
No. 10 - No. 4 sieve (coarse)

Silt/Clay - pass No. 200 sieve

Modifier for Subclassification

Adjective	Percentage of Other Material In Total Sample
clean	0 - 2
trace	2 - 10
some	10 - 30
sandy, silty, clayey, etc.	30 - 50

Table 2A

SOIL CLASSIFICATION BASED ON CONE PENETRATION TEST

Friction Ratio (Percent)	Soil Classification
0 to 2	Clean sand or slightly silty sand
2 to 5	Silty sand, clayey sand, or silt
> 5	Clayey silt, silty clay, or clay

COHESIVE SOILS

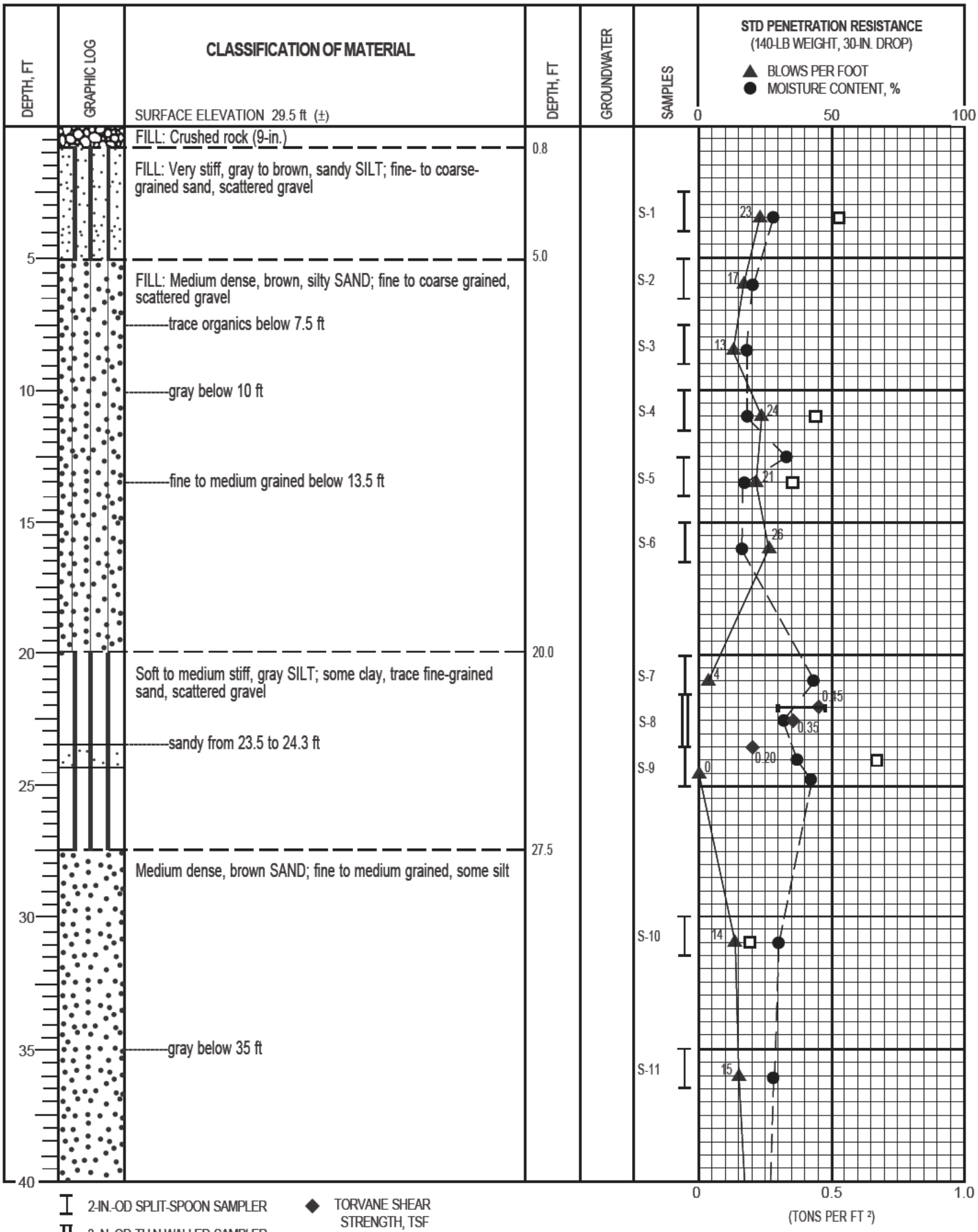
Sleeve Friction, tsf	Relative Consistency
< 0.12	Very Soft
0.12 to 0.25	Soft
0.25 to 0.50	Medium Stiff
0.50 to 1.00	Stiff
1.00 to 2.00	Very Stiff
> 2.00	Hard

COHESIONLESS SOILS

	Soil Type*			
	ML, SM	SM, SP, SW	SP, SW, GW	SW, GP
Relative Density	Cone Penetration Resistance, tsf			
Very Loose	0 - 8	0 - 14	0 - 20	0 - 24
Loose	8 - 20	14 - 35	20 - 50	24 - 60
Med. Dense	20 - 60	35 - 105	50 - 150	60 - 180
Dense	60 - 100	105 - 175	150 - 250	180 - 300
Very Dense	> 100	> 175	> 250	> 300

* Unified Soil Classification System

1) Friction ratio is equal to sleeve friction (tsf) divided by cone penetration (tsf) expressed as a percent.



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

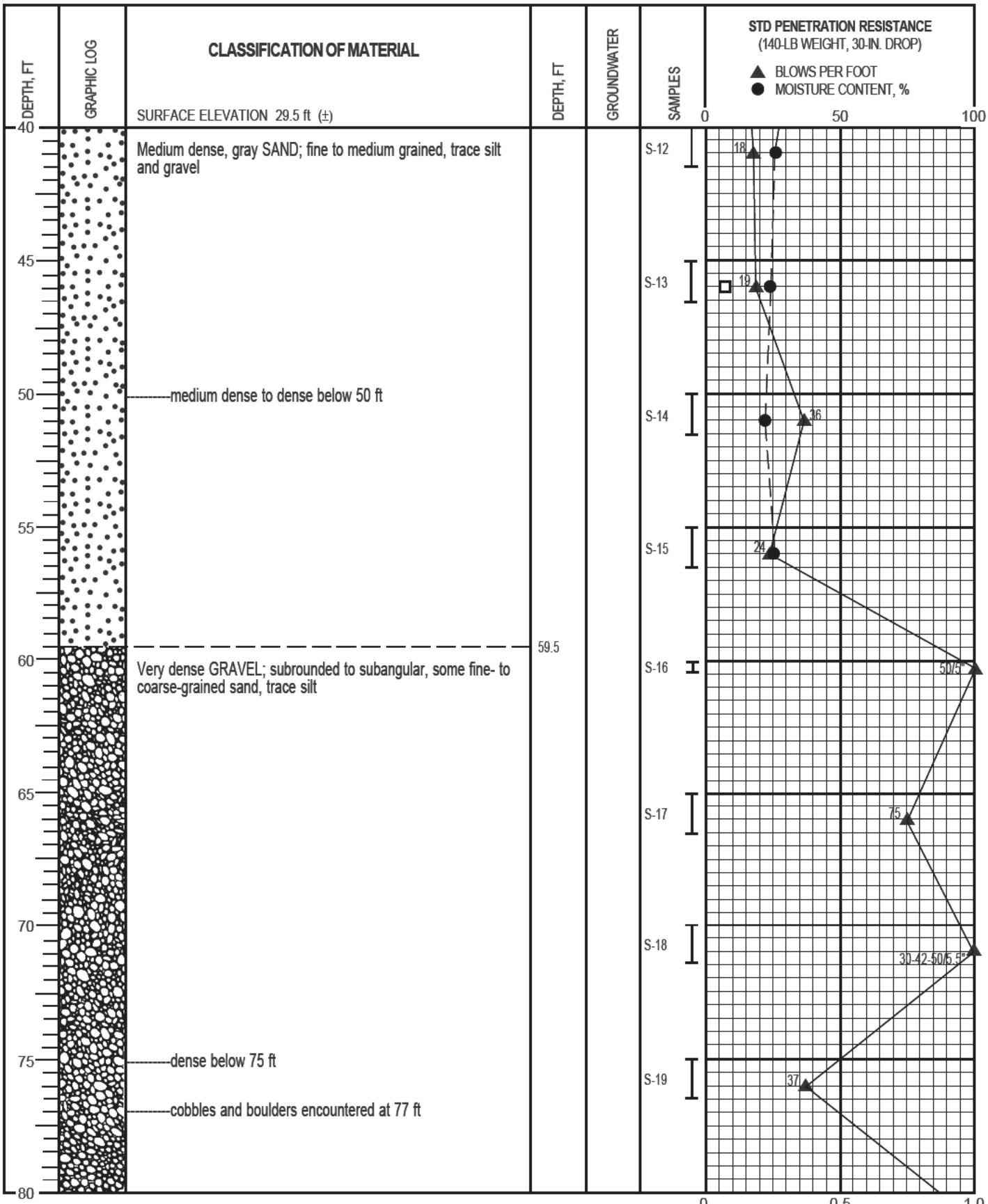
Moisture Content

Plastic Limit

GRI

BORING B-1

DEC. 2013 JOB. NO. W1114 FIG. 1A



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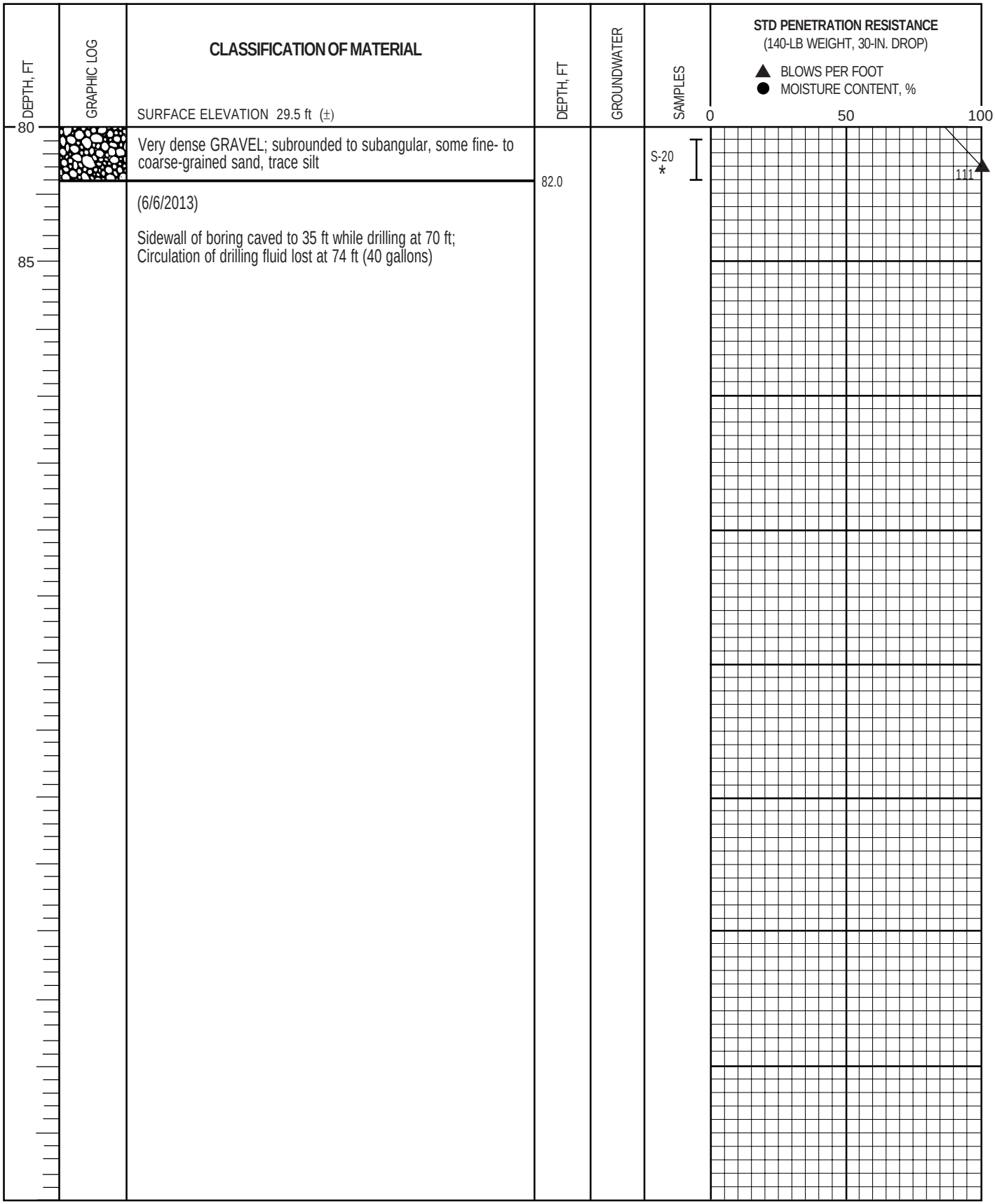
BORING B-1 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 1A



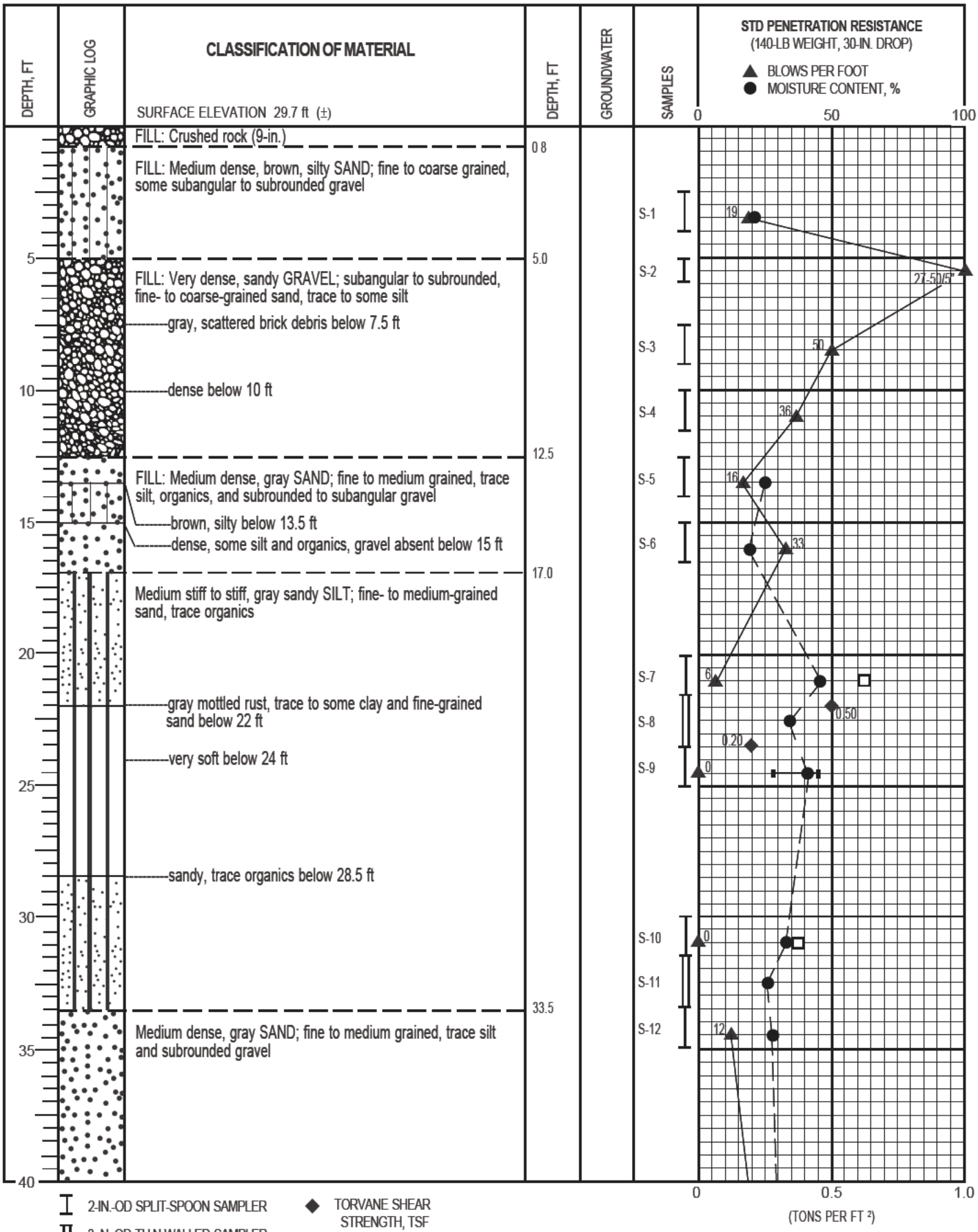
2-IN.-OD SPLIT-SPOON SAMPLER
3- N.-OD TH N-WALLED SAMPLER
G GRAB SAMPLE OF DR LL CUTT NGS
P V BRATING-W RE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plast c L mit

GRI

BORING B-1 (cont.)

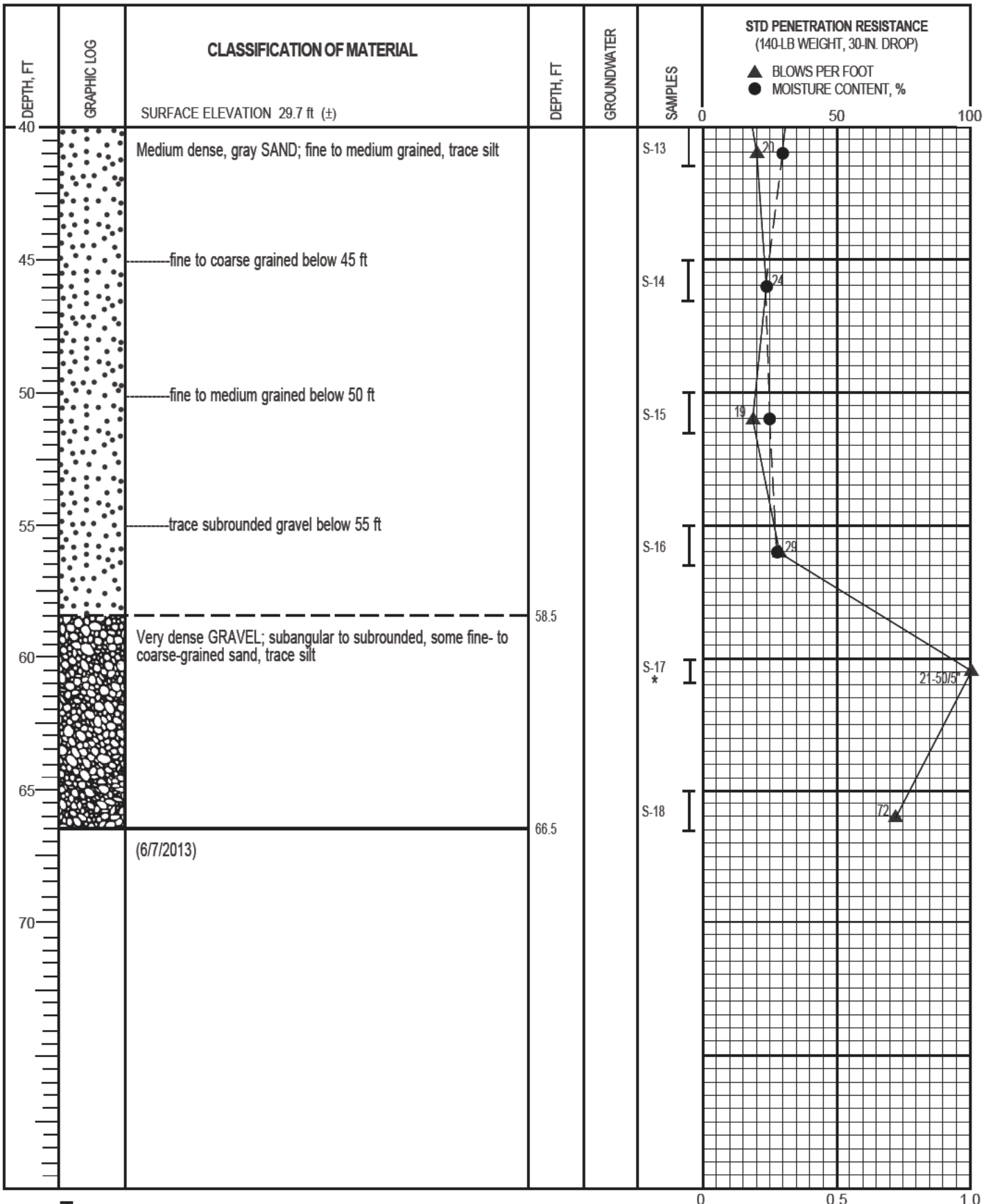
DEC. 2013 JOB. NO. W1114 FIG. 1A



GRI

BORING B-2

DEC. 2013 JOB. NO. W1114 FIG. 2A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

Moisture Content

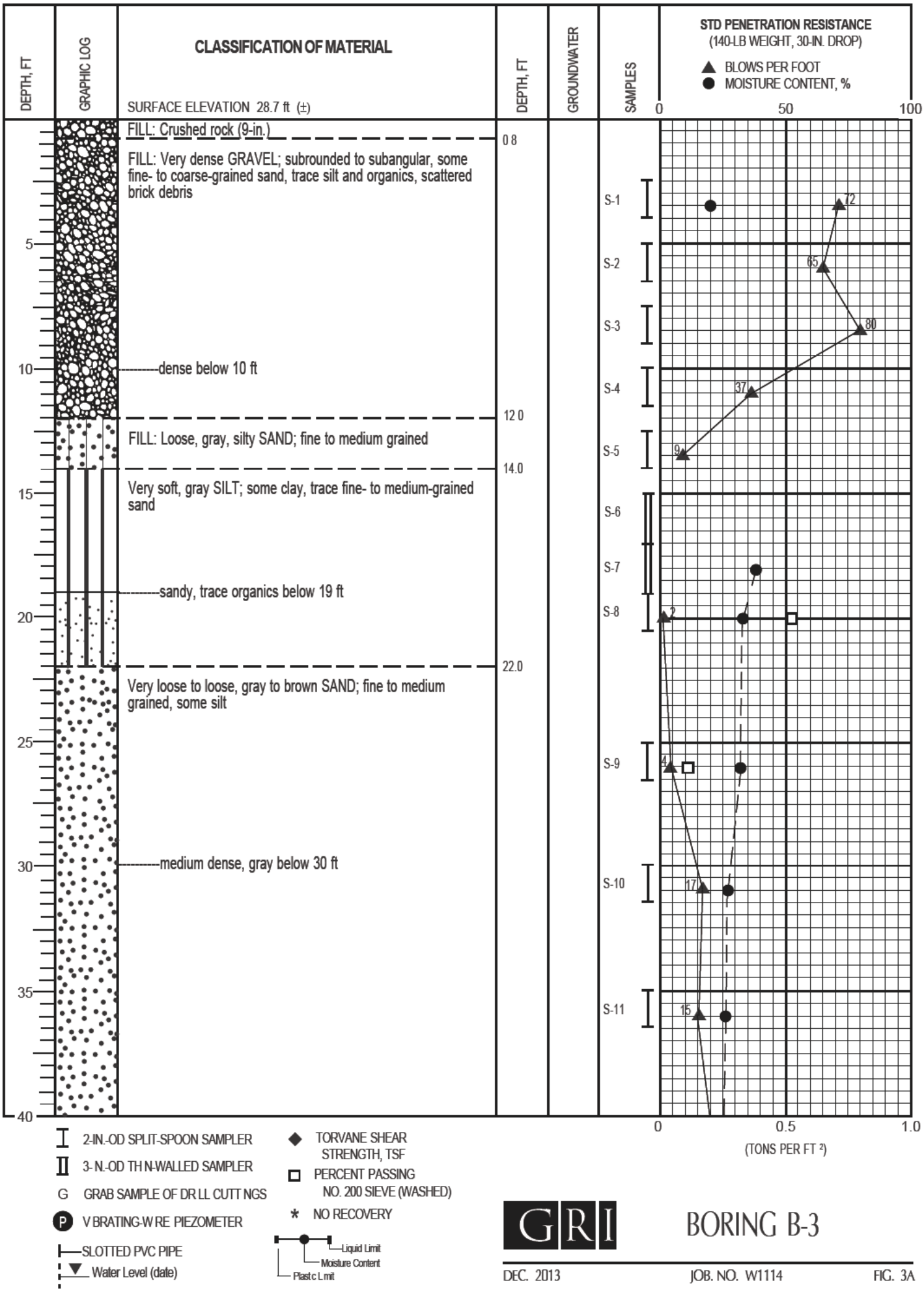
Plastic Limit

GRI

BORING B-2 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 2A

SURFACE ELEVATION ----- ft (±)



I 2-IN.-OD SPLIT-SPOON SAMPLER

II 3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

◆ TORVANE SHEAR STRENGTH, TSF

□ PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

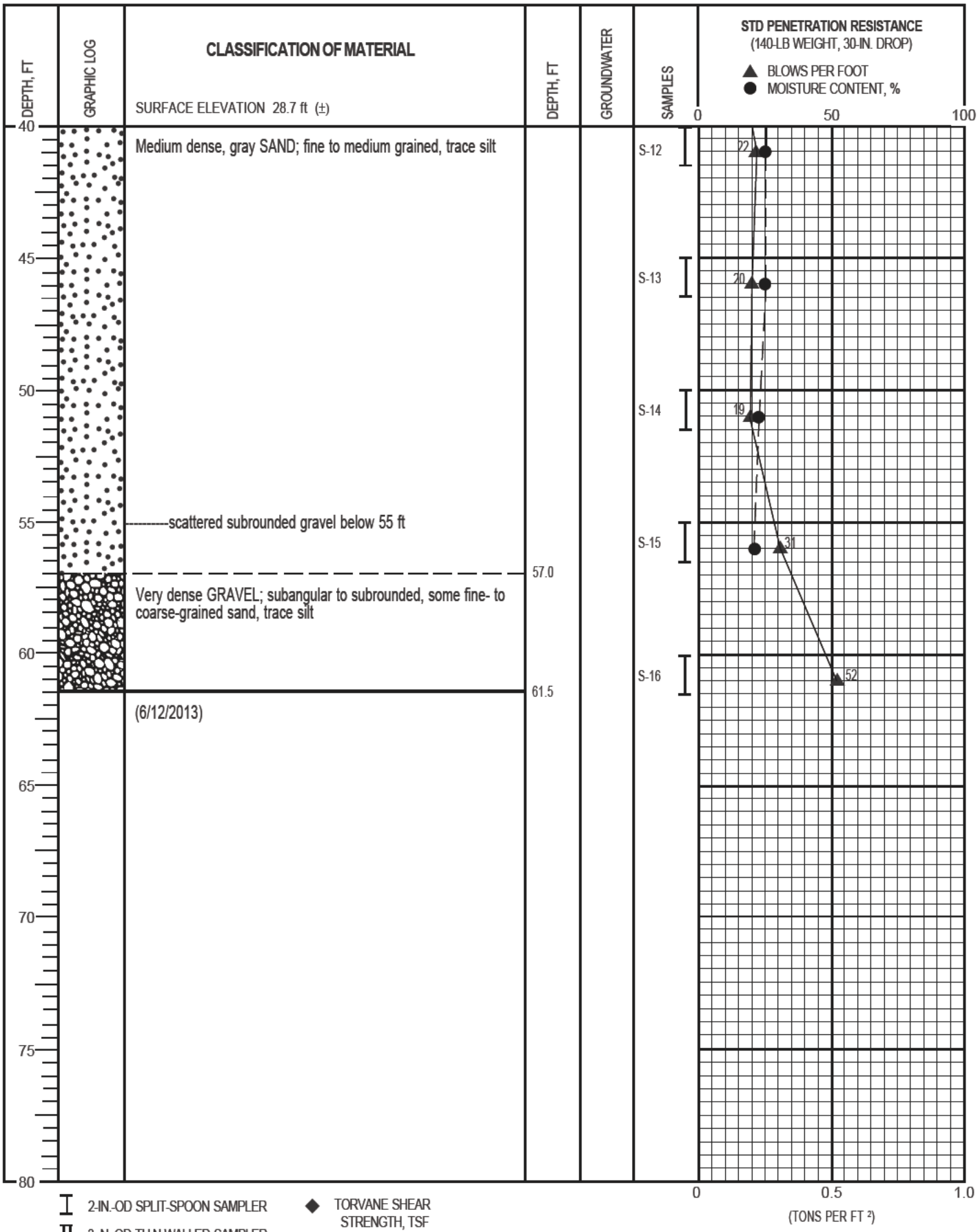
Moisture Content

Plastic Limit

GRI

BORING B-3

DEC. 2013 JOB. NO. W1114 FIG. 3A



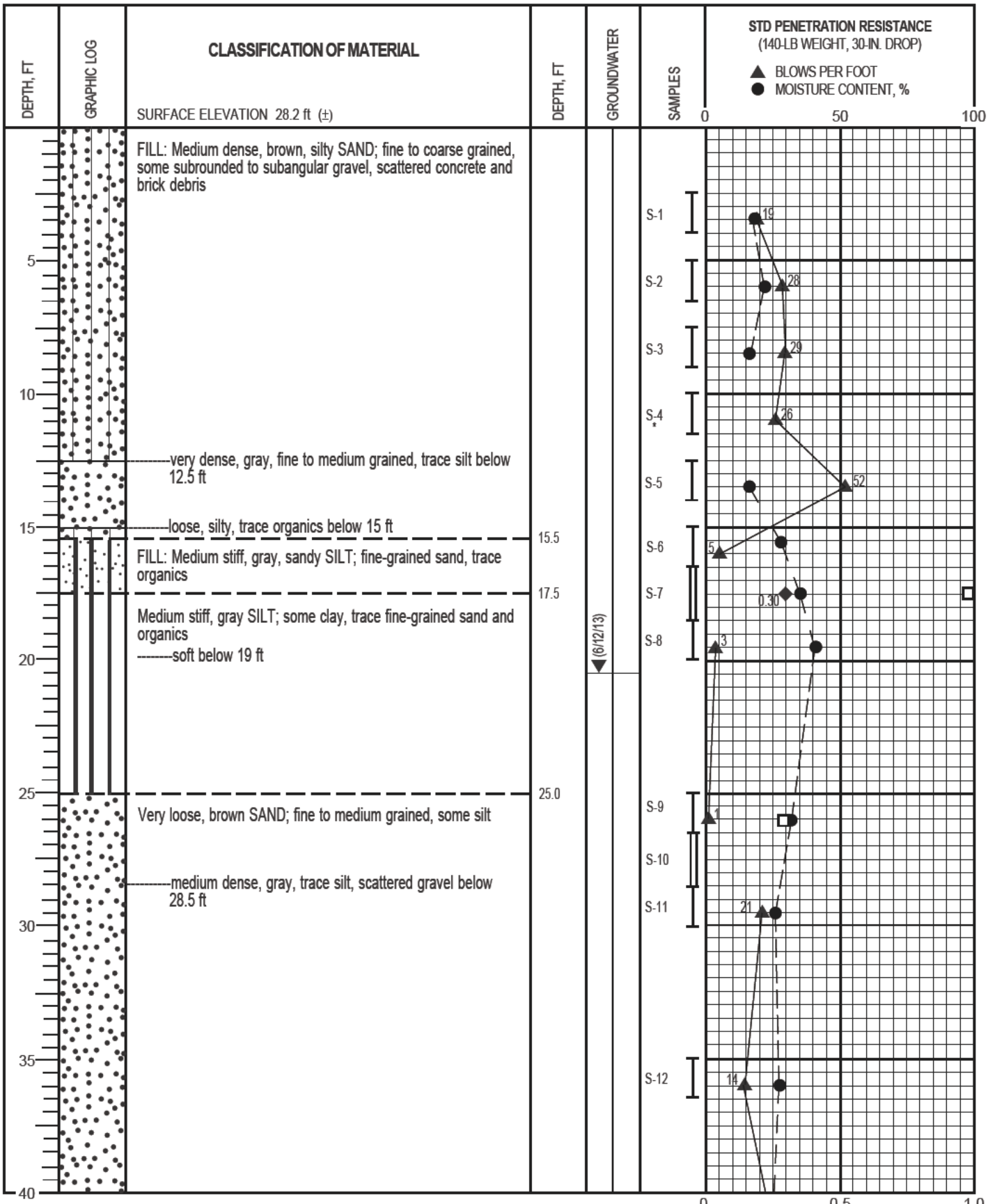
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-3 (cont.)

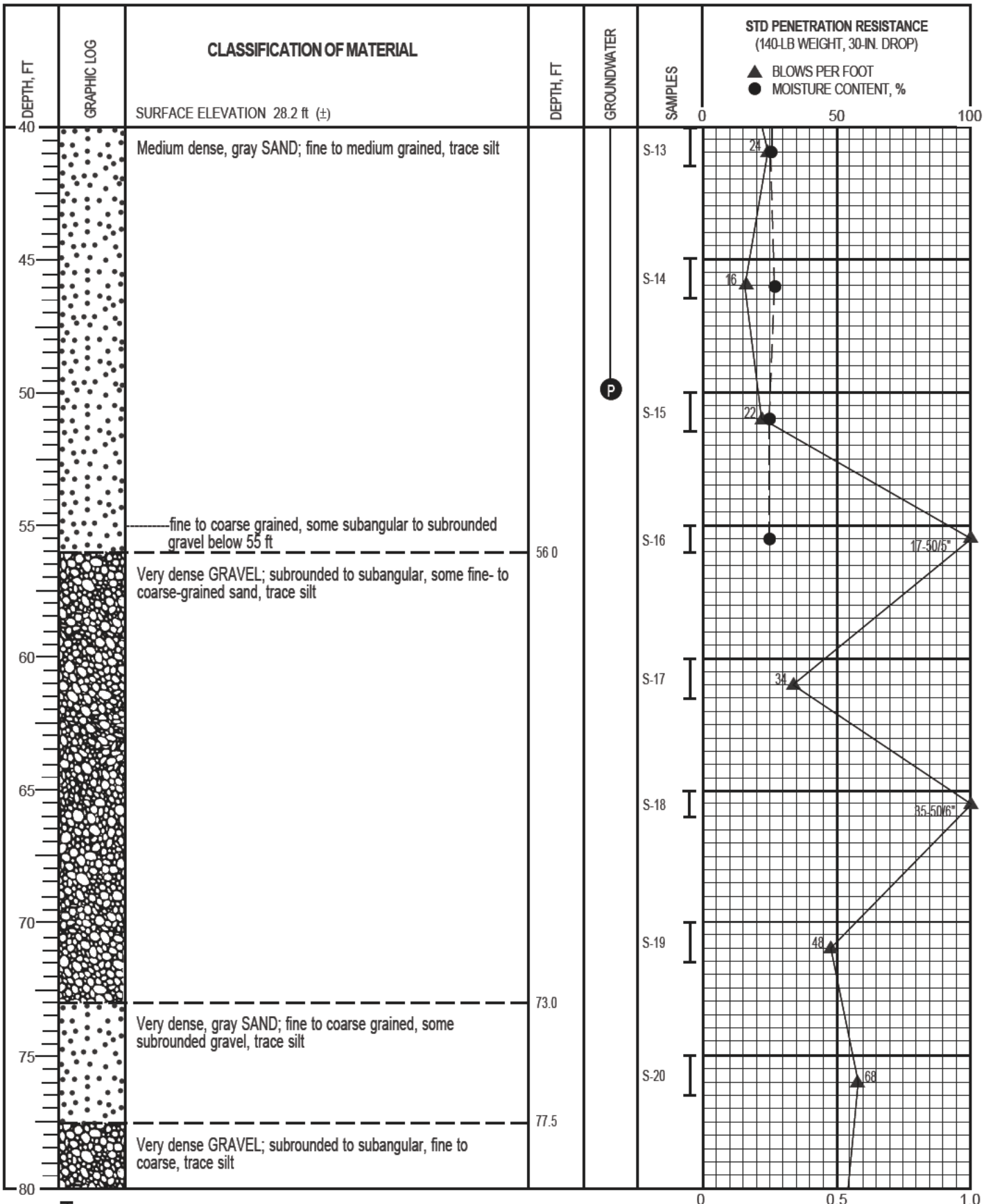
DEC. 2013 JOB. NO. W1114 FIG. 3A



GRI

BORING B-4

DEC. 2013 JOB. NO. W1114 FIG. 4A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

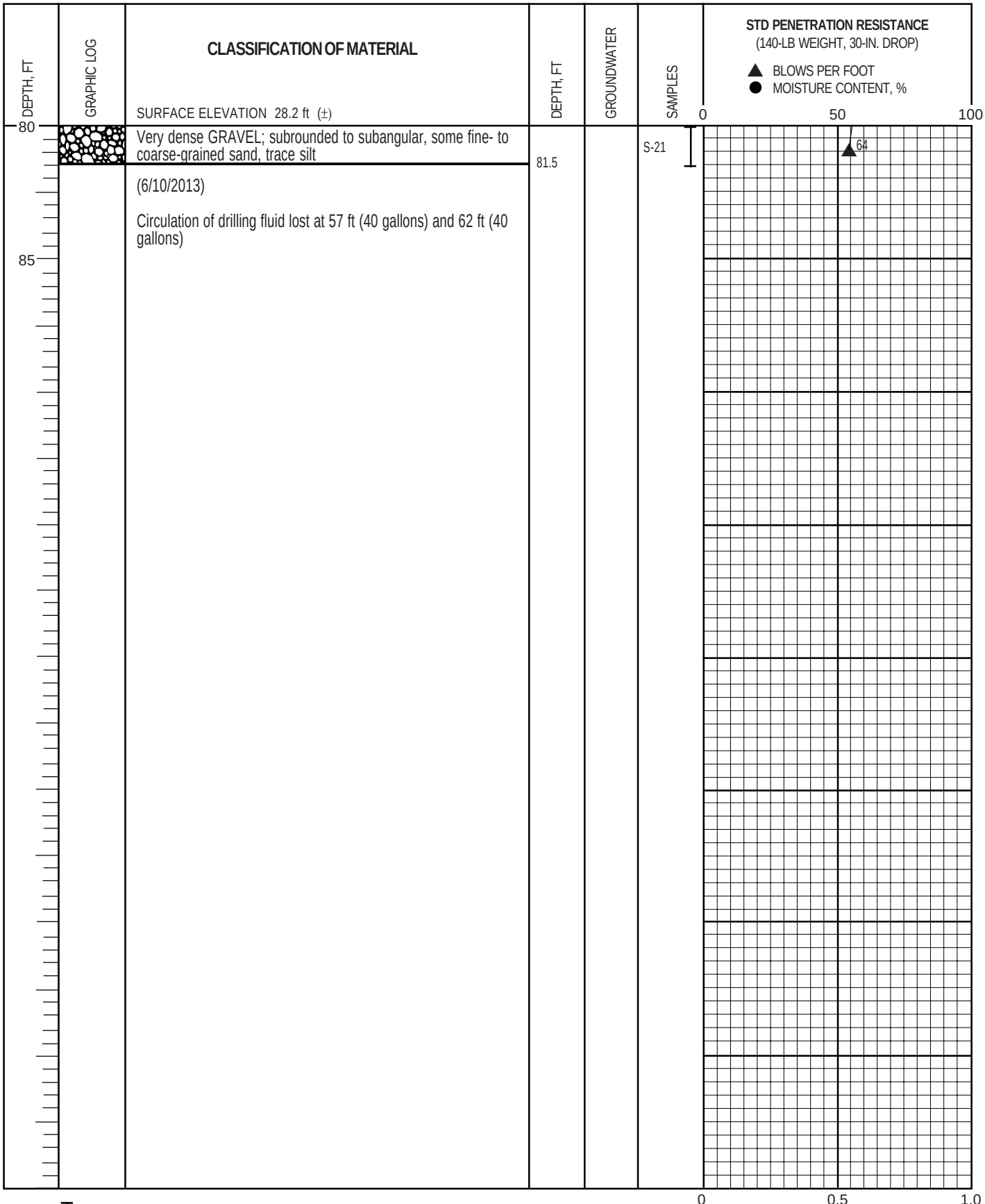
Moisture Content

Plastic Limit

GRI

BORING B-4 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 4A



2-IN.-OD SPLIT-SPOON SAMPLER

3- N.-OD TH N-WALLED SAMPLER

G GRAB SAMPLE OF DR LL CUTT NGS

P V BRATING-W RE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

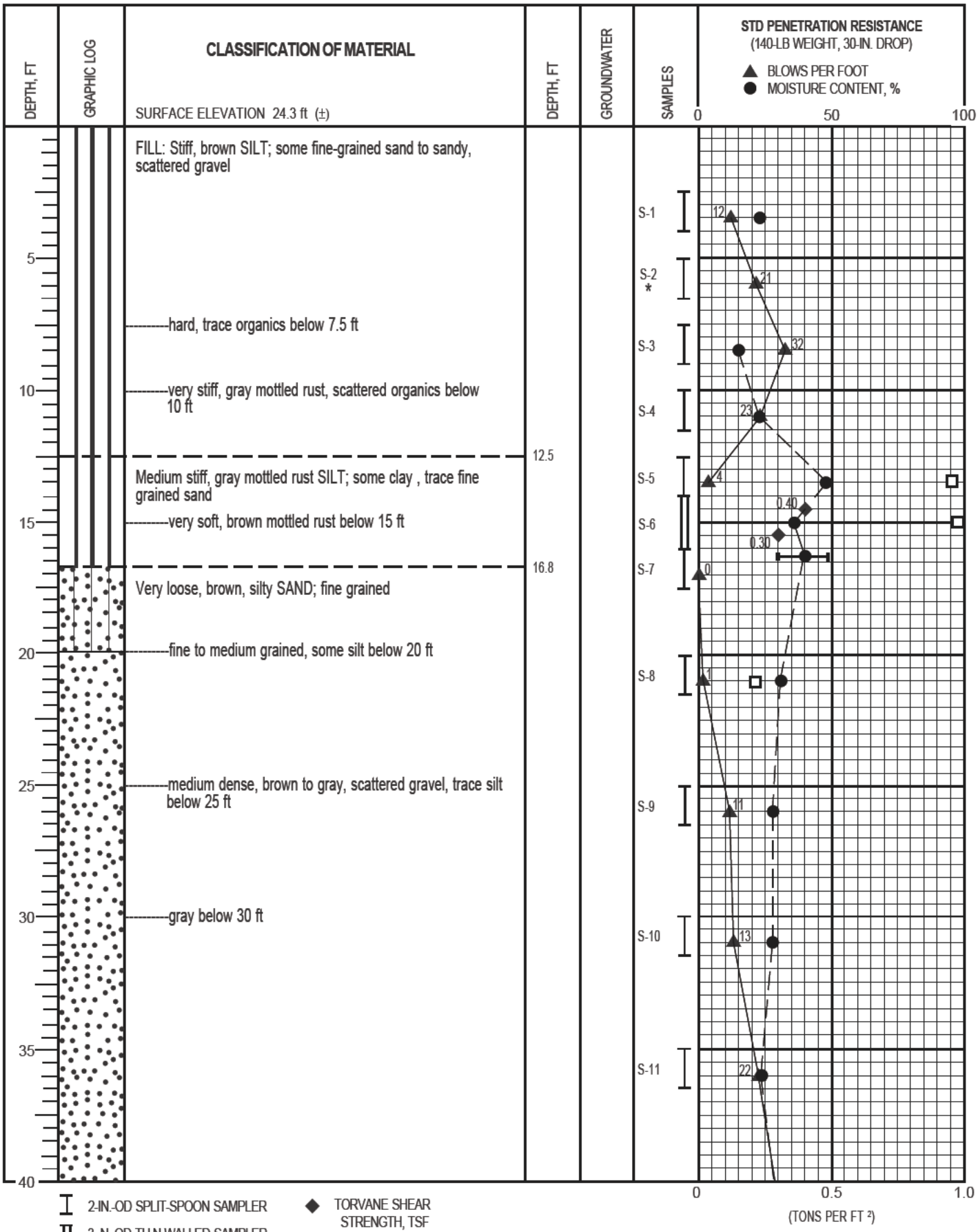
Moisture Content

Plast c L mit

GRI

BORING B-4 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 4A



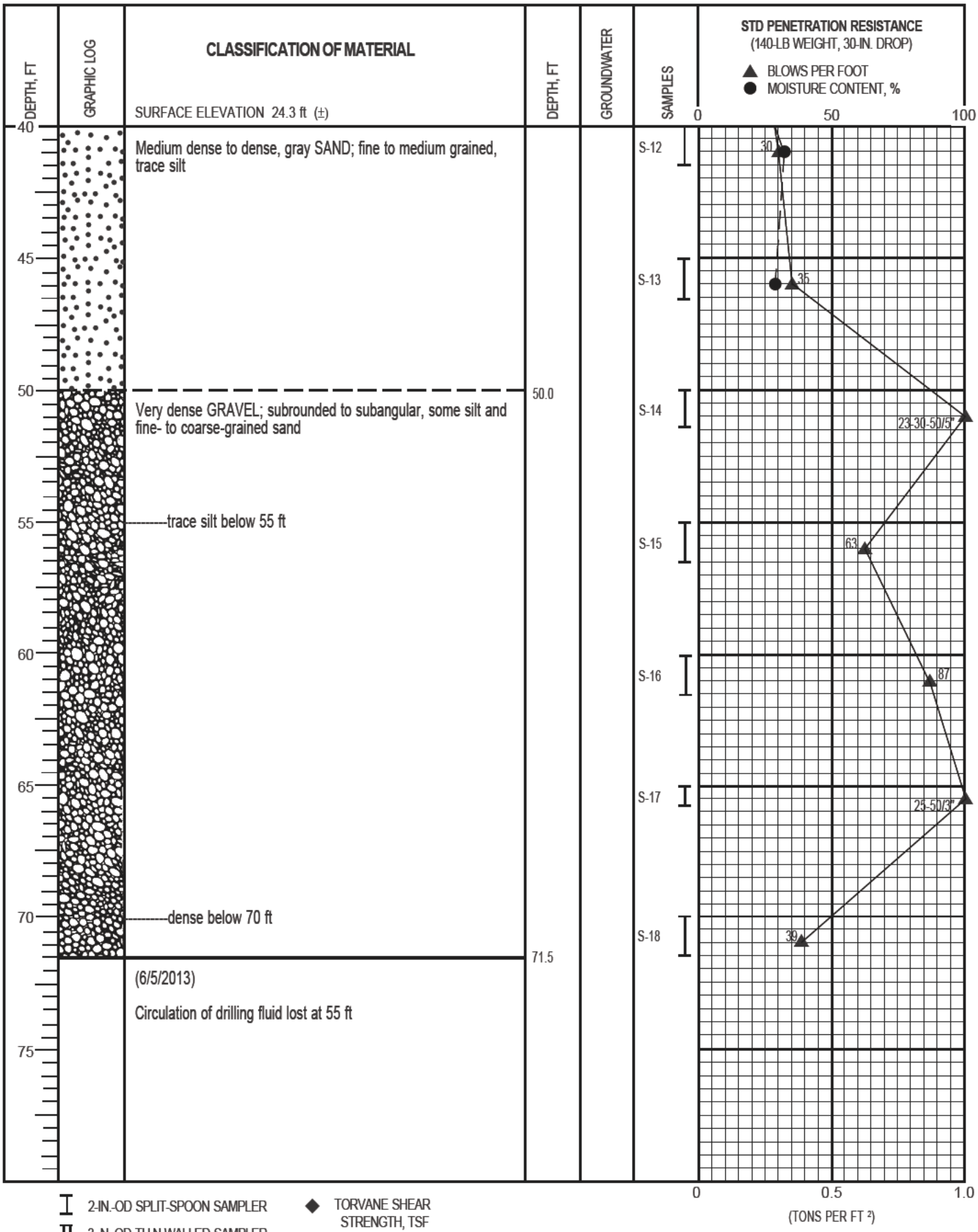
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILLING CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-5

DEC. 2013 JOB. NO. W1114 FIG. 5A



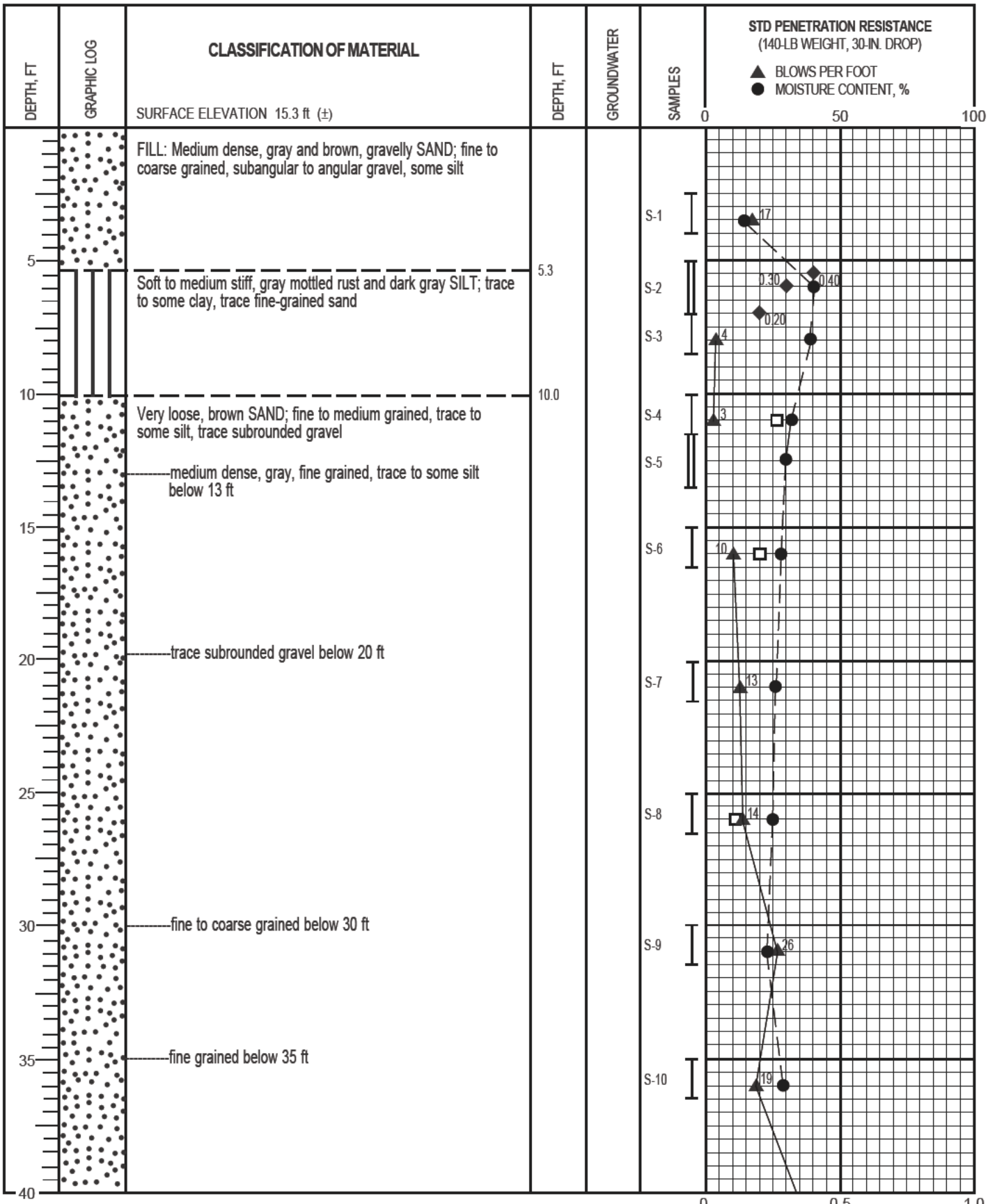
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-5 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 5A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

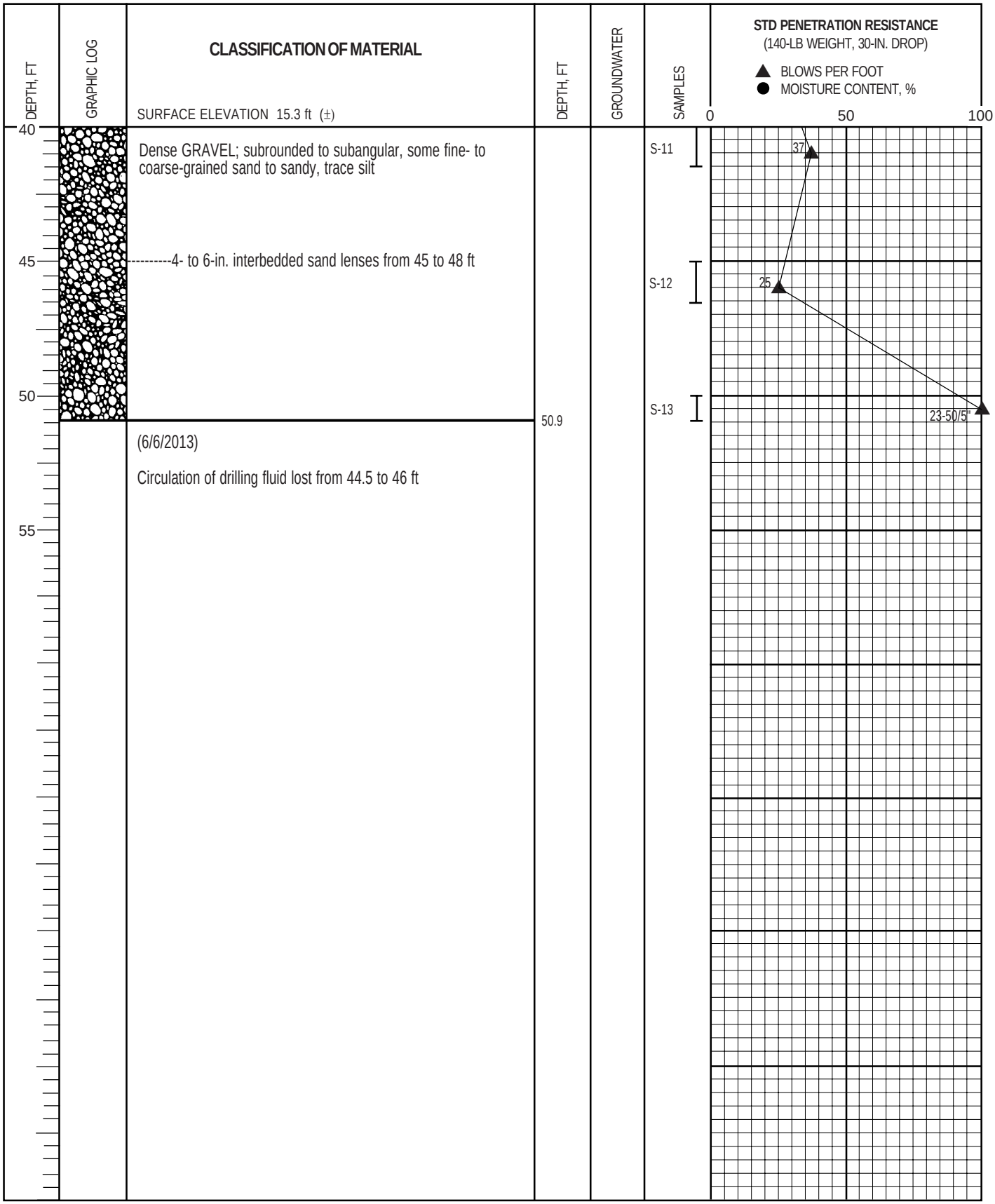
Moisture Content

Plastic Limit

GRI

BORING B-6

DEC. 2013 JOB. NO. W1114 FIG. 6A

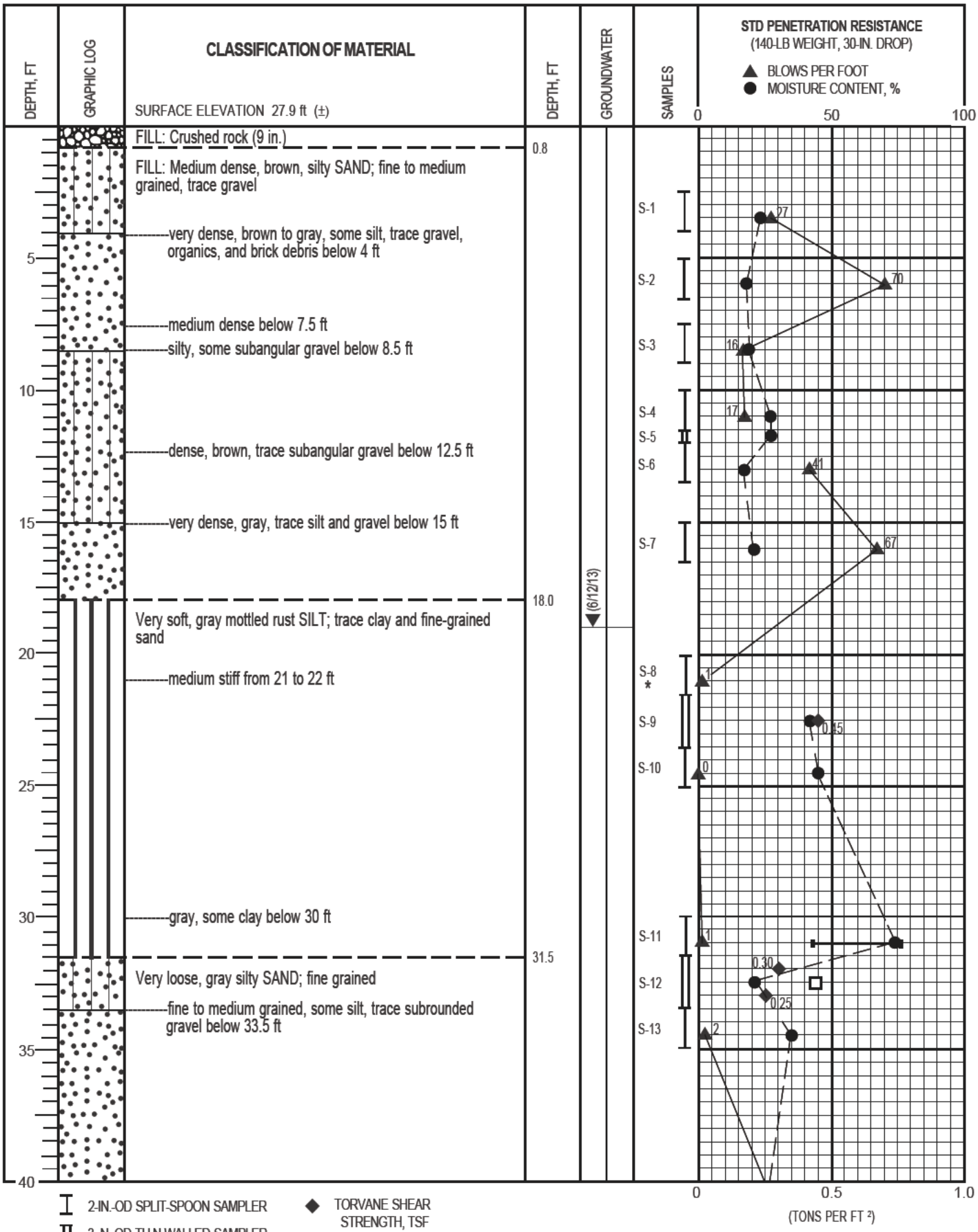


2-IN.-OD SPLIT-SPOON SAMPLER
3- N.-OD TH N-WALLED SAMPLER
G GRAB SAMPLE OF DR LL CUTT NGS
V BRATING-W RE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
NO RECOVERY
Liquid Limit
Moisture Content
Plast c L mit

GRI

BORING B-6 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 6A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

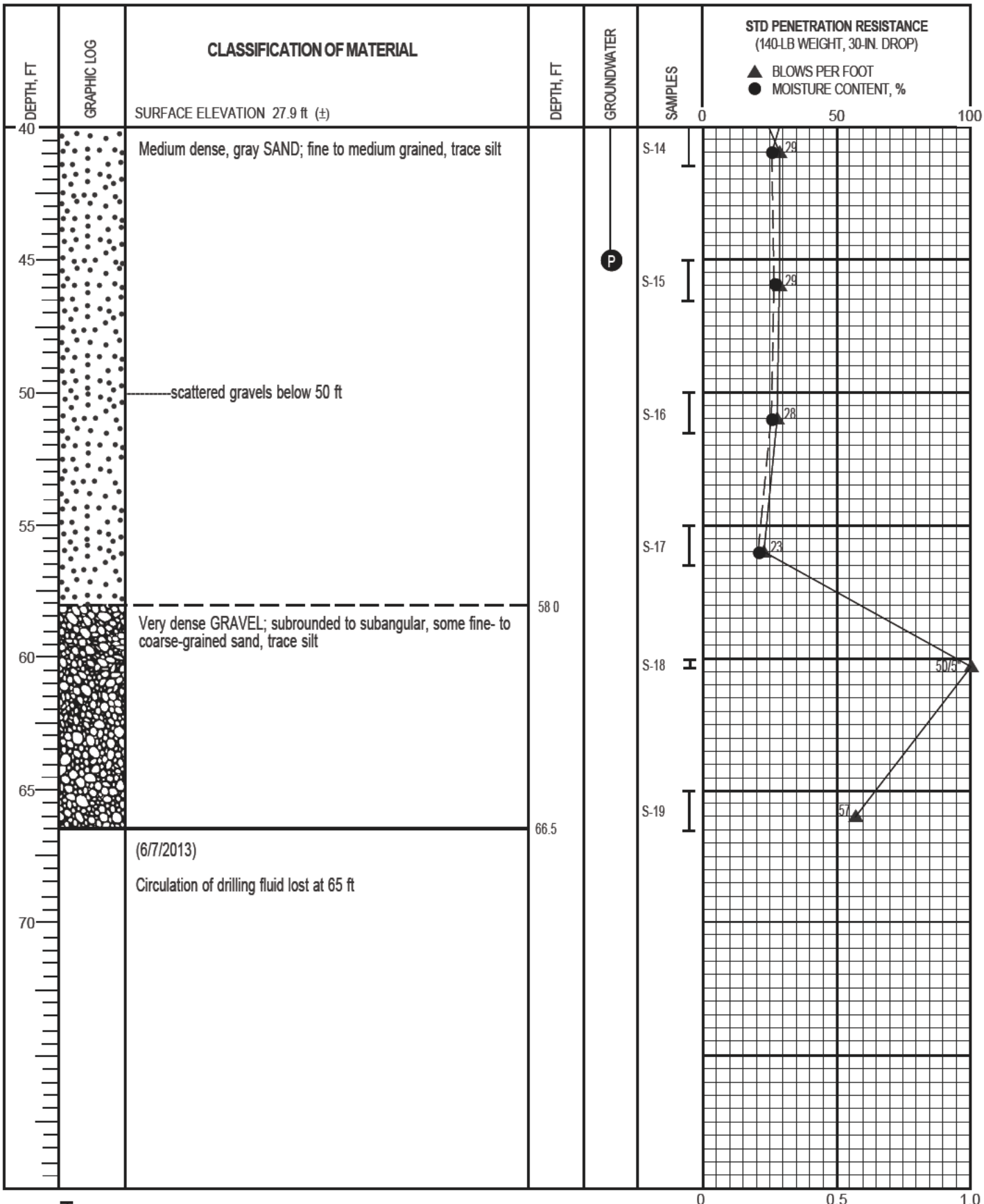
Moisture Content

Plastic Limit

GRI

BORING B-7

DEC. 2013 JOB. NO. W1114 FIG. 7A



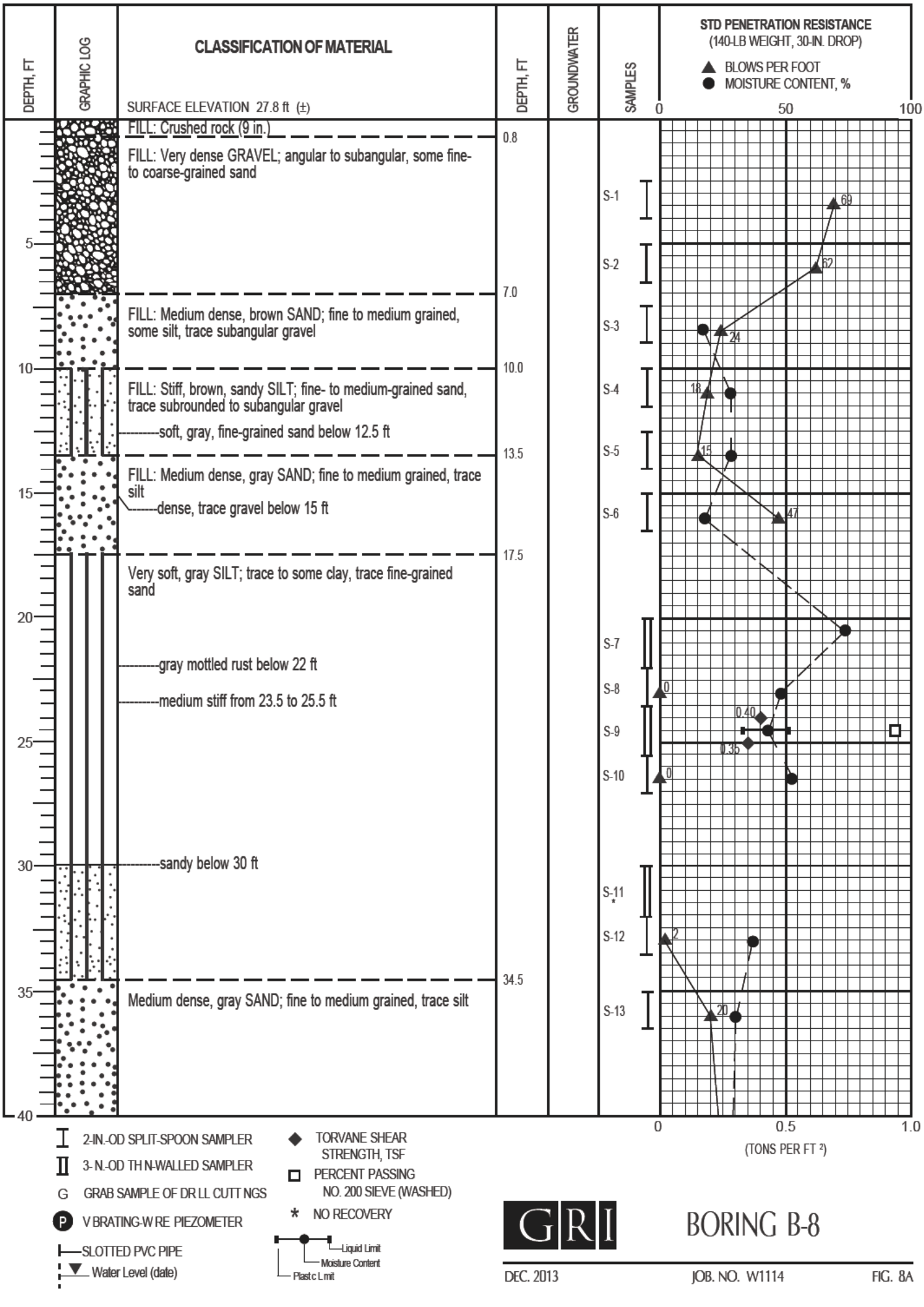
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-7 (cont.)

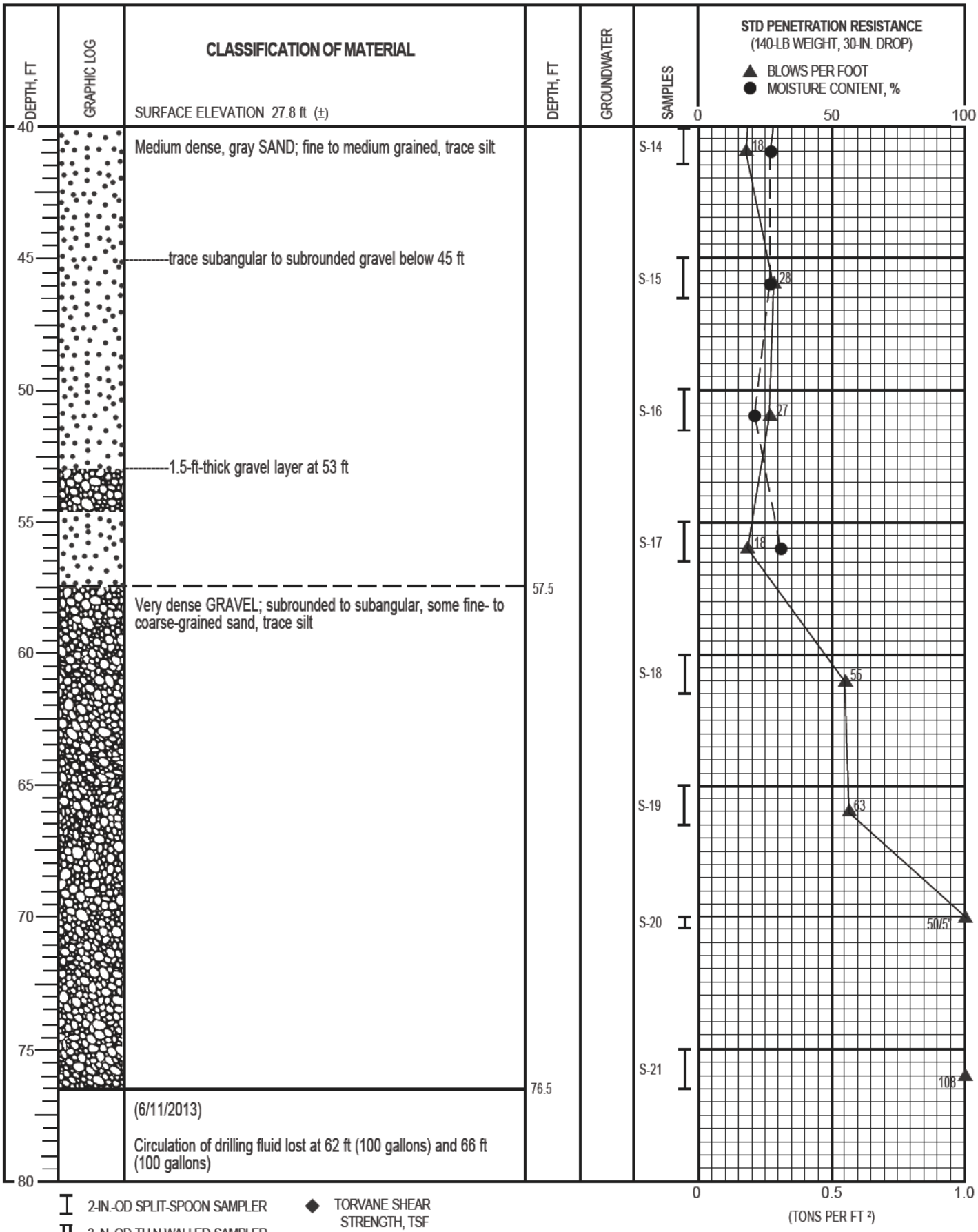
DEC. 2013 JOB. NO. W1114 FIG. 7A



GRI

BORING B-8

DEC. 2013 JOB. NO. W1114 FIG. 8A



2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

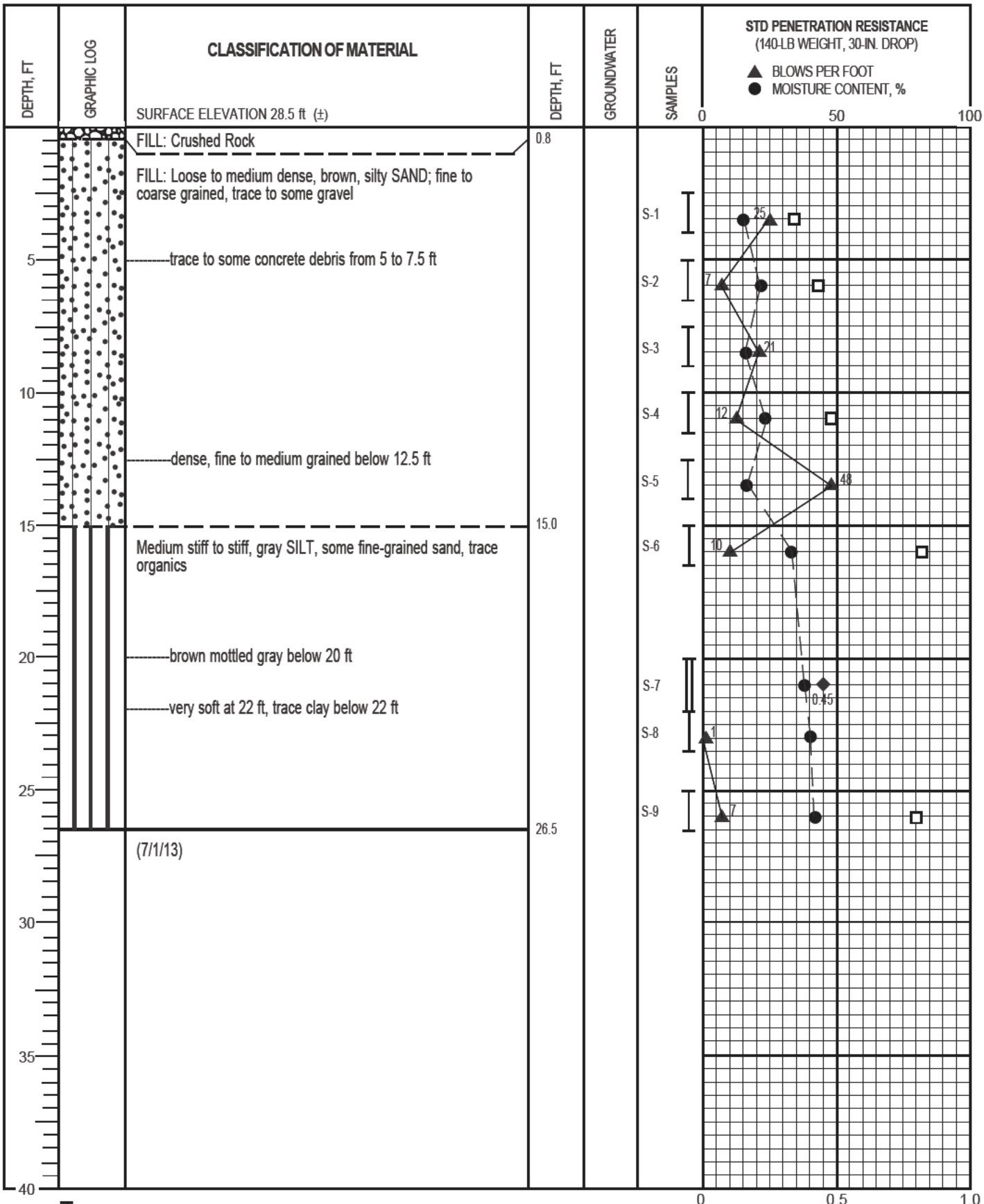
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY

Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-8 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 8A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

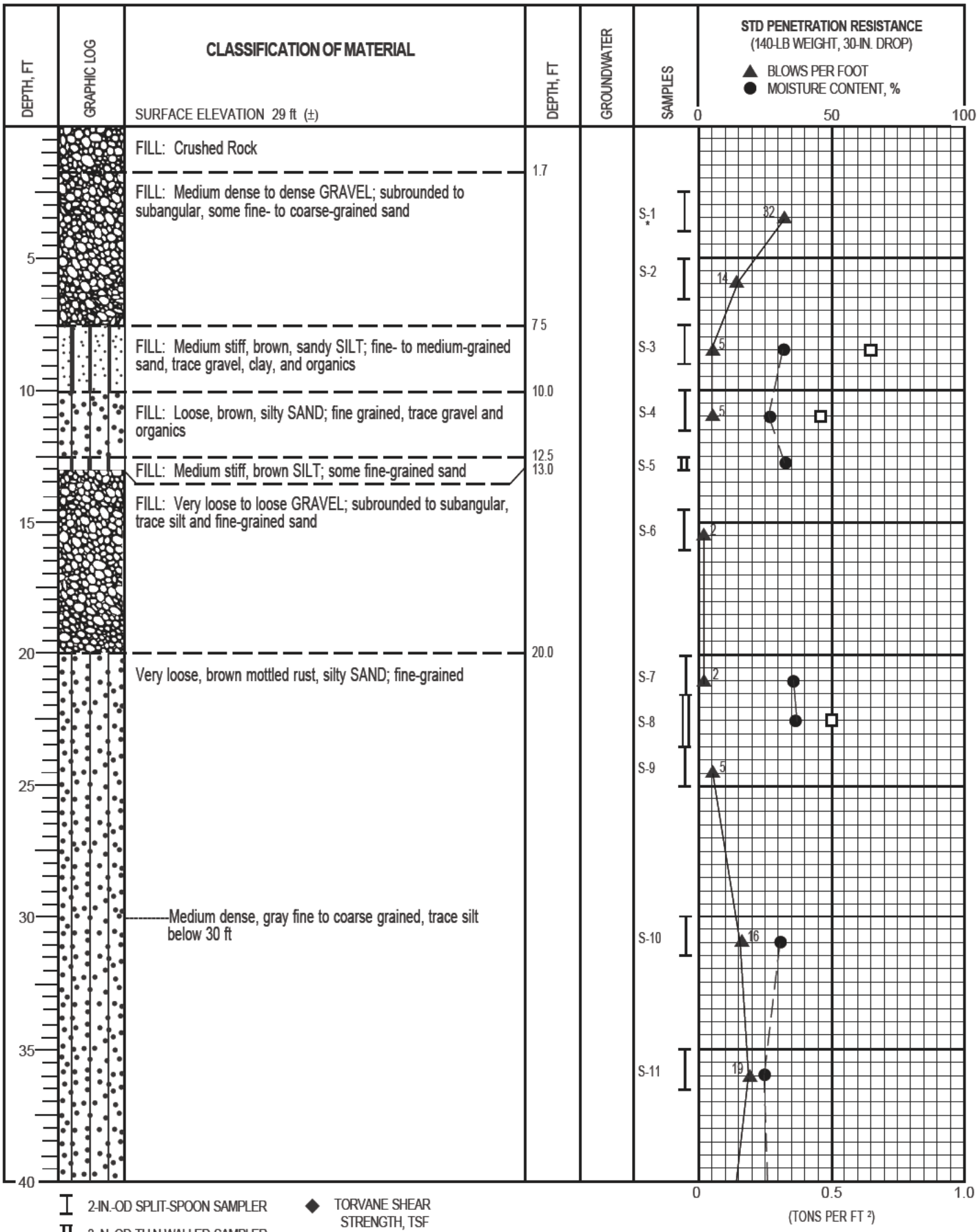
Moisture Content

Plastic Limit

GRI

BORING B-9

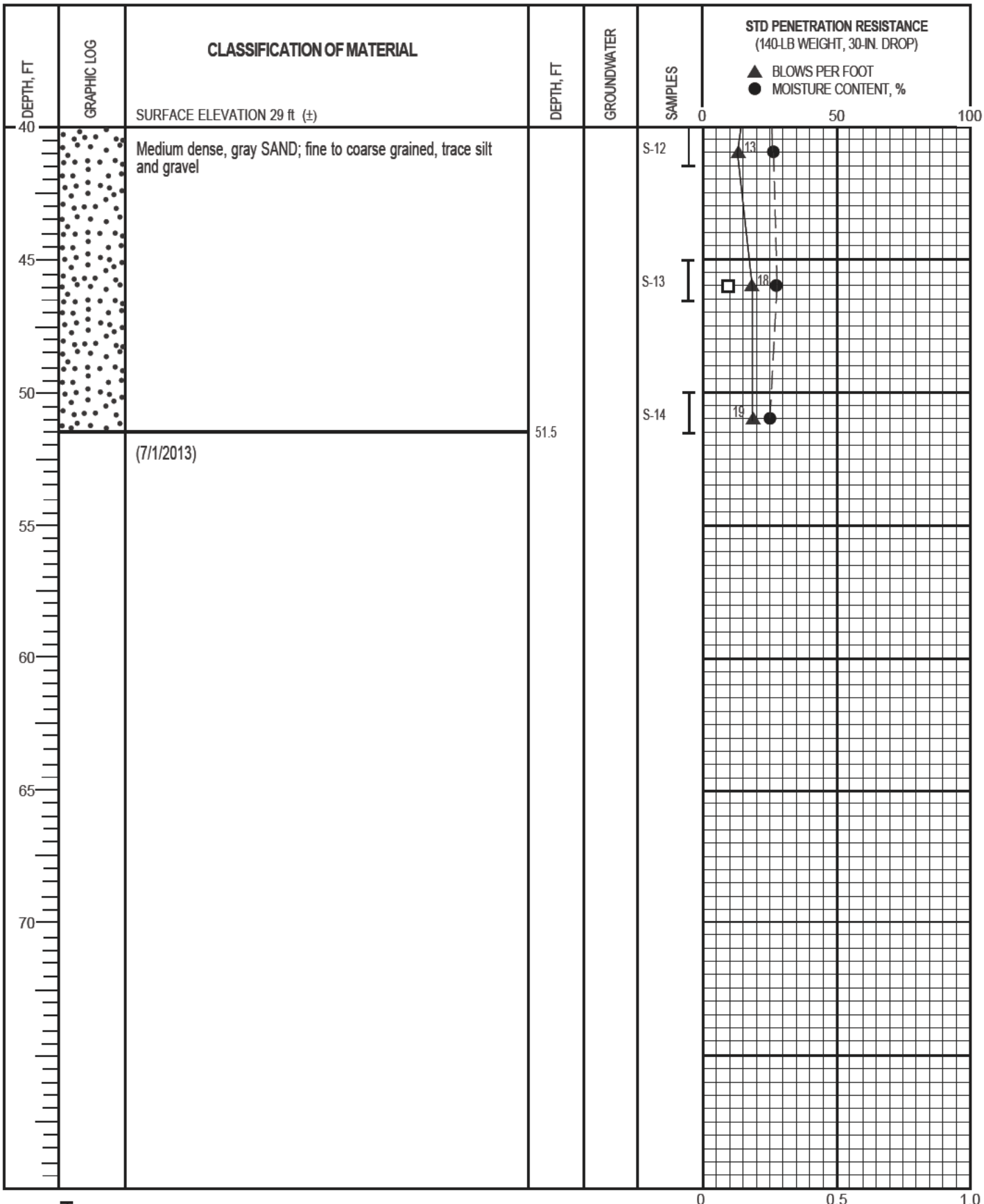
DEC. 2013 JOB. NO. W1114 FIG. 9A



GRI

BORING B-10

DEC. 2013 JOB. NO. W1114 FIG. 10A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

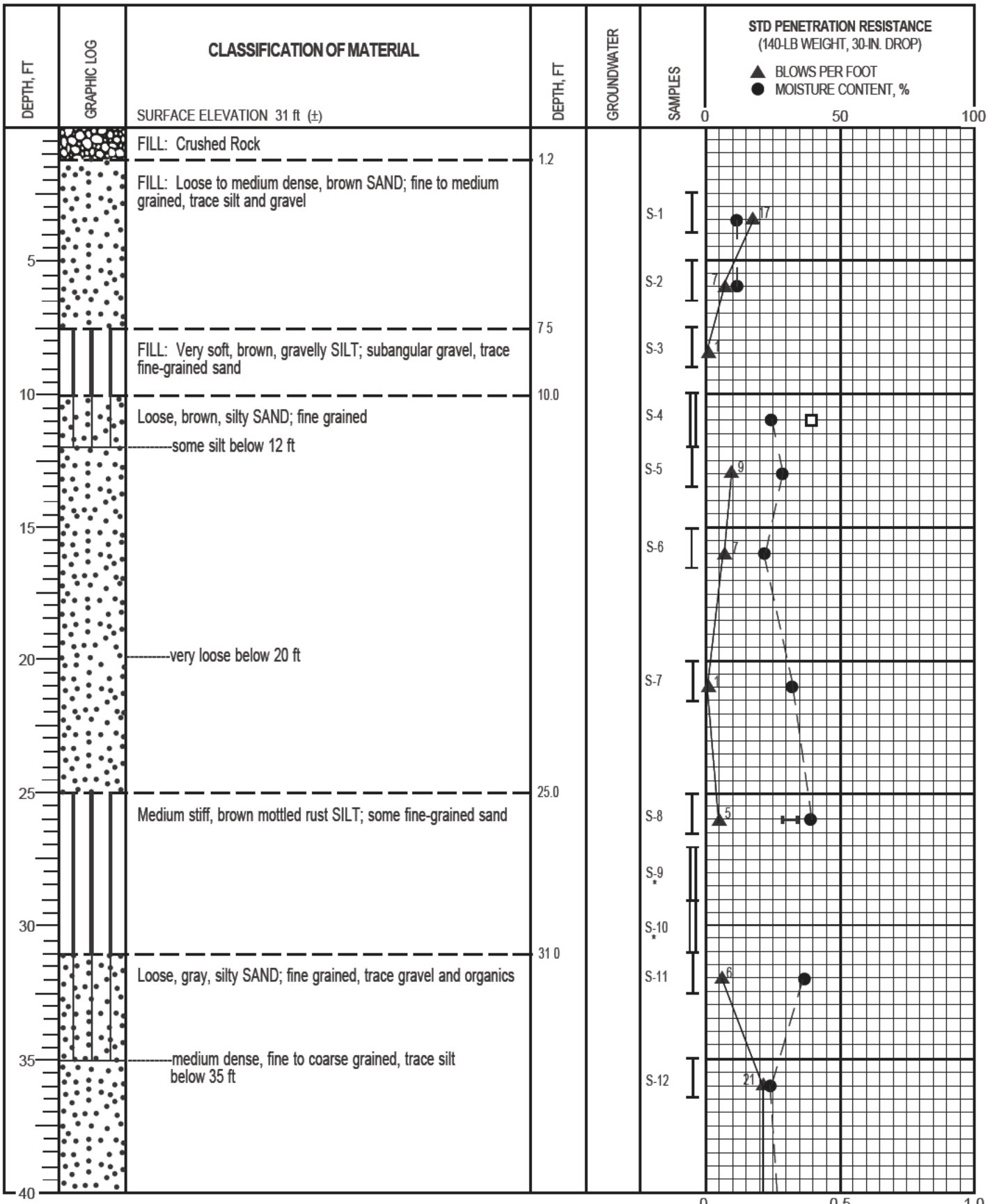
Moisture Content

Plastic Limit

GRI

BORING B-10 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 10A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

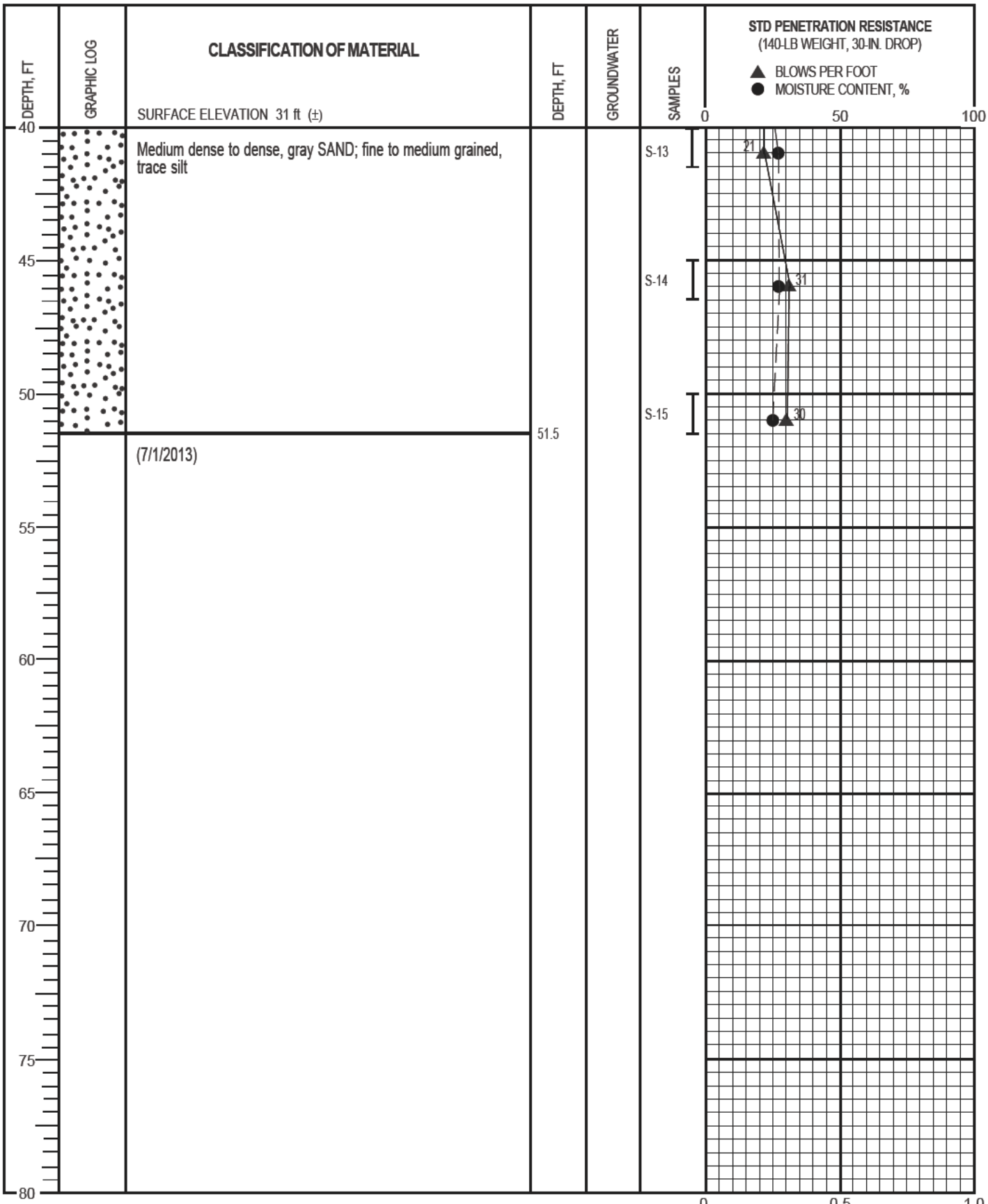
Moisture Content

Plastic Limit

GRI

BORING B-11

DEC. 2013 JOB. NO. W1114 FIG. 11A



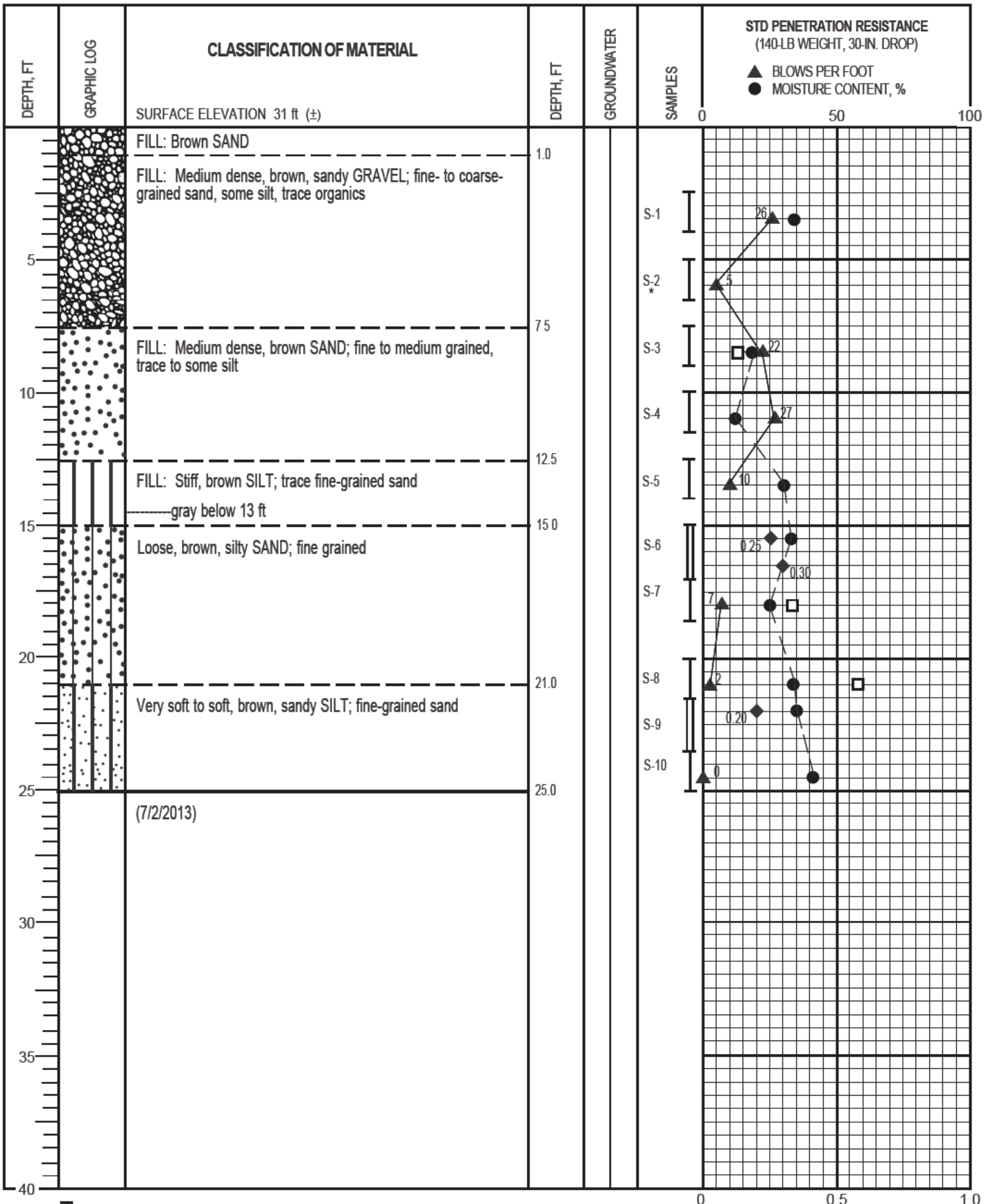
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-11 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 11A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

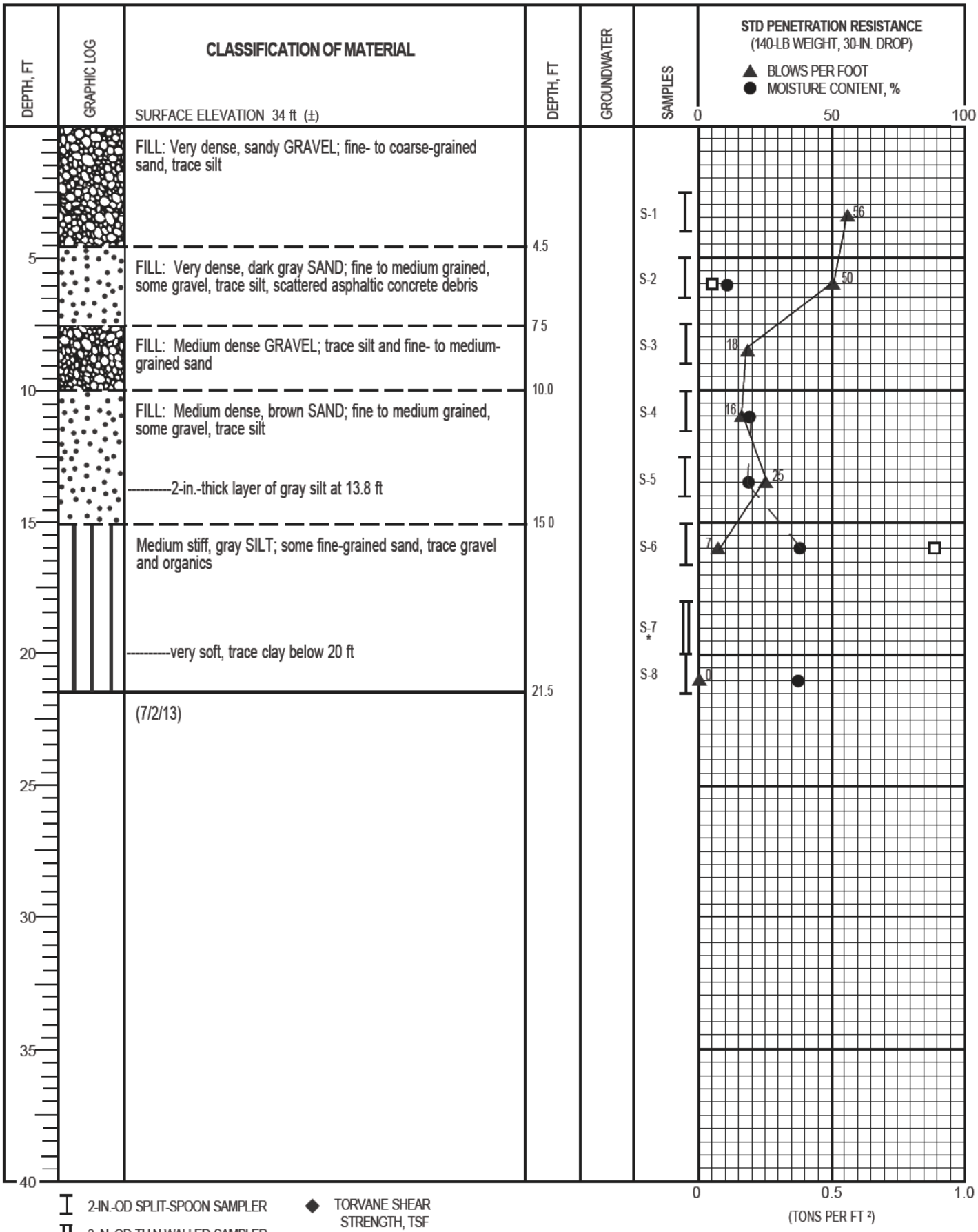
Moisture Content

Plastic Limit

GRI

BORING B-12

DEC. 2013 JOB. NO. W1114 FIG. 12A



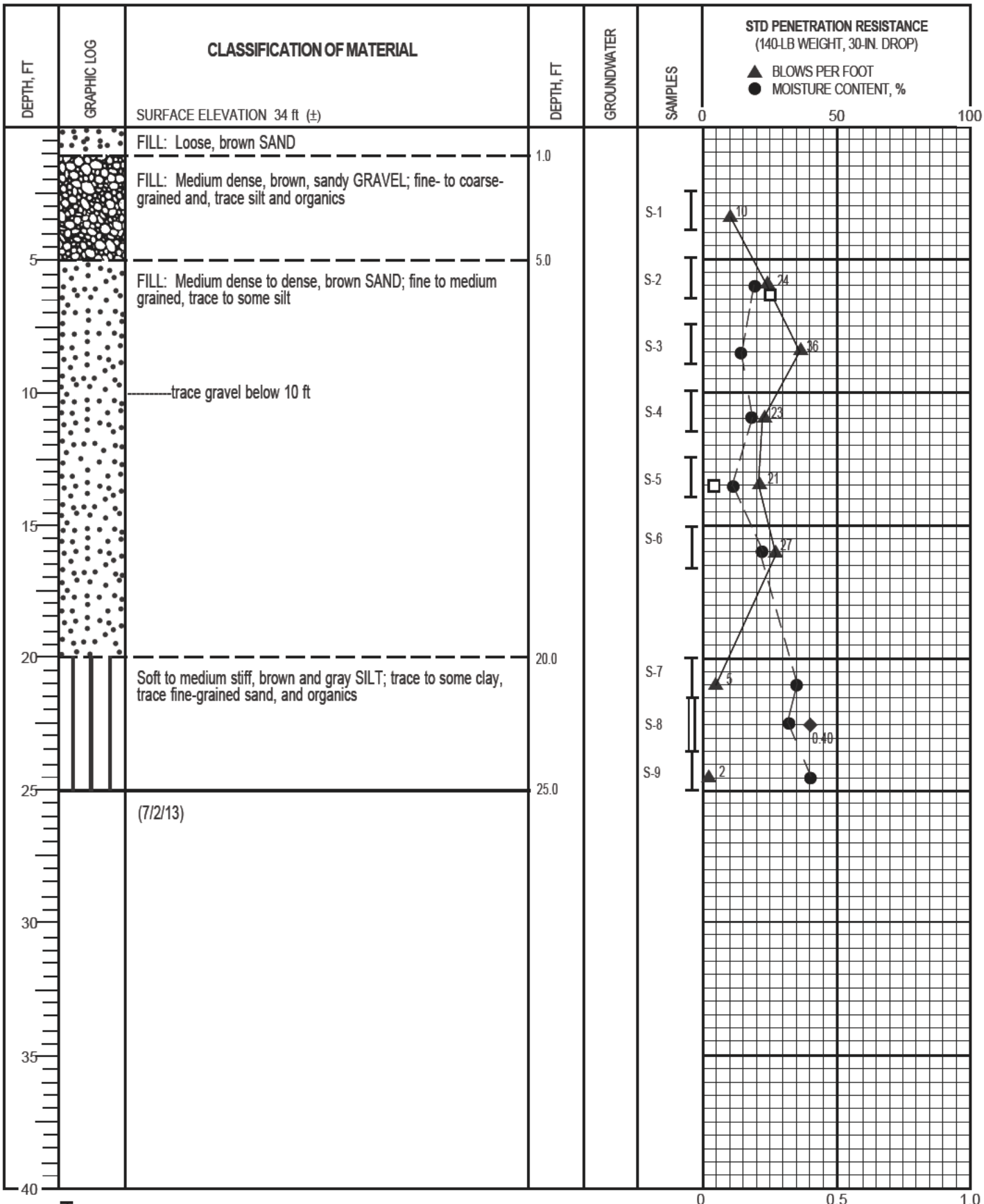
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-13

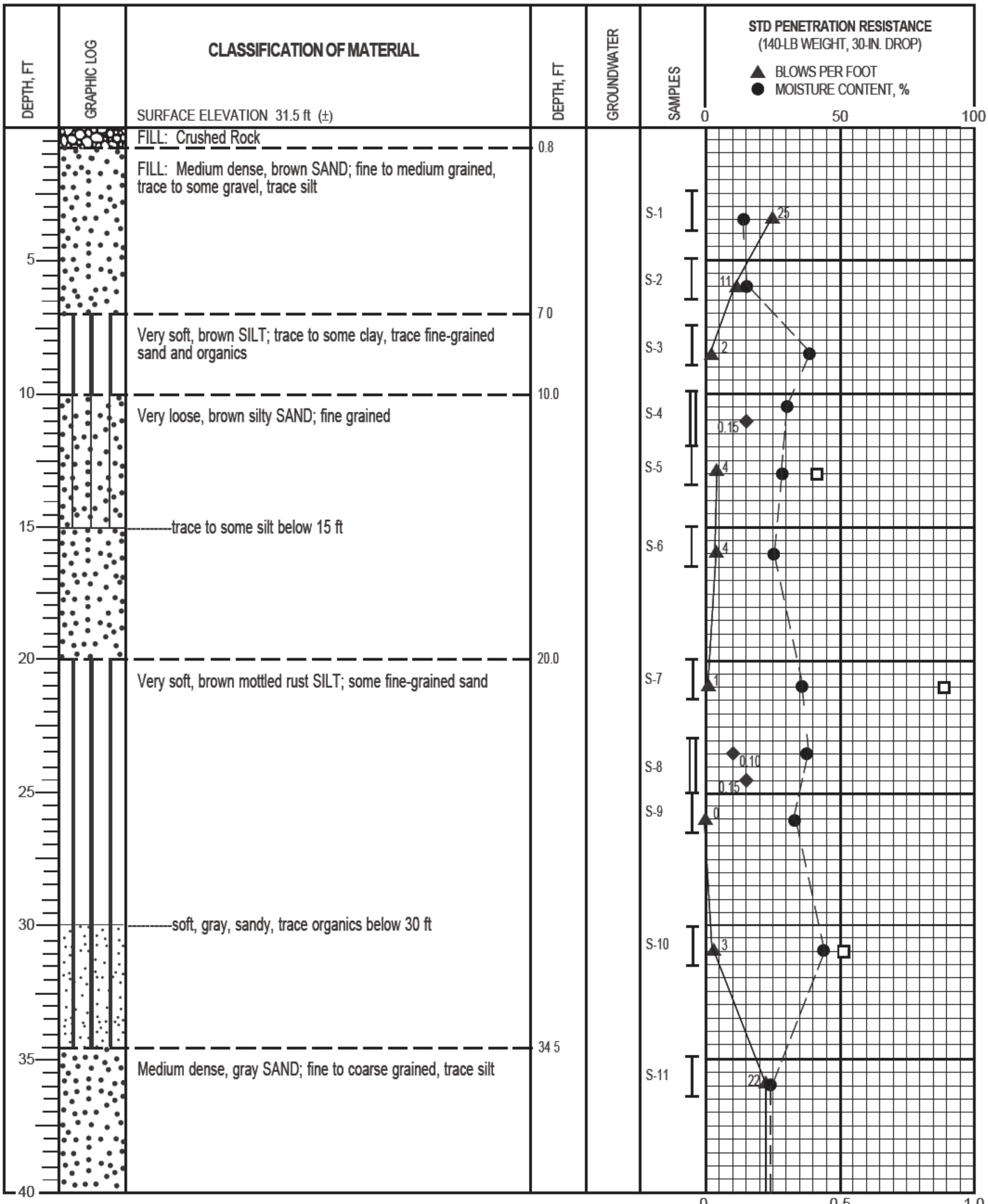
DEC. 2013 JOB. NO. W1114 FIG. 13A



GRI

BORING B-14

DEC. 2013 JOB. NO. W1114 FIG. 14A



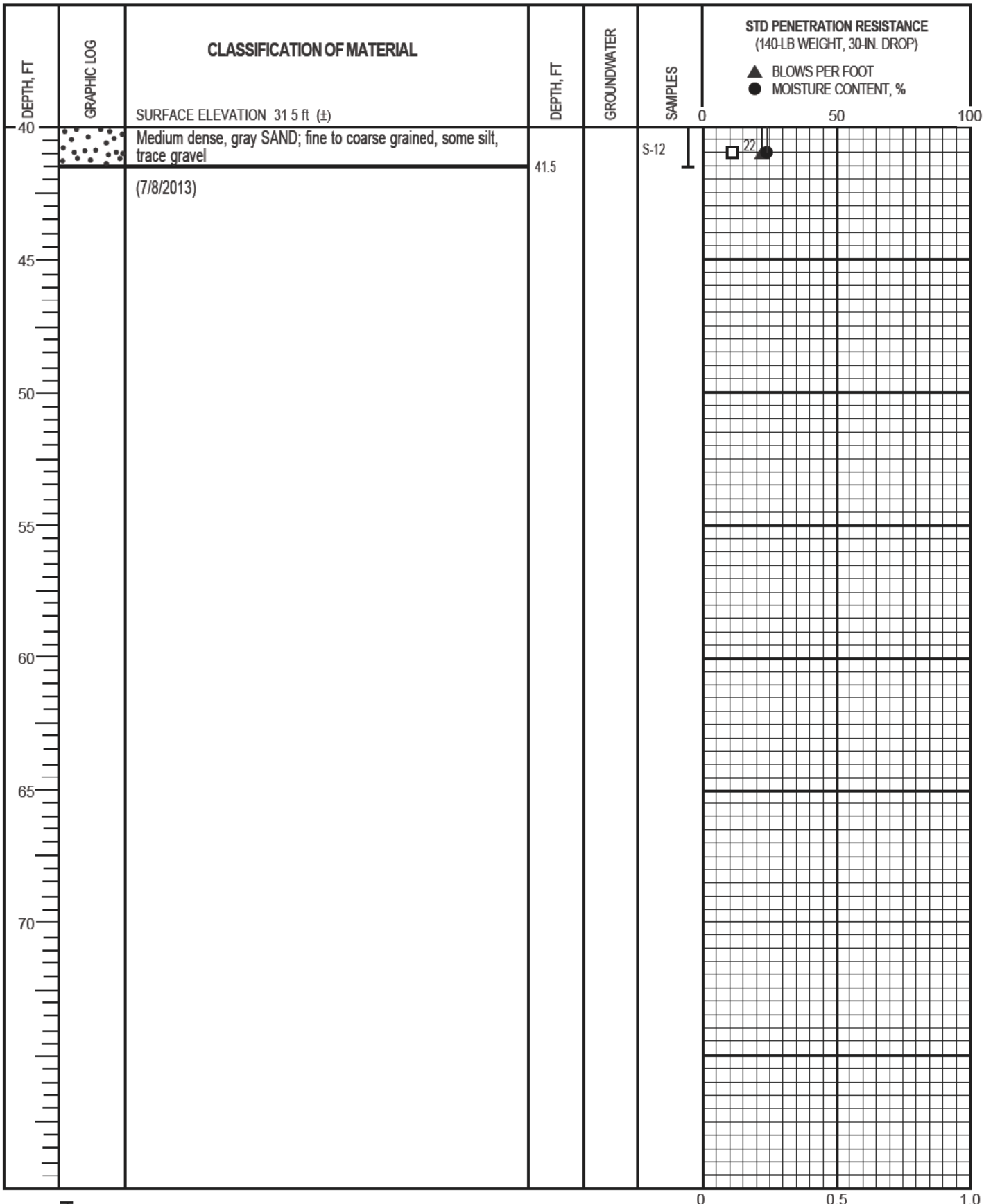
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-15

DEC. 2013 JOB. NO. W1114 FIG. 15A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

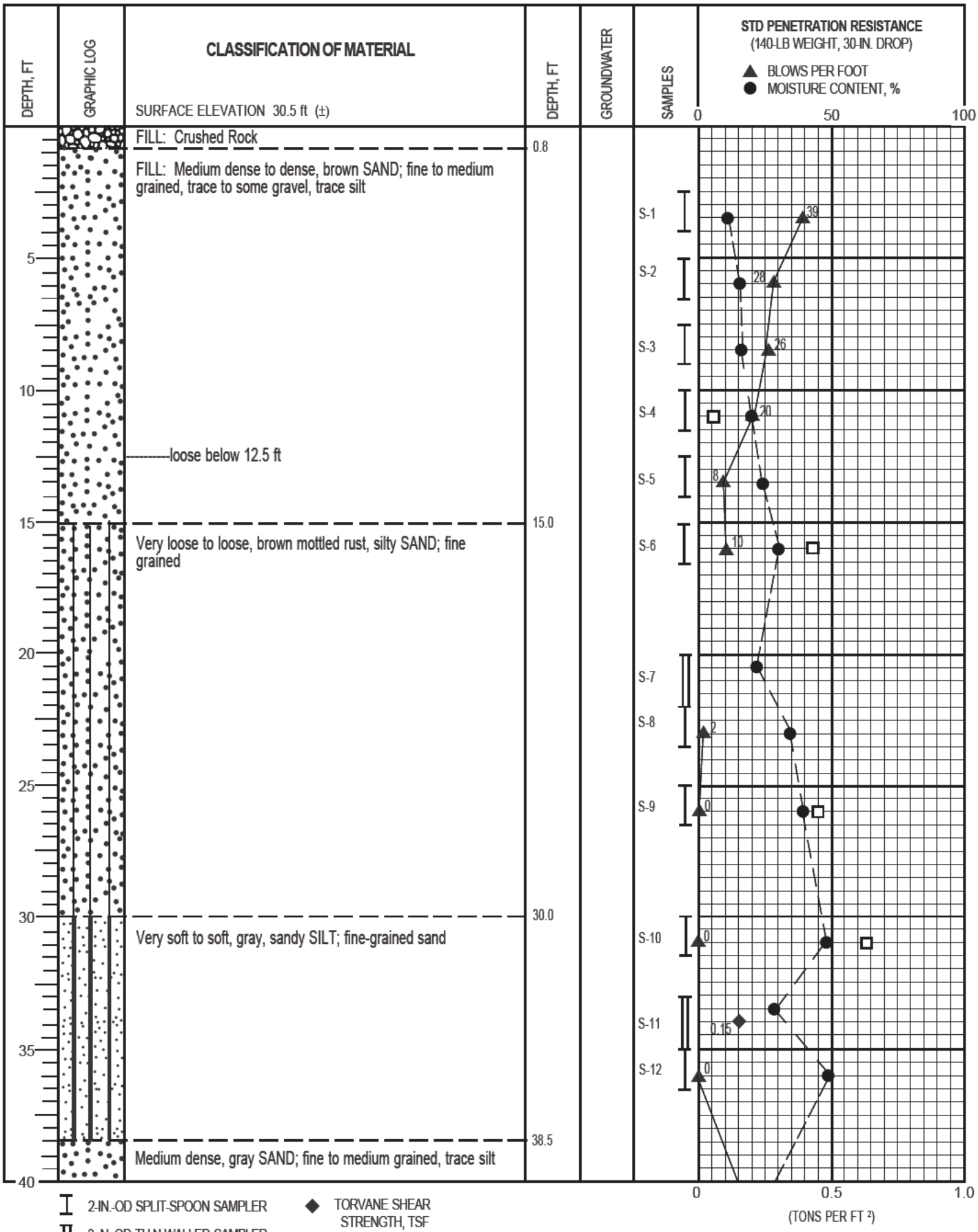
Moisture Content

Plastic Limit

GRI

BORING B-15 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 15A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

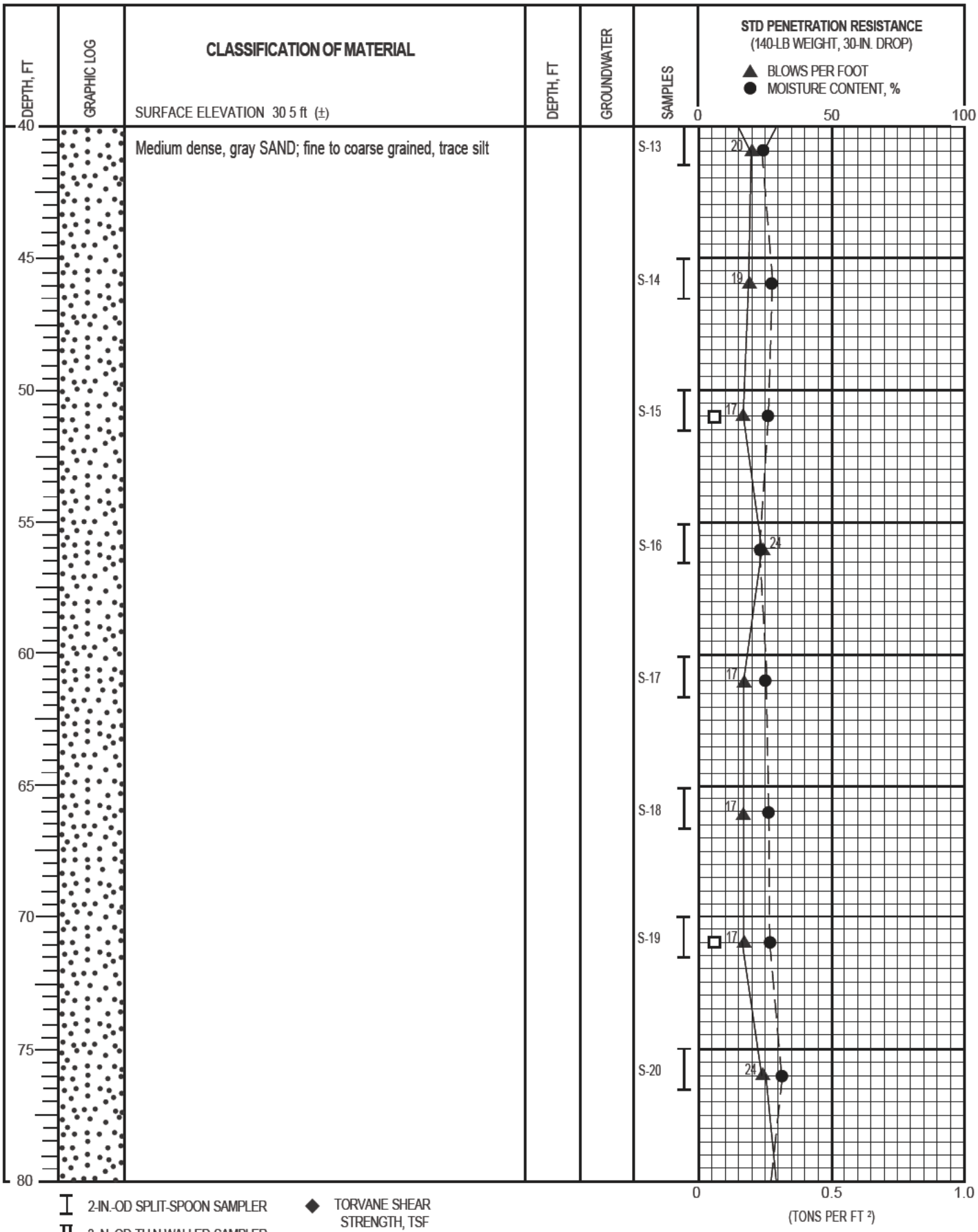
Moisture Content

Plastic Limit

GRI

BORING B-16

DEC. 2013 JOB. NO. W1114 FIG. 16A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

P VIBRATING-WIRE PIEZOMETER

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

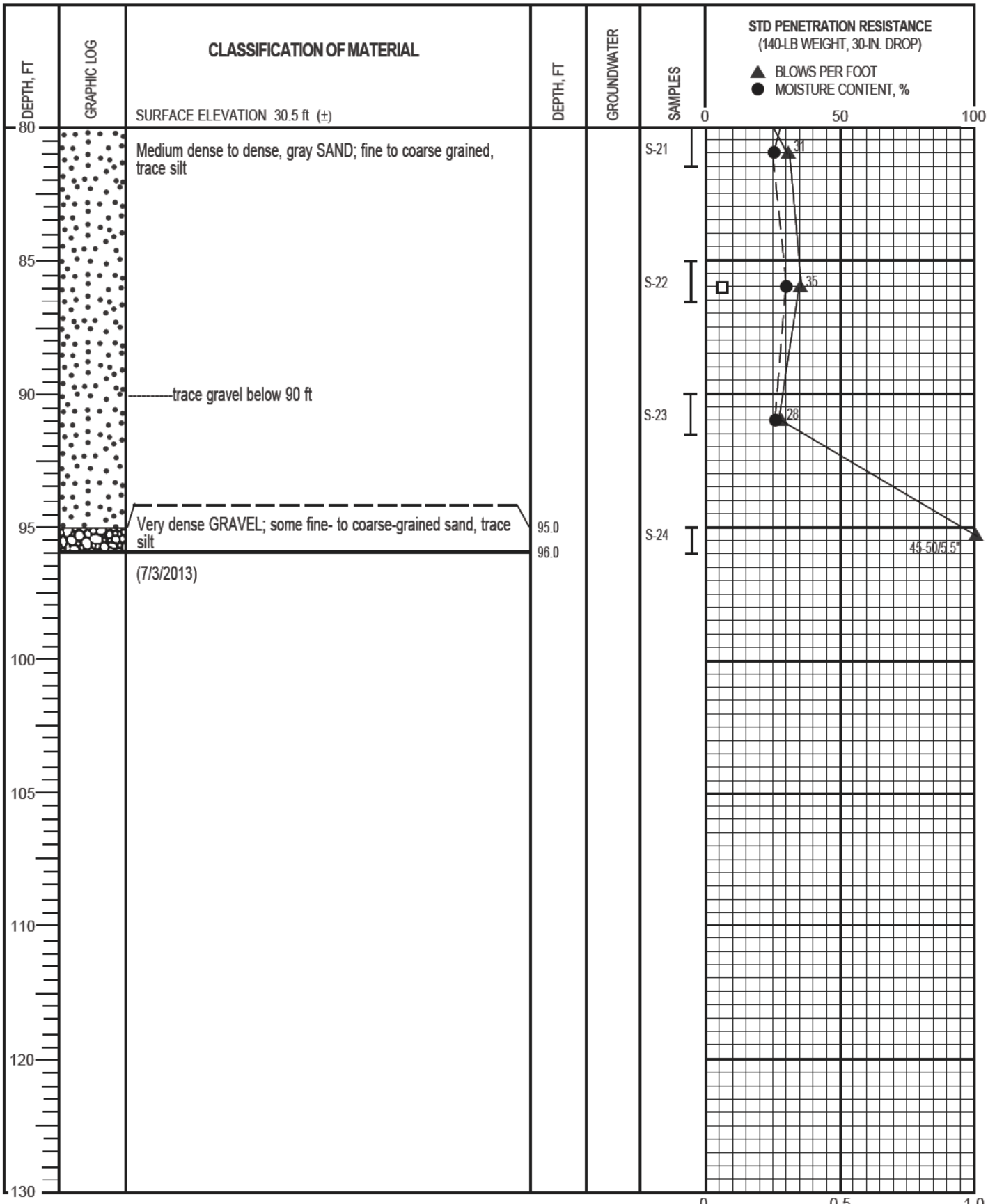
Moisture Content

Plastic Limit

GRI

BORING B-16 (cont.)

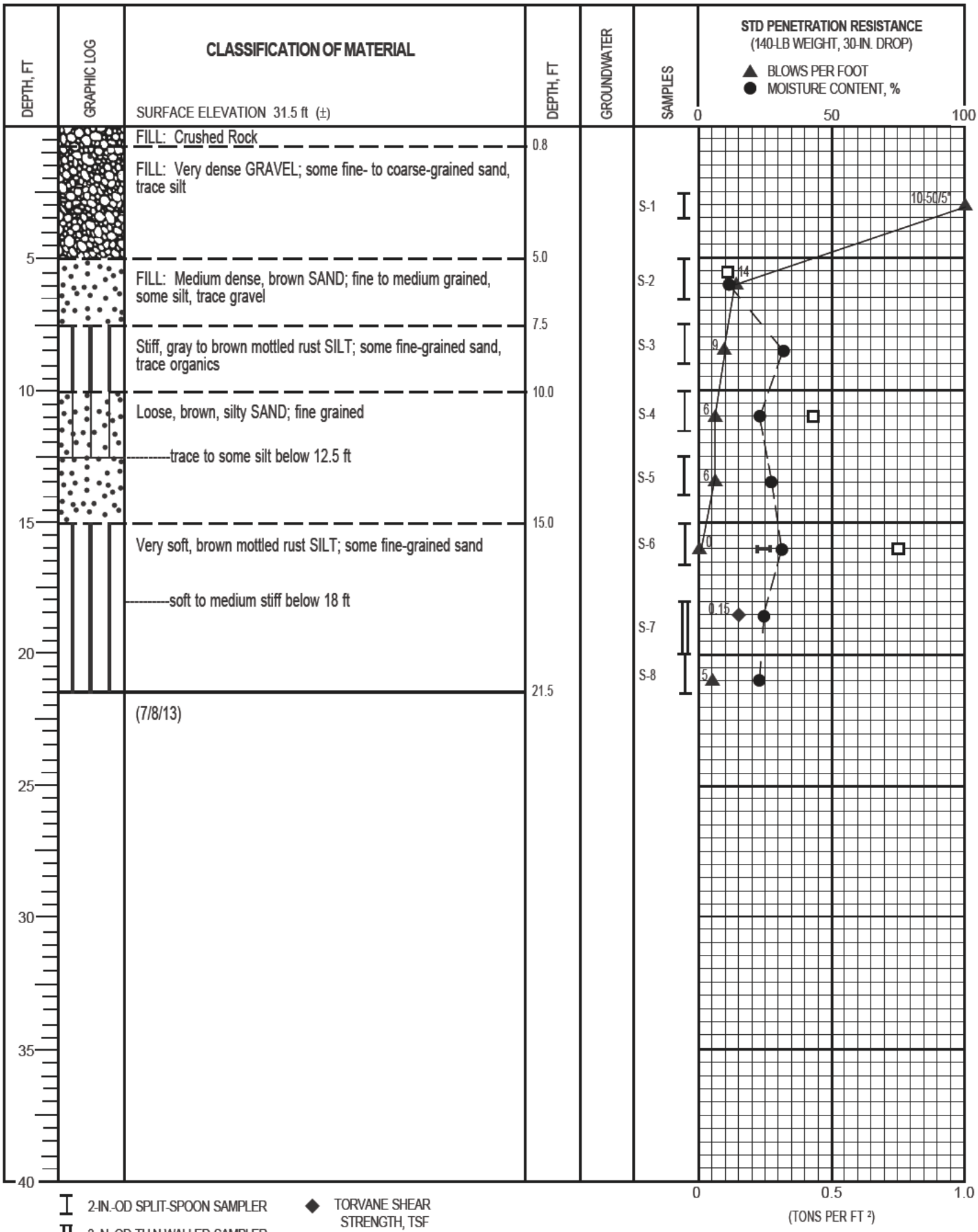
DEC. 2013 JOB. NO. W1114 FIG. 16A



GRI

BORING B-16 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 16A

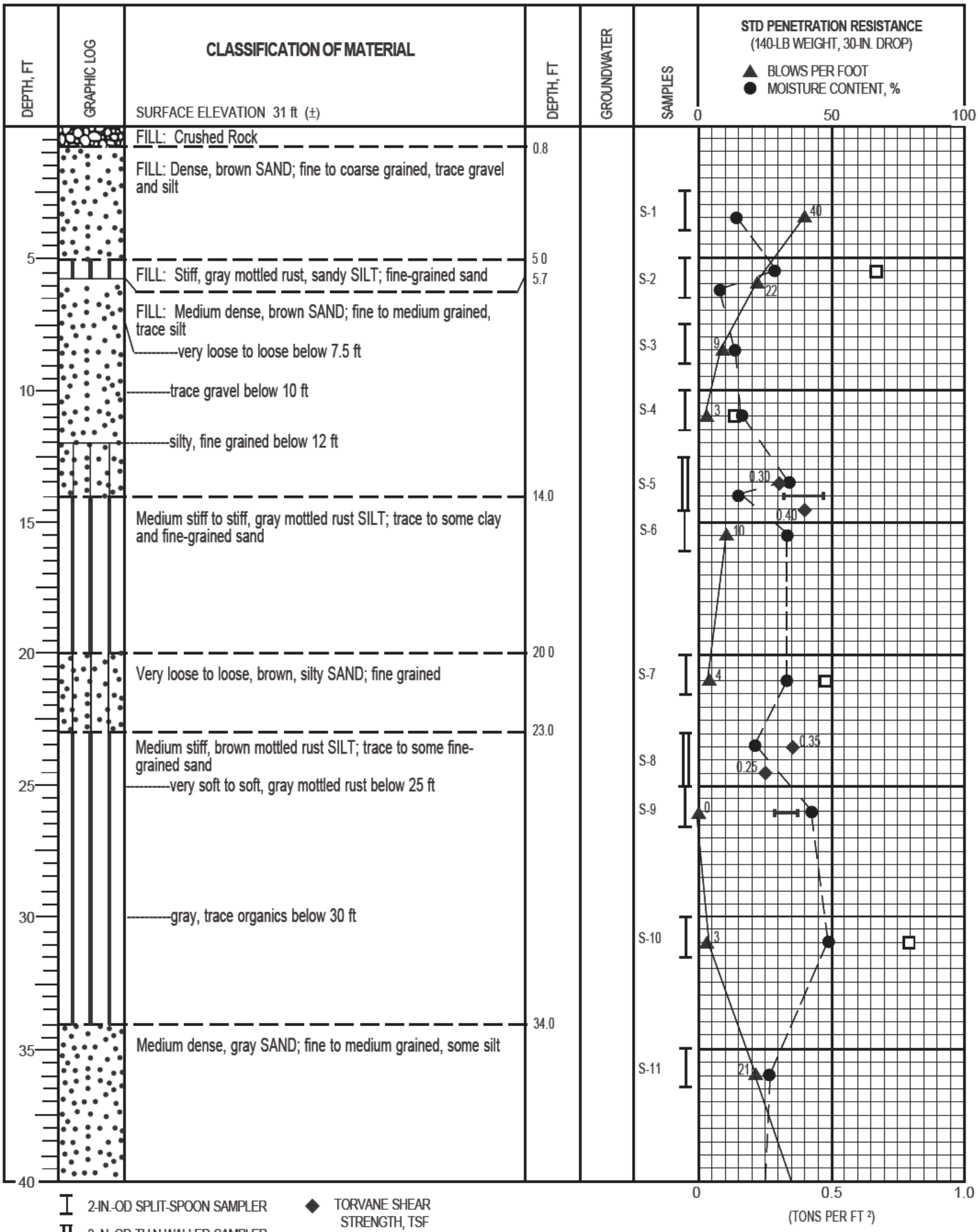


GRI

BORING B-17

DEC. 2013 JOB. NO. W1114 FIG. 17A

SURFACE ELEVATION ----- ft (±)

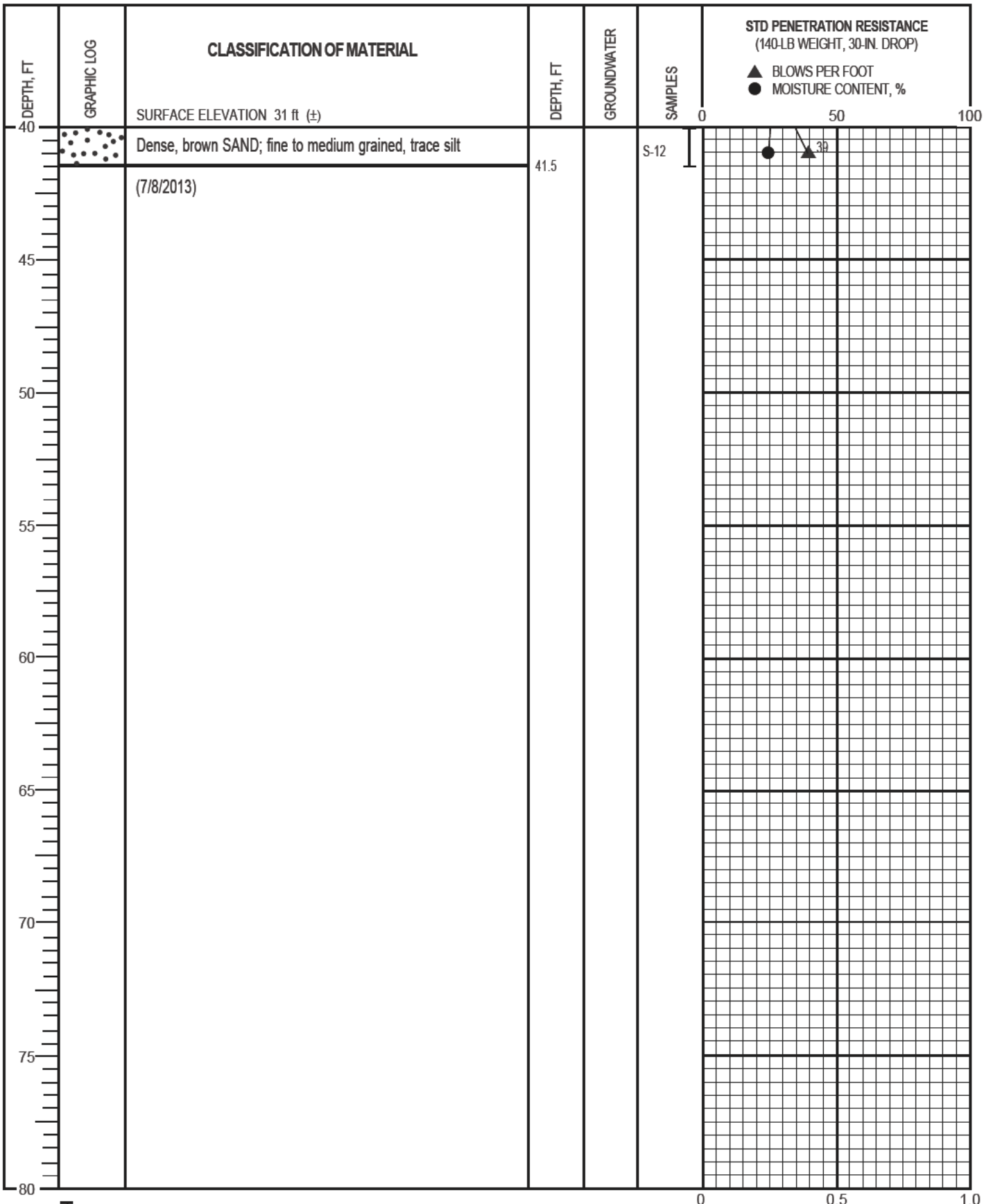


2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
P VIBRATING-WIRE PIEZOMETER
SLOTTED PVC PIPE
Water Level (date)
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-18

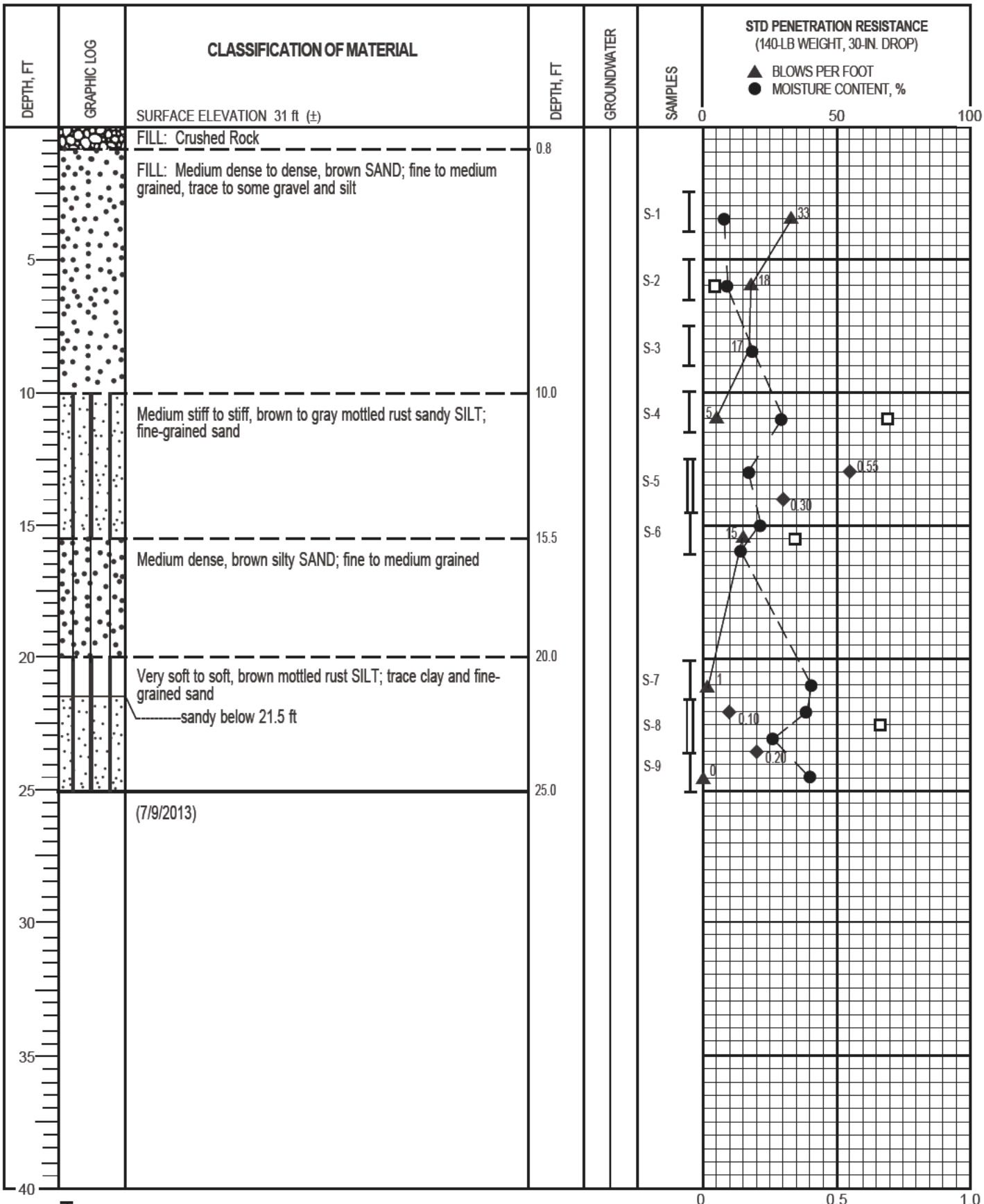
DEC. 2013 JOB. NO. W1114 FIG. 18A



GRI

BORING B-18 (cont.)

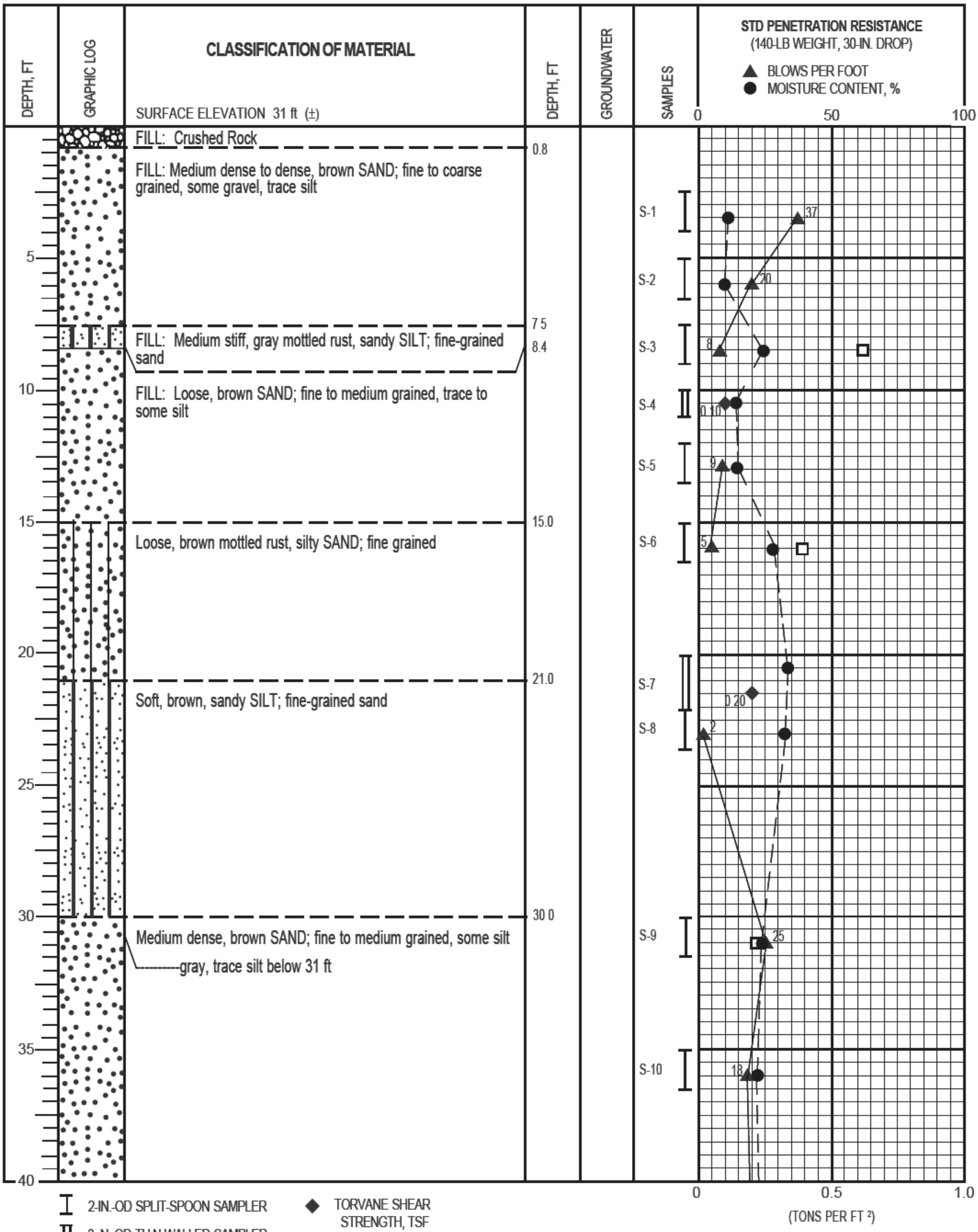
DEC. 2013 JOB. NO. W1114 FIG. 18A



GRI

BORING B-19

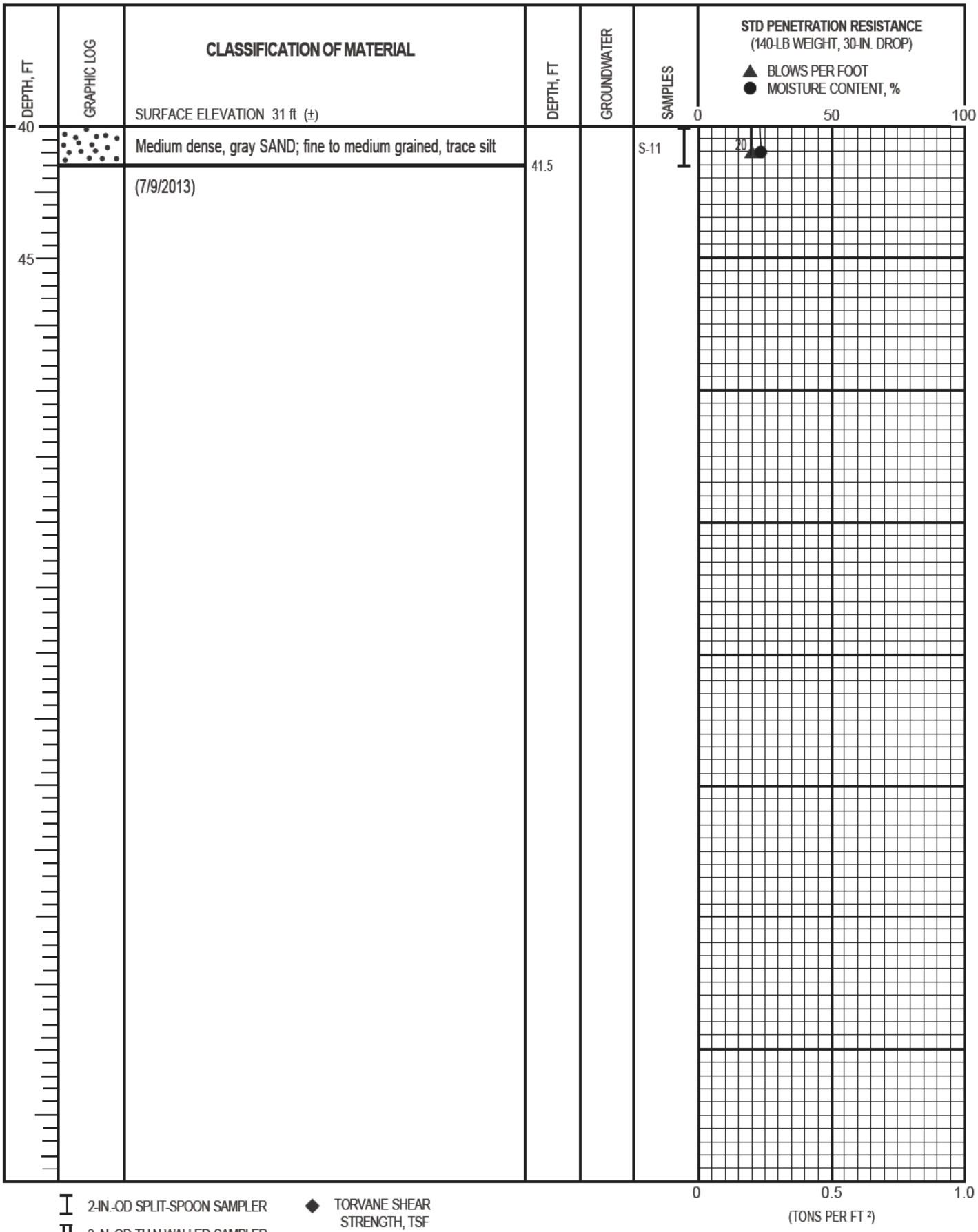
DEC. 2013 JOB. NO. W1114 FIG. 19A



GRI

BORING B-20

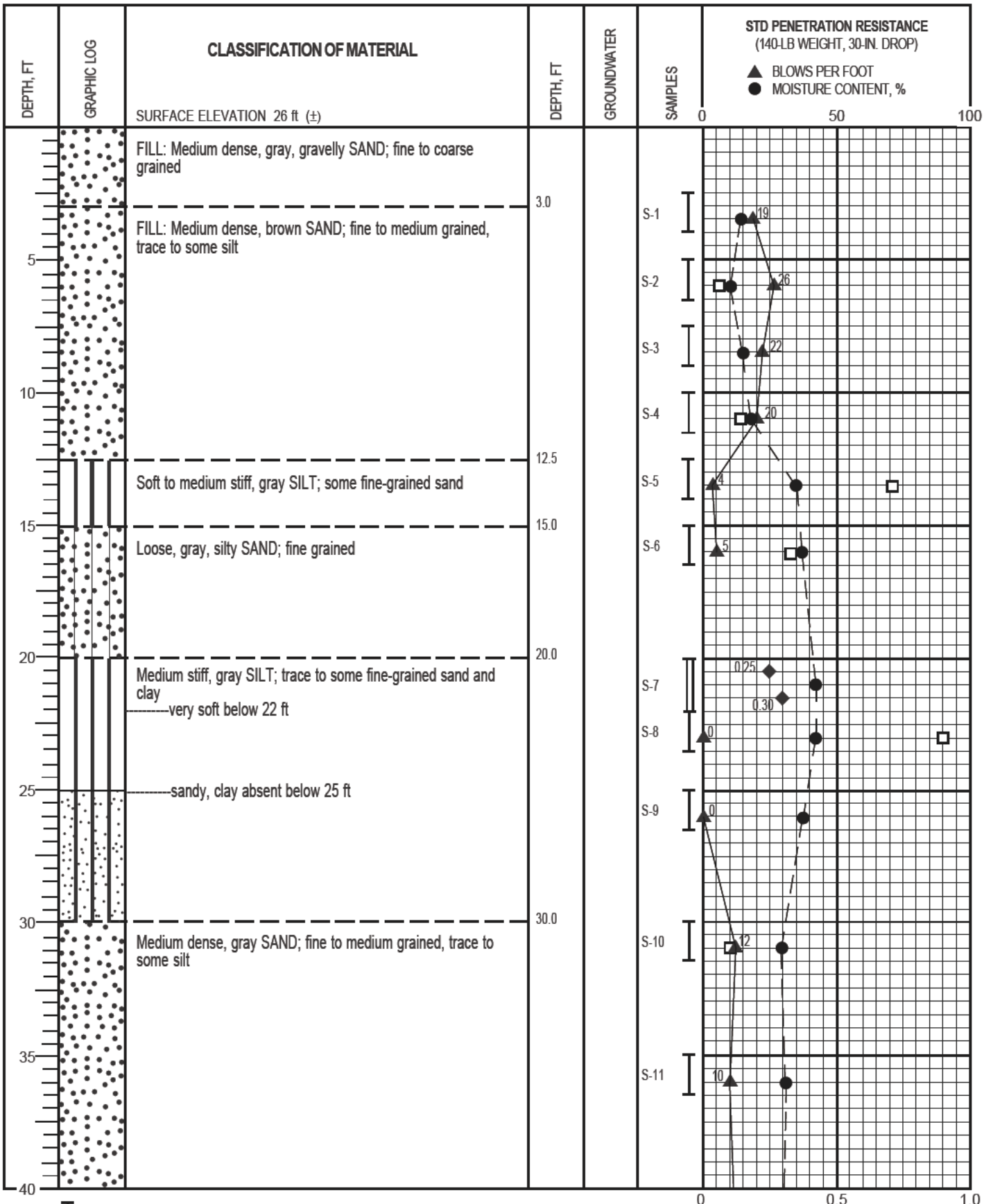
DEC. 2013 JOB. NO. W1114 FIG. 20A



GRI

BORING B-20 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 20A

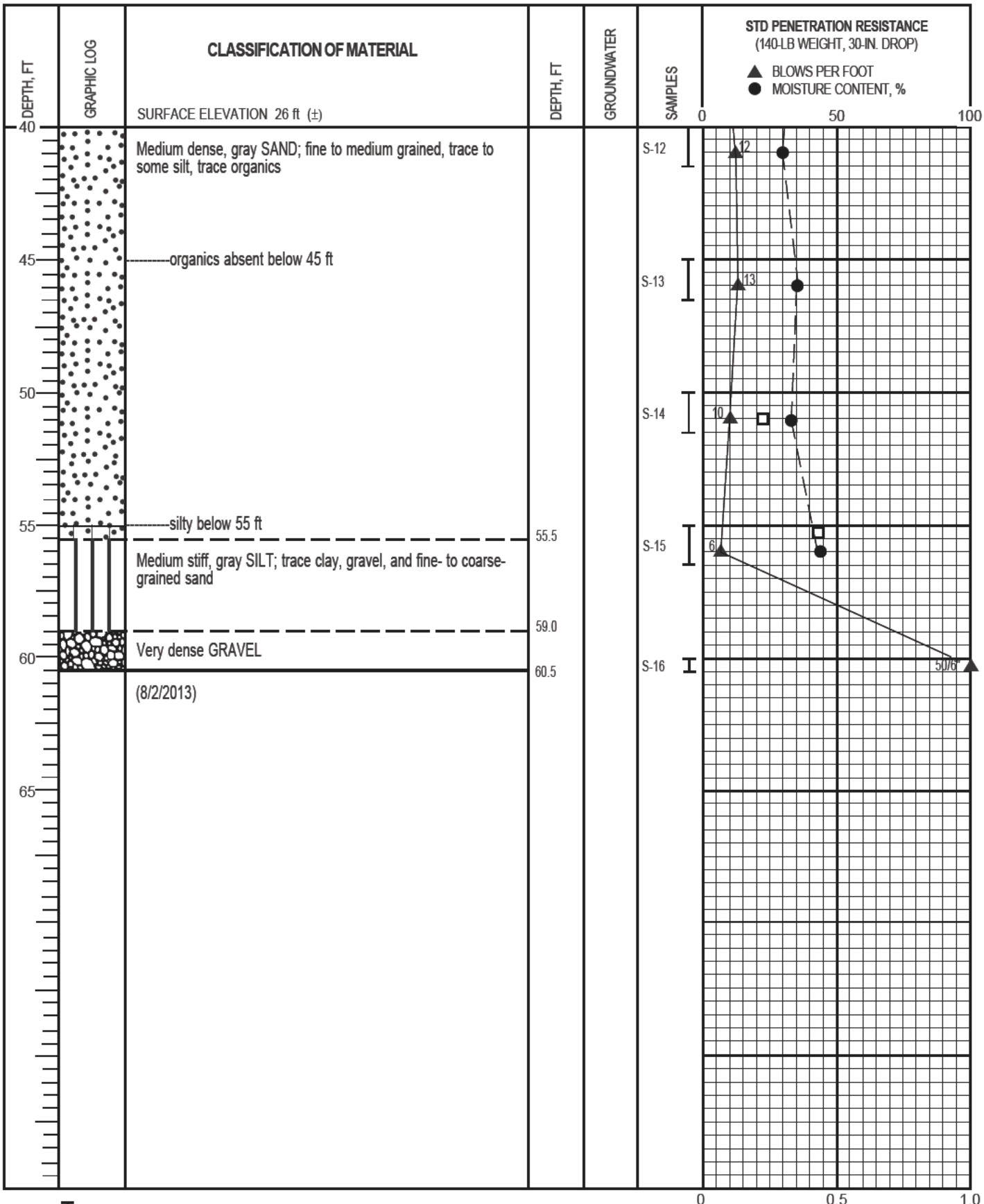


2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-21

DEC. 2013 JOB. NO. W1114 FIG. 21A



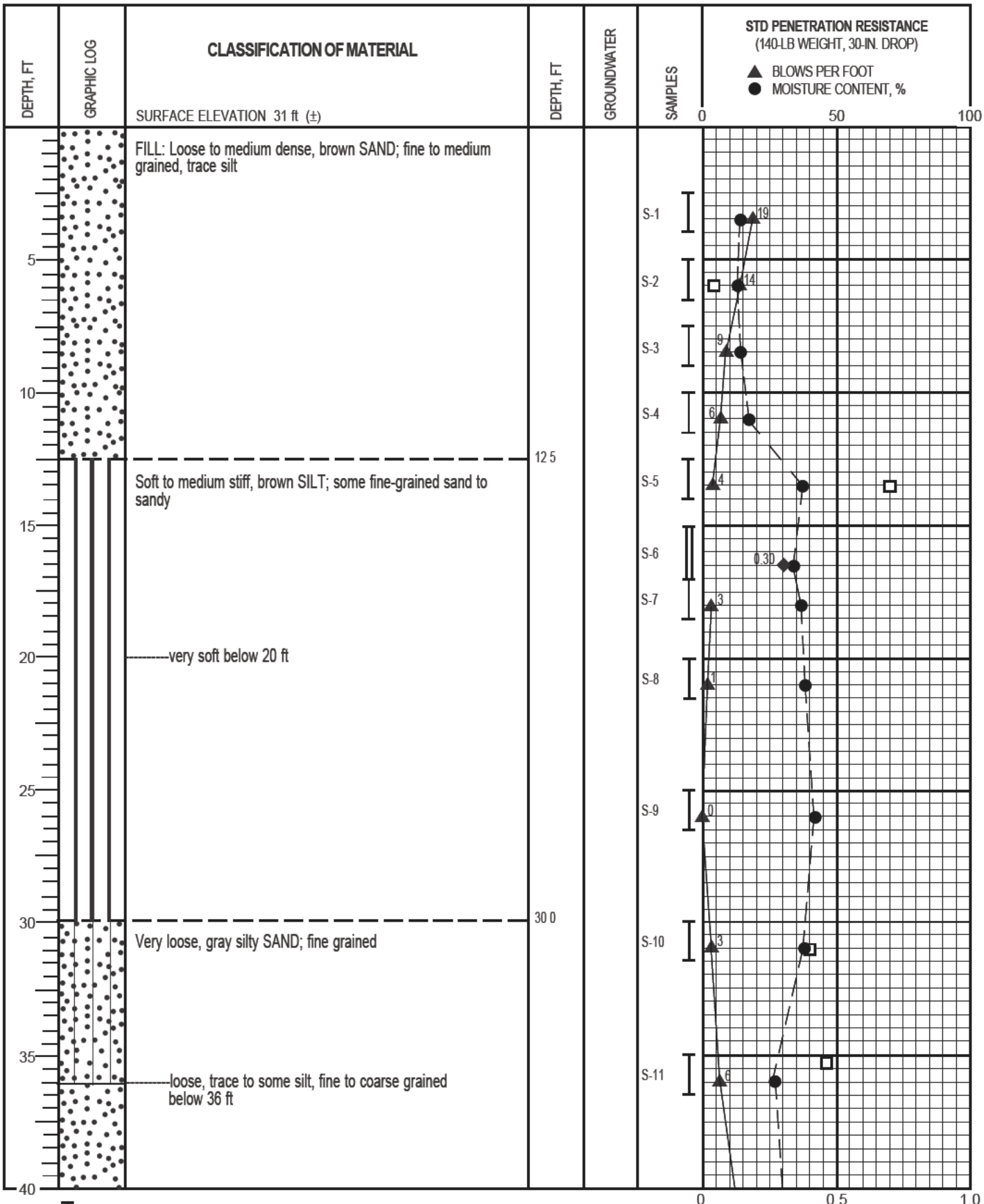
I 2-IN.-OD SPLIT-SPOON SAMPLER
II 3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)

◆ TORVANE SHEAR STRENGTH, TSF
□ PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-21 (cont)

DEC. 2013 JOB. NO. W1114 FIG. 21A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

NX CORE RUN

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

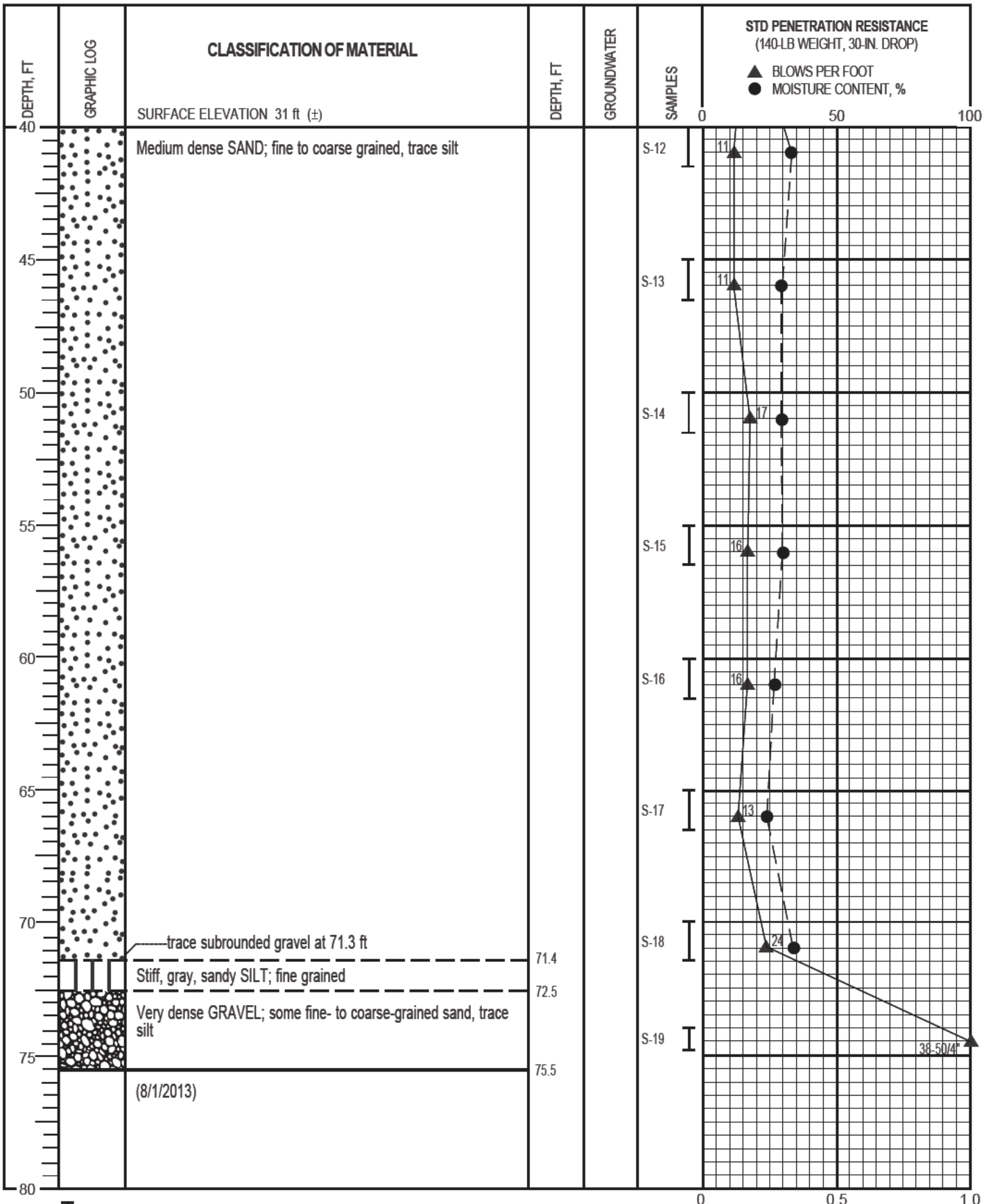
Moisture Content

Plastic Limit

GRI

BORING B-22

DEC. 2013 JOB. NO. W1114 FIG. 22A



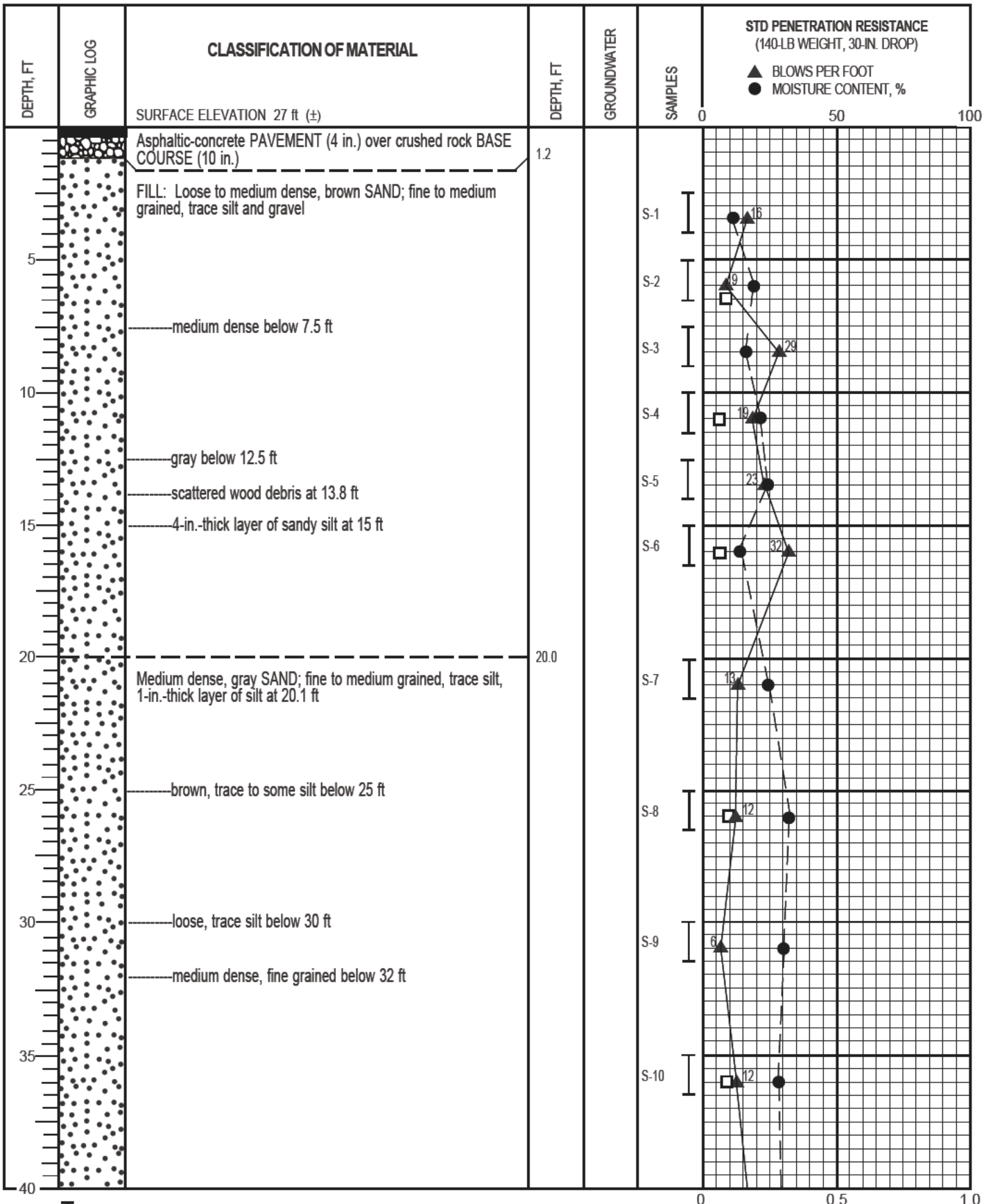
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-22 (cont)

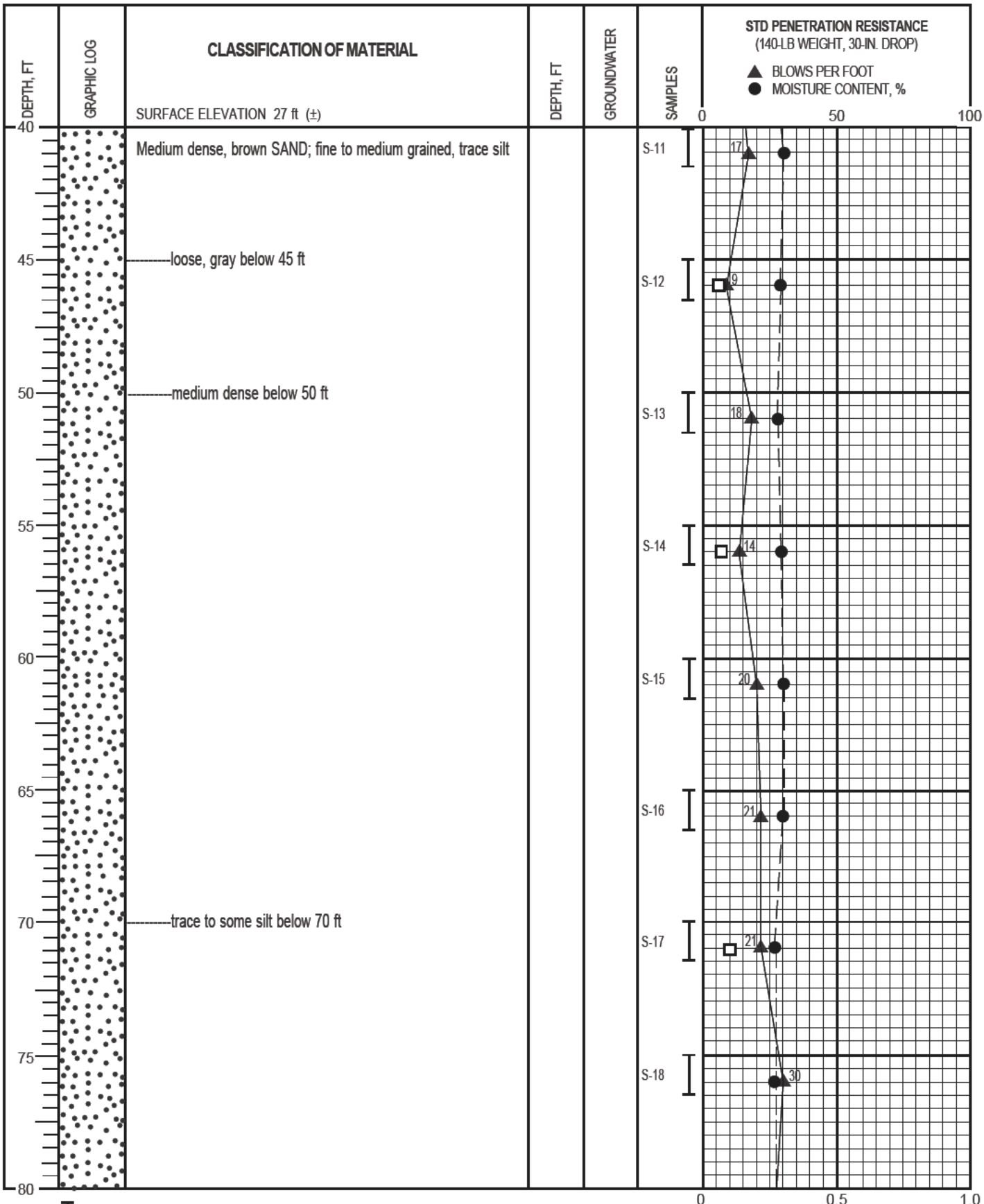
DEC. 2013 JOB. NO. W1114 FIG. 22A



GRI

BORING B-23

DEC. 2013 JOB. NO. W1114 FIG. 23A



2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)

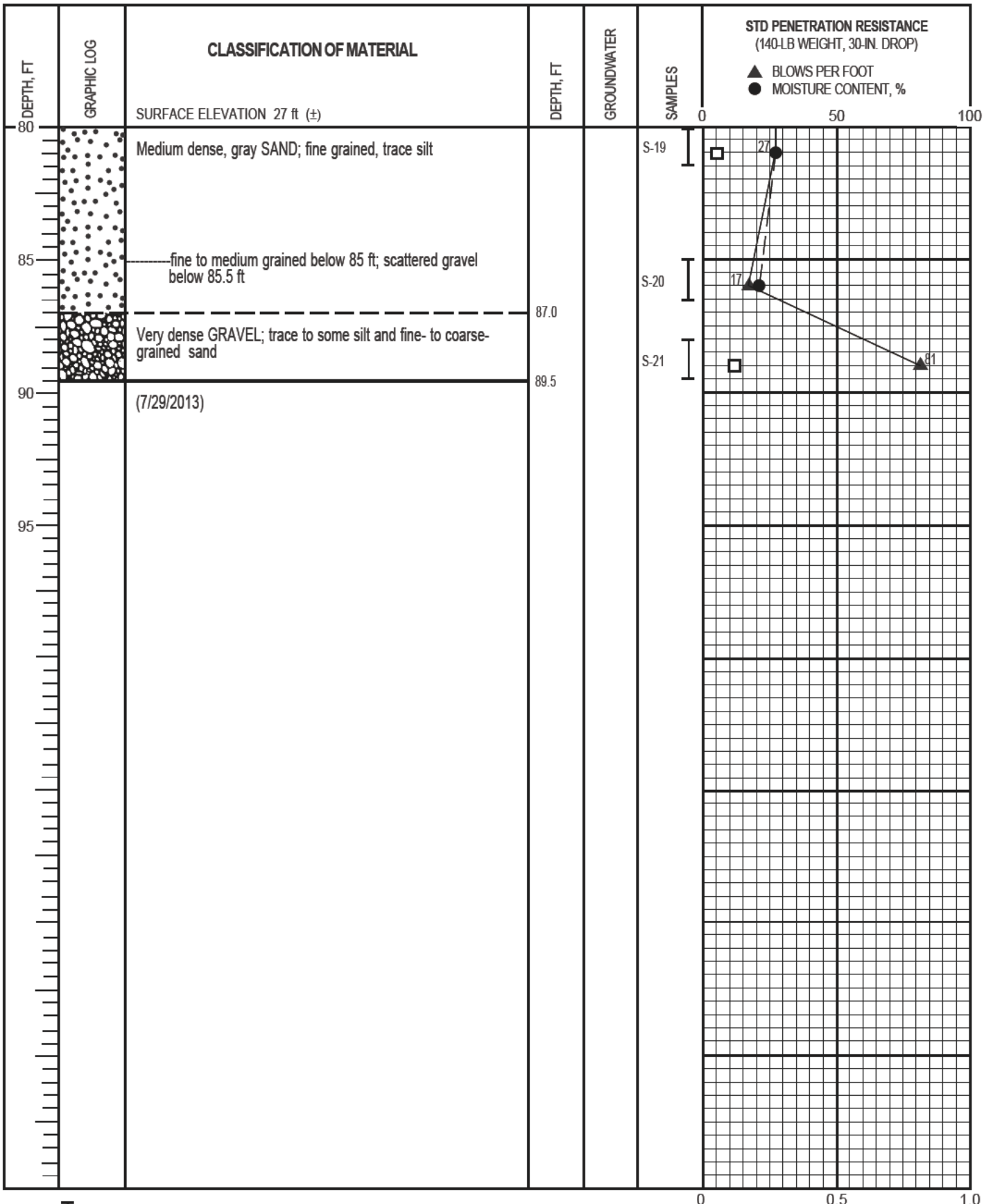
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY

Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-23 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 23A



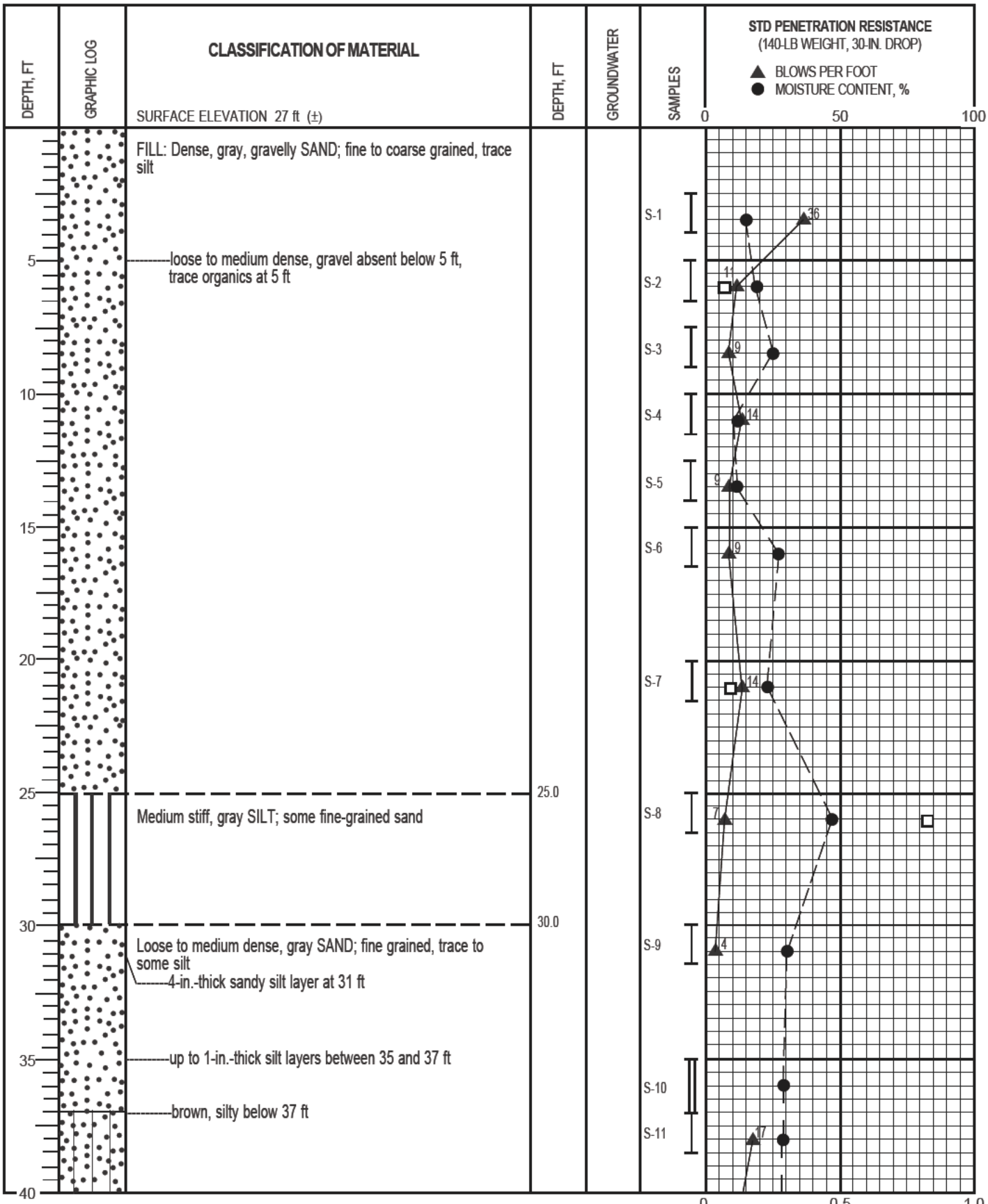
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-23 (cont.)

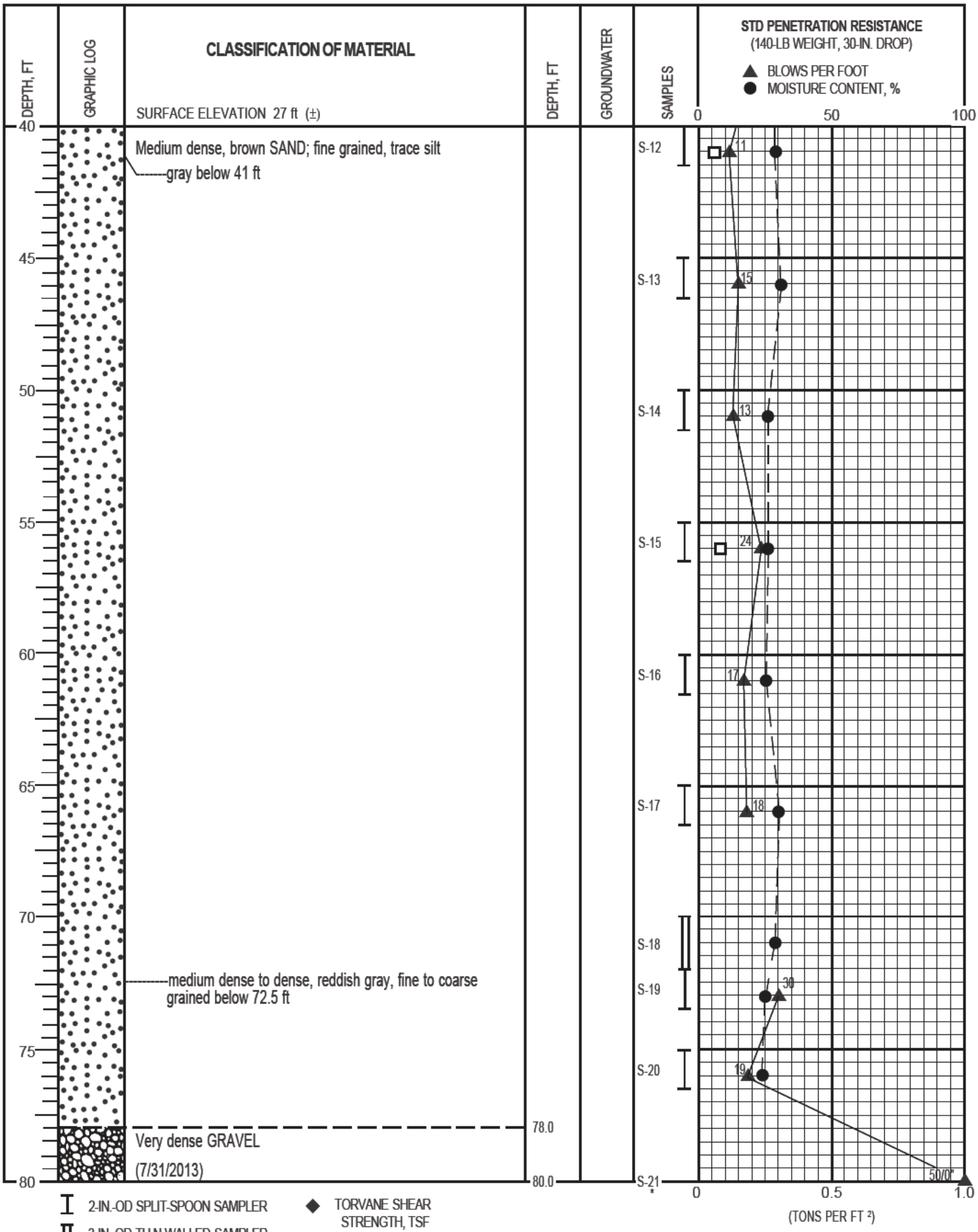
DEC. 2013 JOB. NO. W1114 FIG. 23A



GRI

BORING B-24

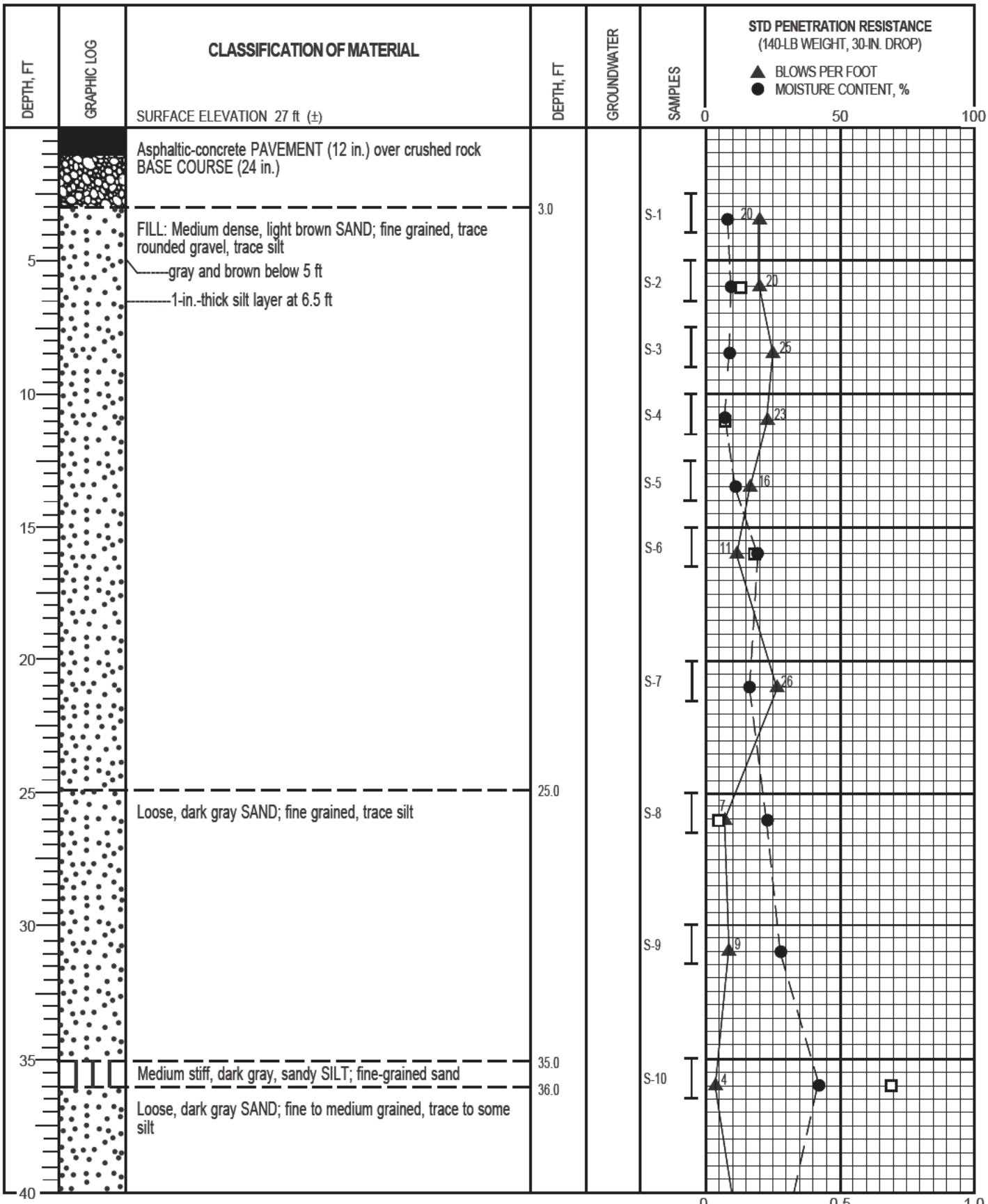
DEC. 2013 JOB. NO. W1114 FIG. 24A



GRI

BORING B-24 (cont)

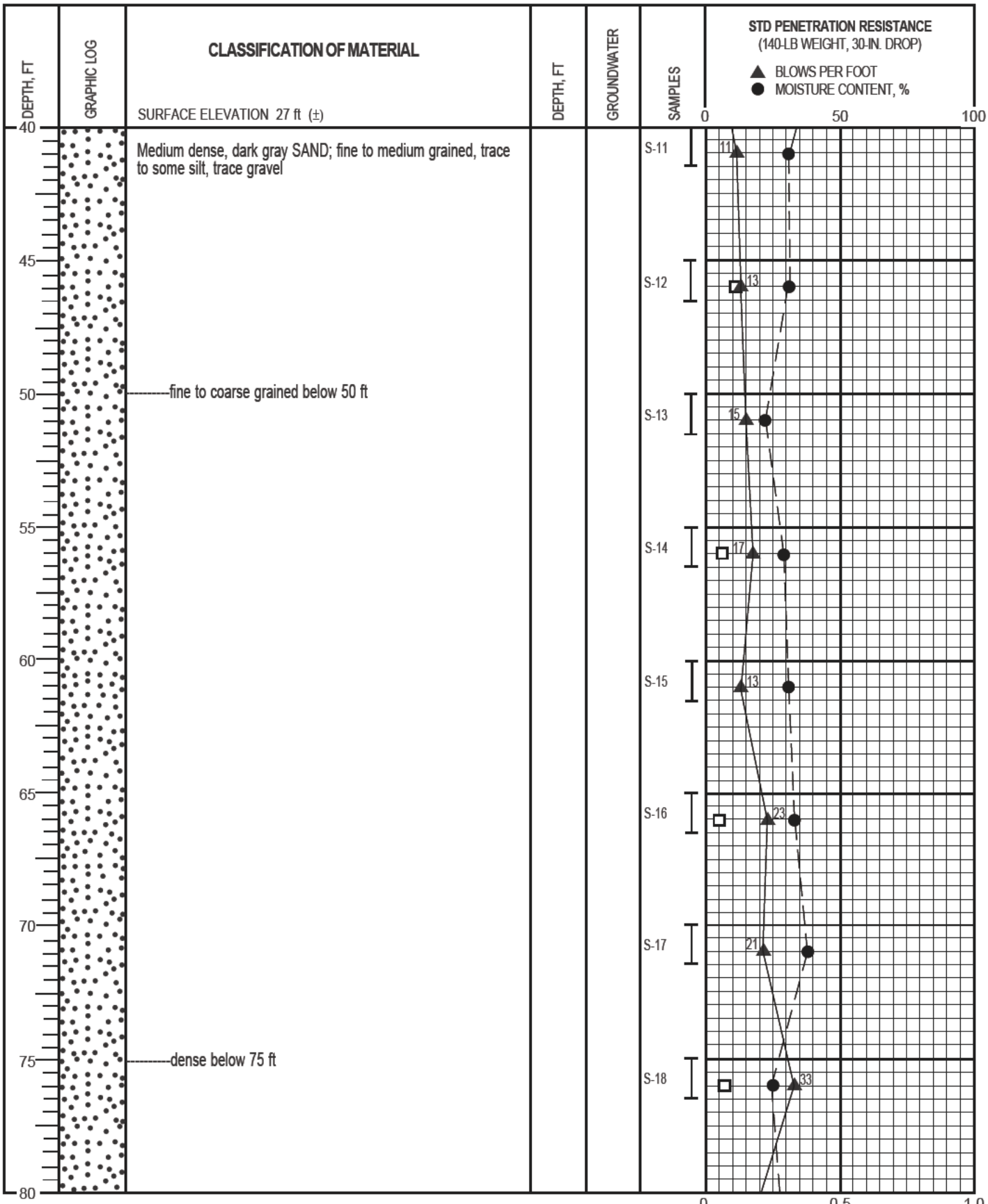
DEC. 2013 JOB. NO. W1114 FIG. 24A



GRI

BORING B-25

DEC. 2013 JOB. NO. W1114 FIG. 25A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

NX CORE RUN

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

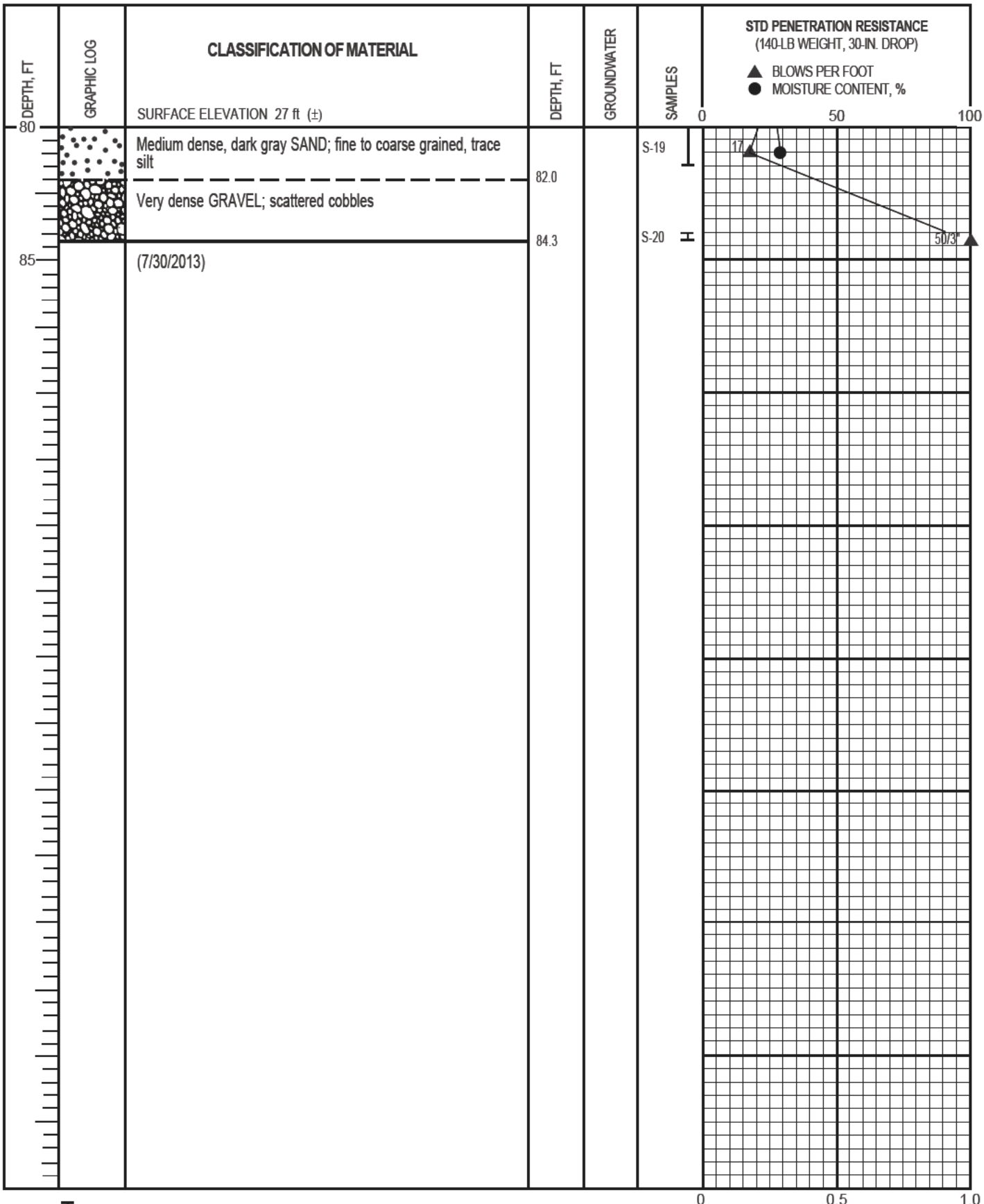
Moisture Content

Plastic Limit

GRI

BORING B-25 (cont)

DEC. 2013 JOB. NO. W1114 FIG. 25A



I 2-IN.-OD SPLIT-SPOON SAMPLER

II 3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

NX CORE RUN

SLOTTED PVC PIPE

Water Level (date)

◆ TORVANE SHEAR STRENGTH, TSF

□ PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

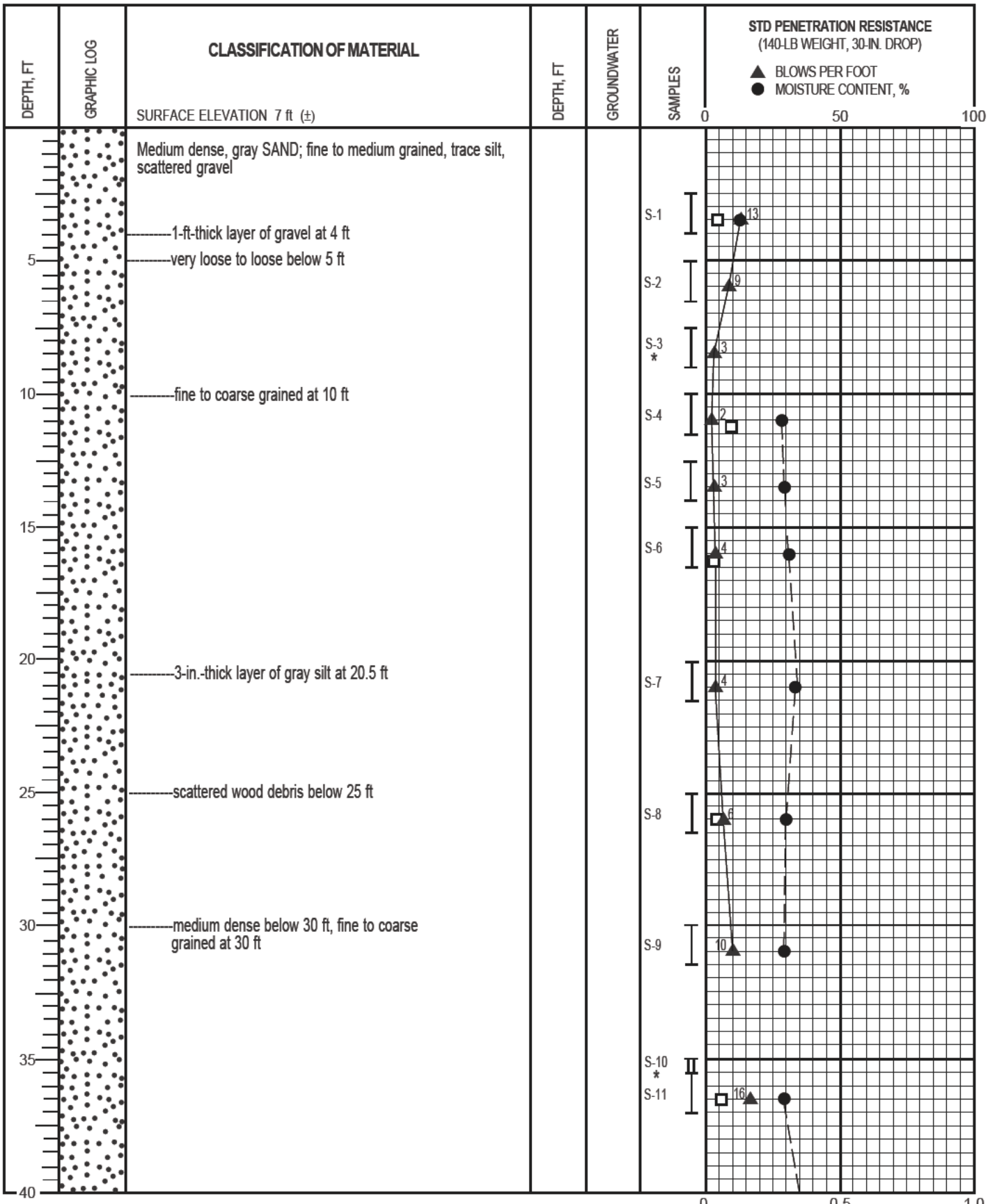
Moisture Content

Plastic Limit

GRI

BORING B-25 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 25A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

NX CORE RUN

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

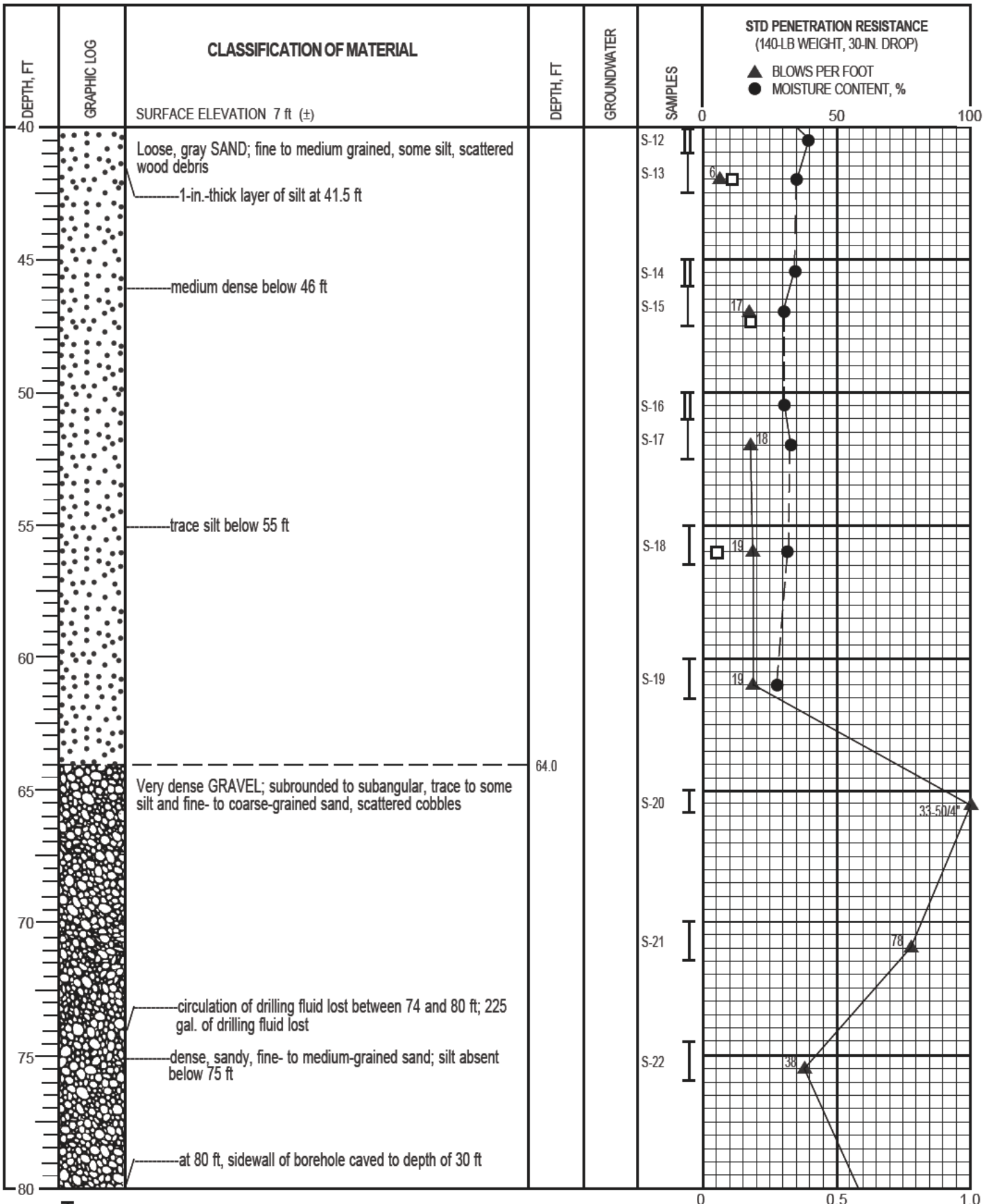
Moisture Content

Plastic Limit

GRI

BORING B-26

DEC. 2013 JOB. NO. W1114 FIG. 26A



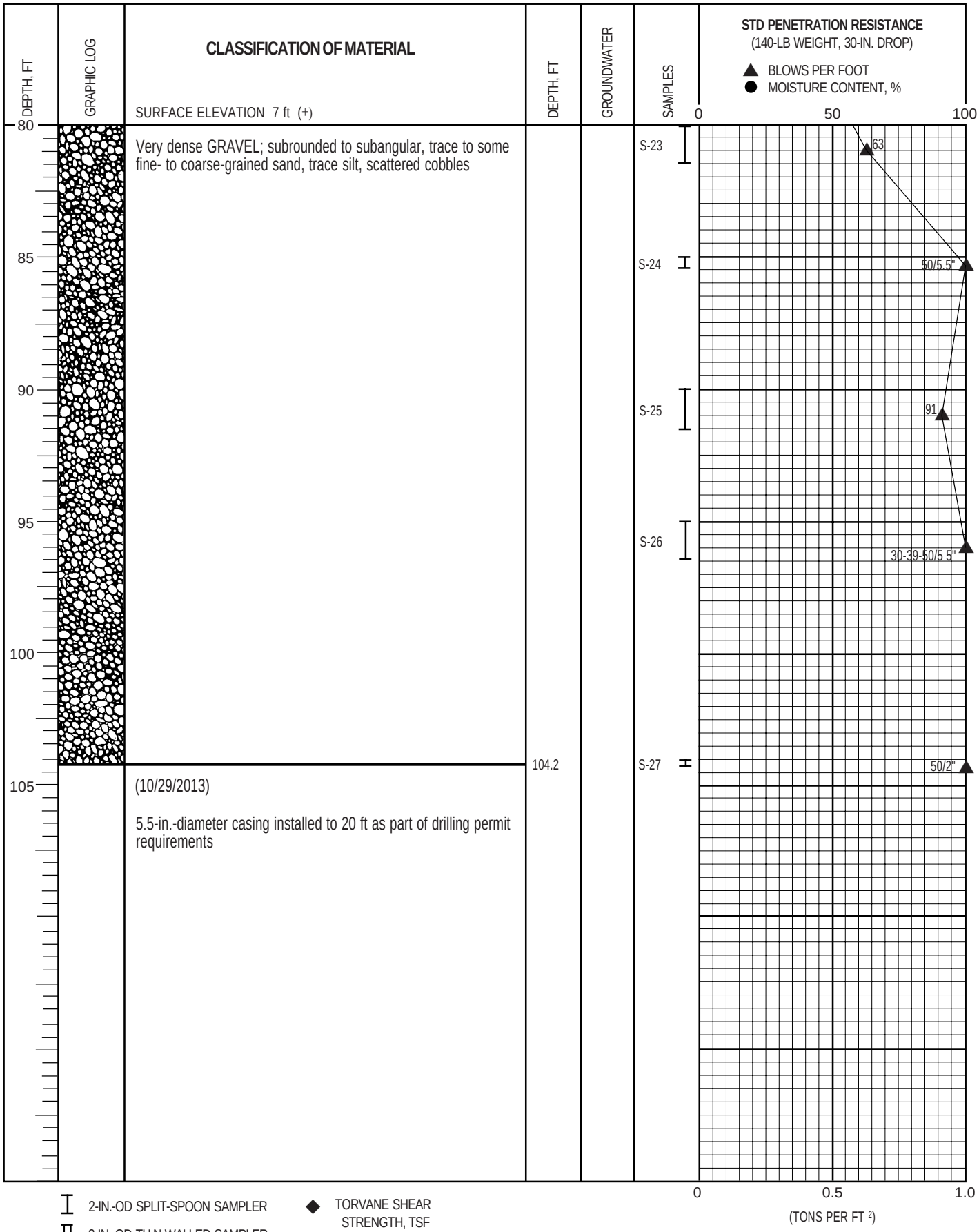
2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)

TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-26 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 26A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD TH N-WALLED SAMPLER

G GRAB SAMPLE OF DR LL CUTT NGS

NX CORE RUN

SLOTTED PVC P PE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASS NG NO. 200 S EVE (WASHED)

* NO RECOVERY

Liquid Limit

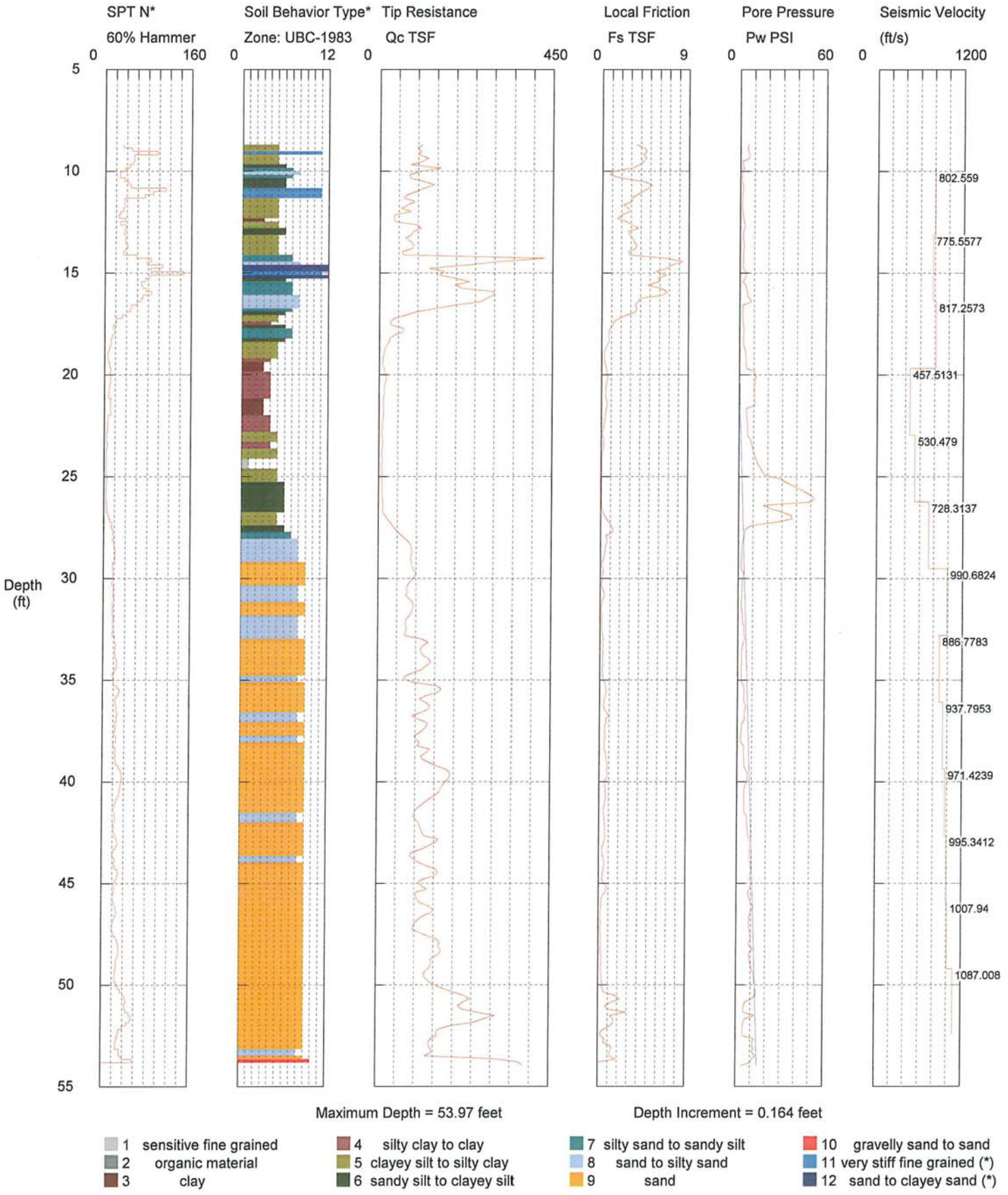
Moisture Content

Plastic Lim t

GRI

BORING B-26 (cont.)

DEC. 2013 JOB. NO. W1114 FIG. 26A



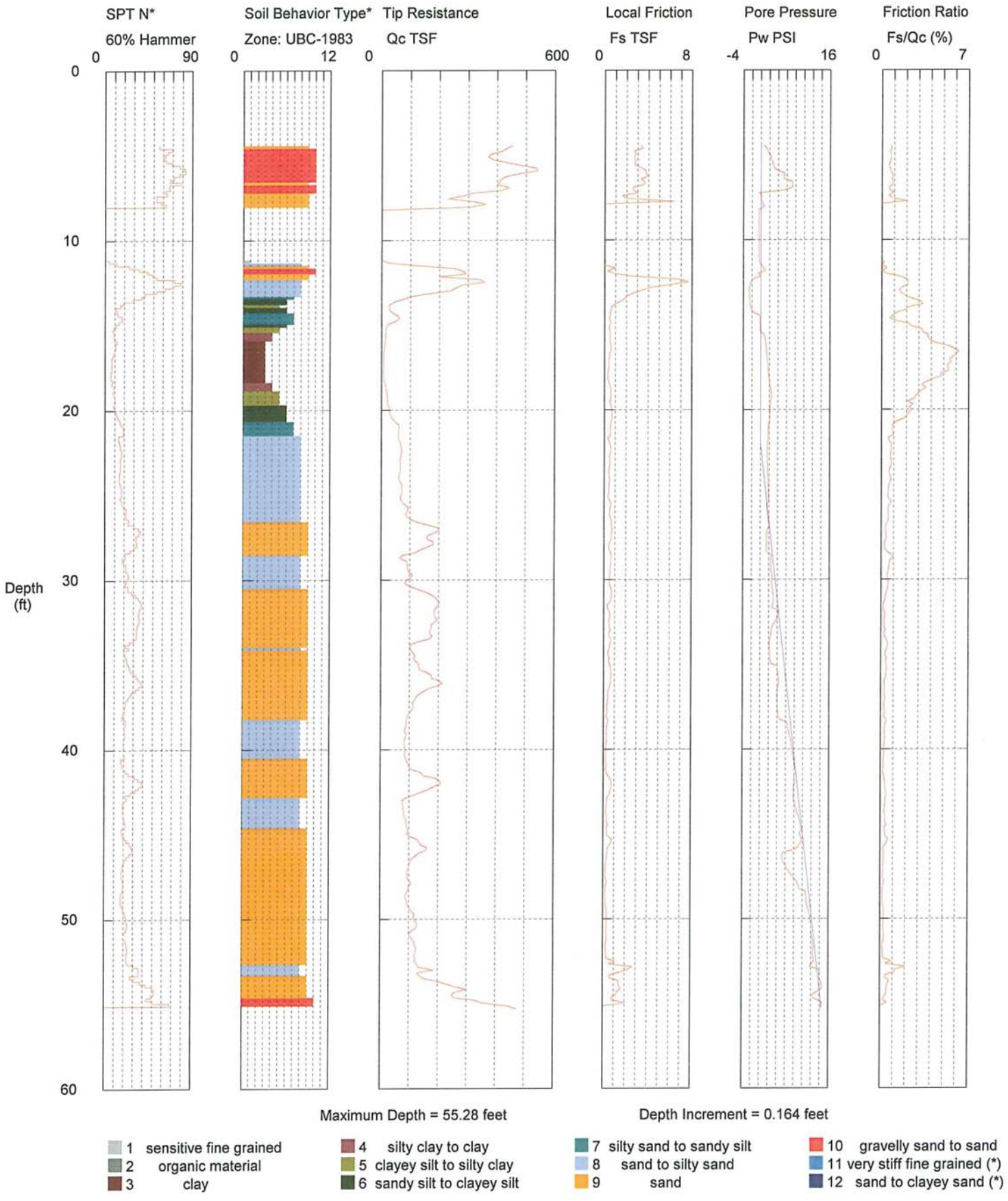
SURFACE ELEVATION = 28.5 FT

GRI

CONE PENETRATION TEST CPT-1

(WITH SEISMIC VELOCITY)

DEC. 2013 JOB NO. W1114 FIG. 27A

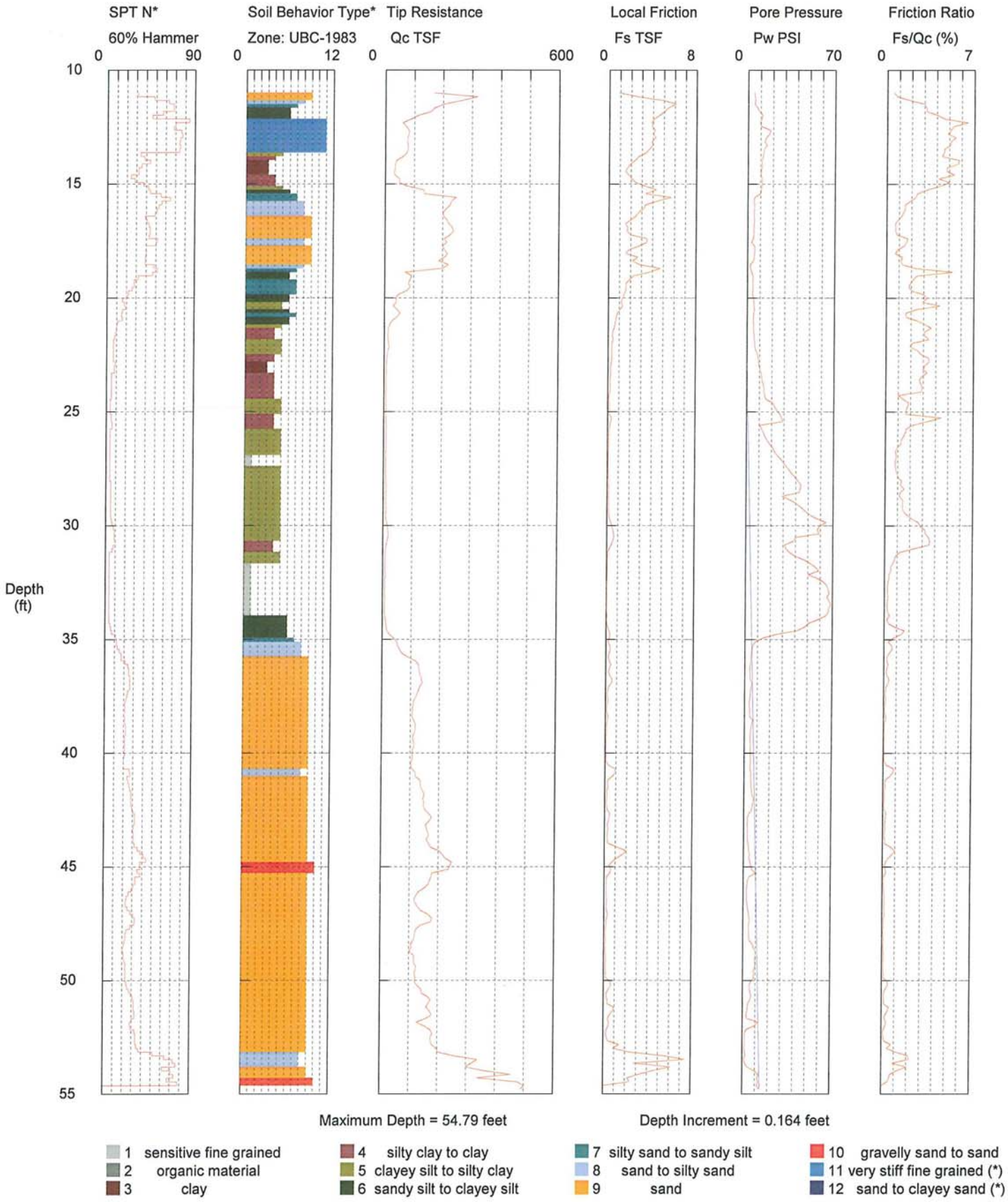


SURFACE ELEVATION = 29.9 FT

GRI

CONE PENETRATION TEST CPT-2

DEC. 2013 JOB NO. W1114 FIG. 28A

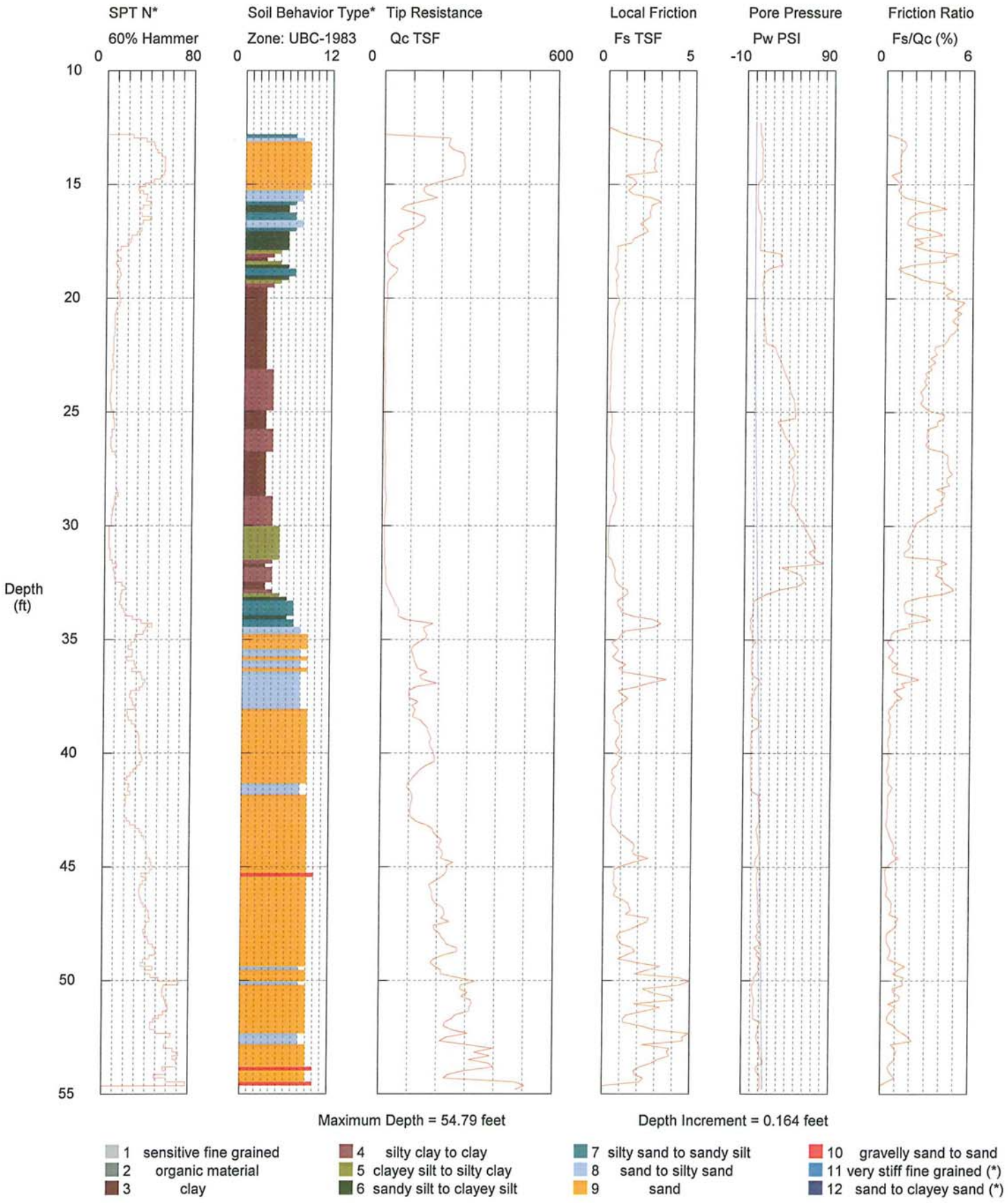


SURFACE ELEVATION = 28.5 FT

GRI

CONE PENETRATION TEST CPT-3

DEC. 2013 JOB NO. W1114 FIG. 29A

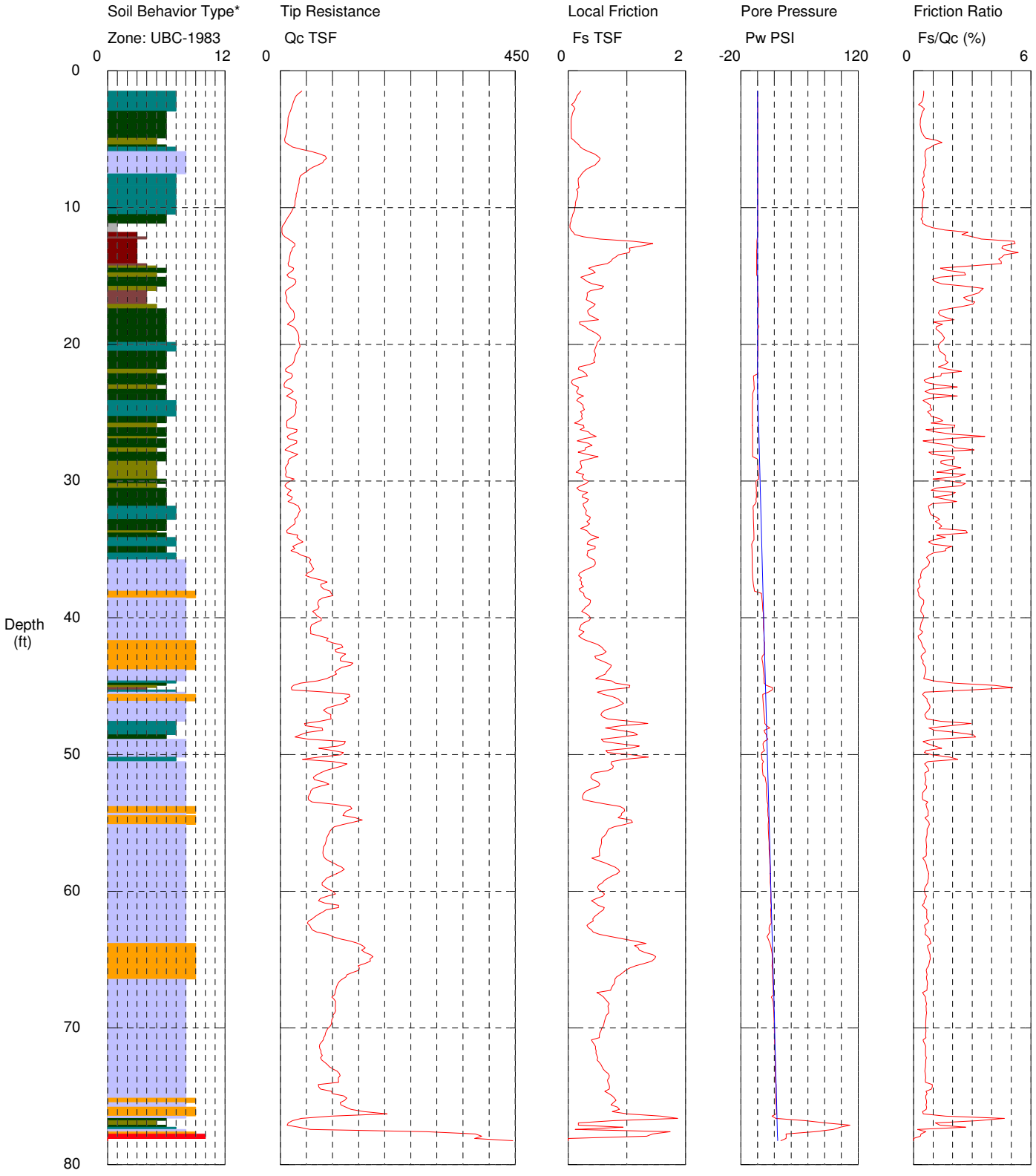


SURFACE ELEVATION = 26.8

GRI

CONE PENETRATION TEST CPT-4

DEC. 2013 JOB NO. W1114 FIG. 30A

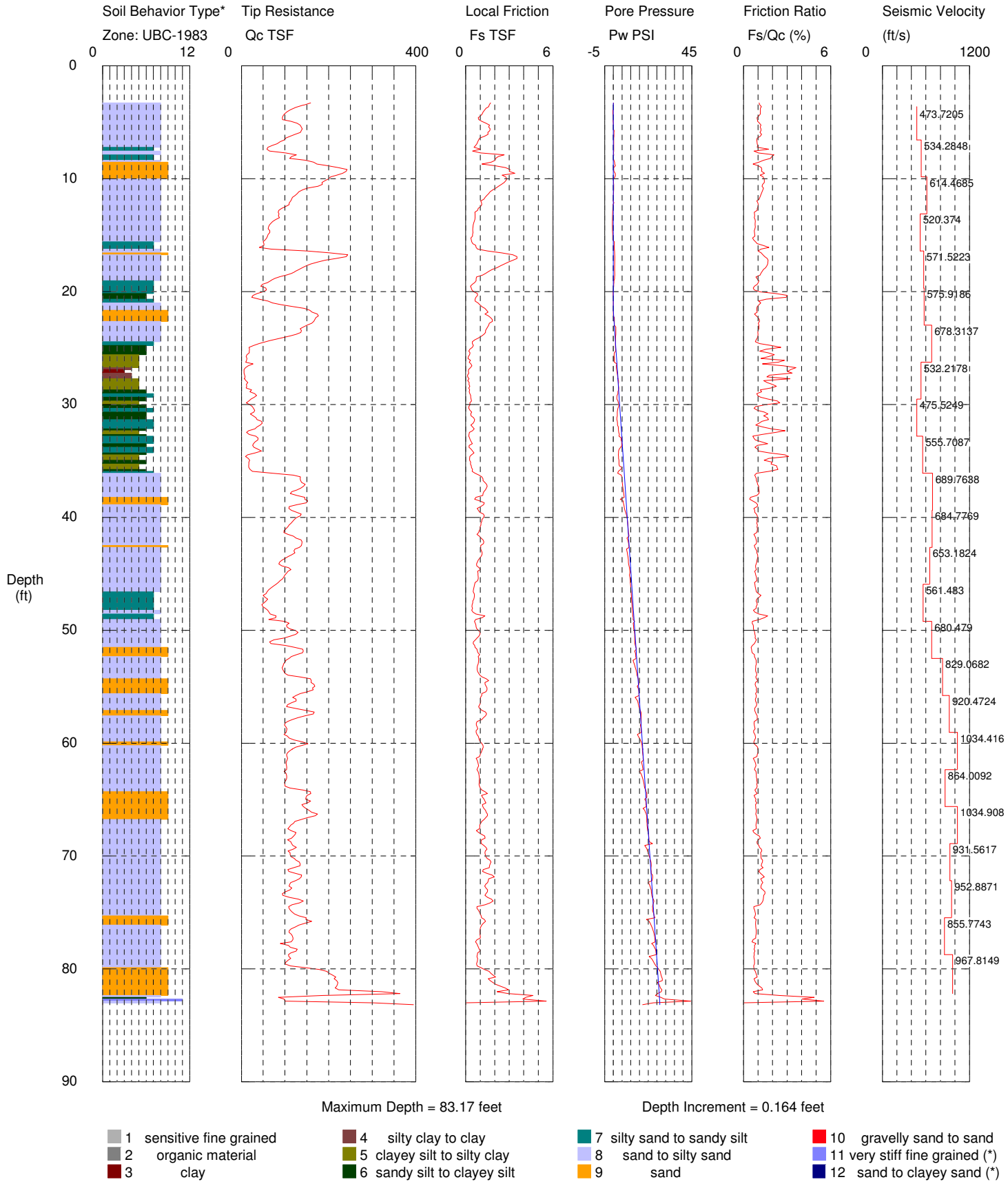


SURFACE ELEVATION = 31 FT

GRI

CONE PENETRATION TEST CPT-5

DEC. 2013 JOB NO. W1114 FIG. 31A



SURFACE ELEVATION = 27 FT

GRI

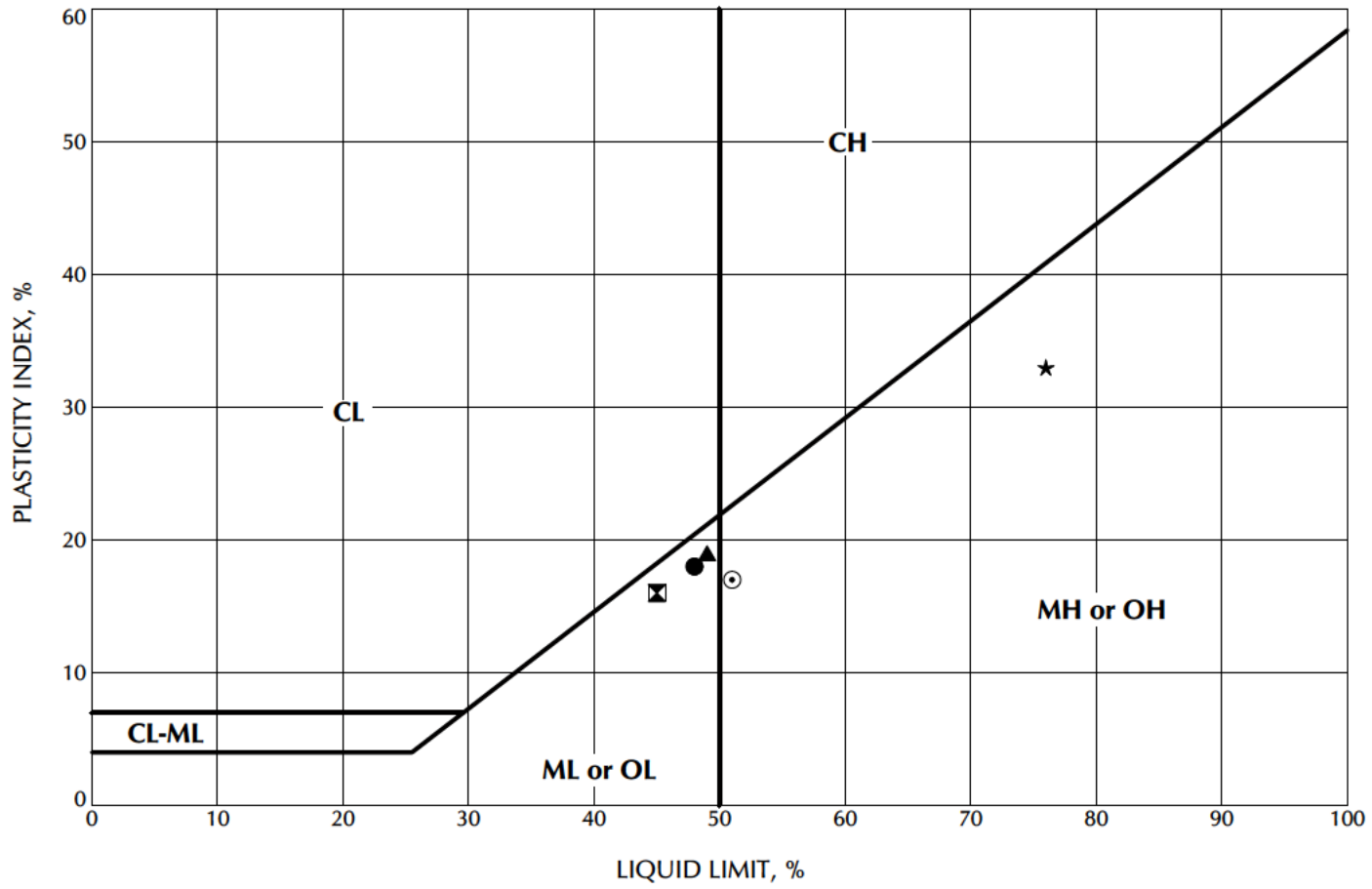
CONE PENETRATION TEST CPT-6

(WITH SEISMIC VELOCITY)

DEC. 2013 JOB NO. W1114 FIG. 32A

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
O	ORGAN C S S AND ORGAN C S Y C AYS O OW P AS C Y
M	NORGAN C C AYEY S S O VERY NE SANDS O S G P AS C Y
C	NORGAN C C AYS O OW O MED UM P AS C Y

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
O	ORGAN C C AYS O MED UM O G P AS C Y, ORGAN C S S
M	NORGAN C S S AND C AYEY S
C	NORGAN C C AYS O G P AS C Y



	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-01	S-8	21.8	SILT; some clay, trace sand	48	30	18	32
⊠	B-02	S-9	24.0	SILT; some clay, trace to some sand	45	29	16	41
▲	B-05	S-7	16.0	SILT; some clay	49	30	19	40
★	B-07	S-11	31.0	SILT; some clay, trace sand	76	43	33	74
⊙	B-08	S-9	25.3	SILT; trace to some clay, trace sand	51	34	17	43

GRI

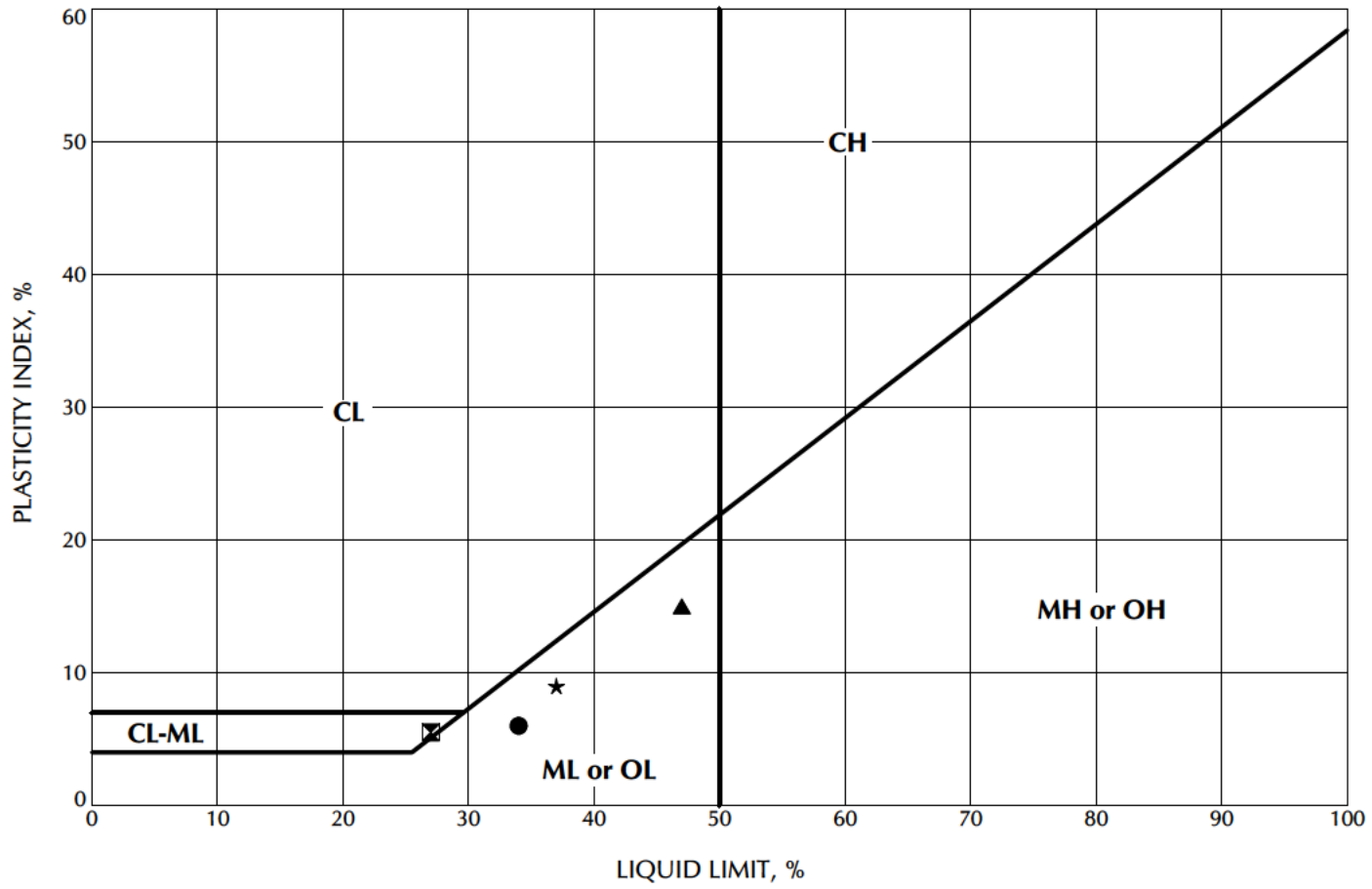
PLASTICITY CHART

DEC. 2013 JOB NO. W1114 FIG. 33A

A ERBERG-PLAS C Y 5 PER PAGE W1114-LAB GPJ GR DA A EMPLA E GD 12/10/13

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
O	ORGAN C S S AND ORGAN C S Y C AYS O OW P AS C Y
M	NORGAN C C AYEY S S O VERY NE SANDS O S G P AS C Y
C	NORGAN C C AYS O OW O MED UM P AS C Y

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE-GRAINED SOIL GROUPS
O	ORGAN C C AYS O MED UM O G P AS C Y, ORGAN C S S
M	NORGAN C S S AND C AYEY S
C	NORGAN C C AYS O G P AS C Y



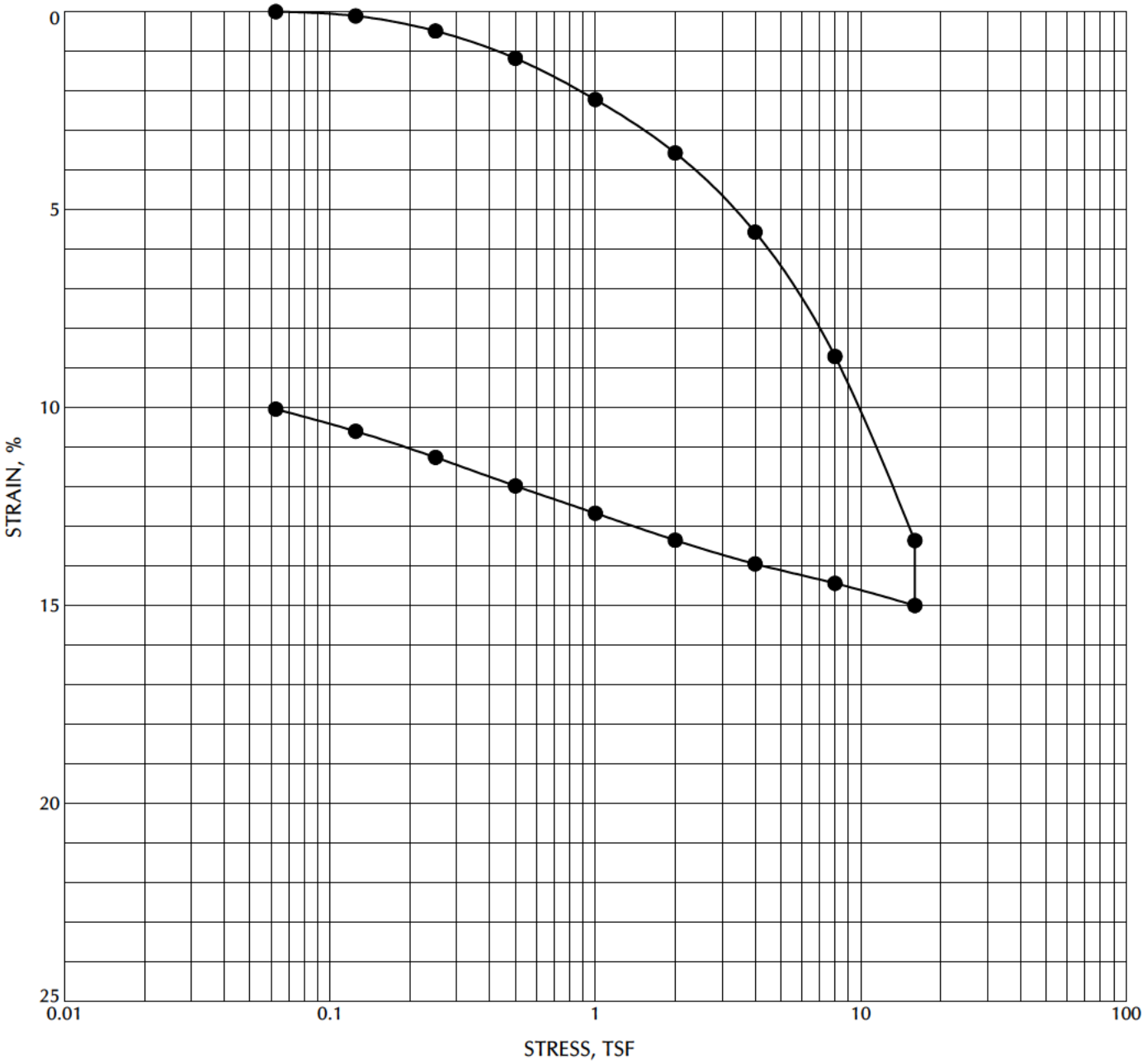
	Location	Sample	Depth, ft	Classification	LL	PL	PI	MC, %
●	B-11	S-8	25.0	SILT; some sand	34	28	6	39
⊠	B-17	S-6	15.0	SILT; some sand	27	22	5	31
▲	B-18	S-5	12.5	SILT; trace to some clay and sand	47	32	15	16
★	B-18	S-9	25.0	SILT; trace to some clay and sand	37	28	9	42
⊙								

GRI

PLASTICITY CHART

DEC. 2013 JOB NO. W1114 FIG. 34A

A ERBERG-PLAS C Y 5 PER PAGE W1114-LAB.GPJ GR DA A EMPLA E GD 12/10/13



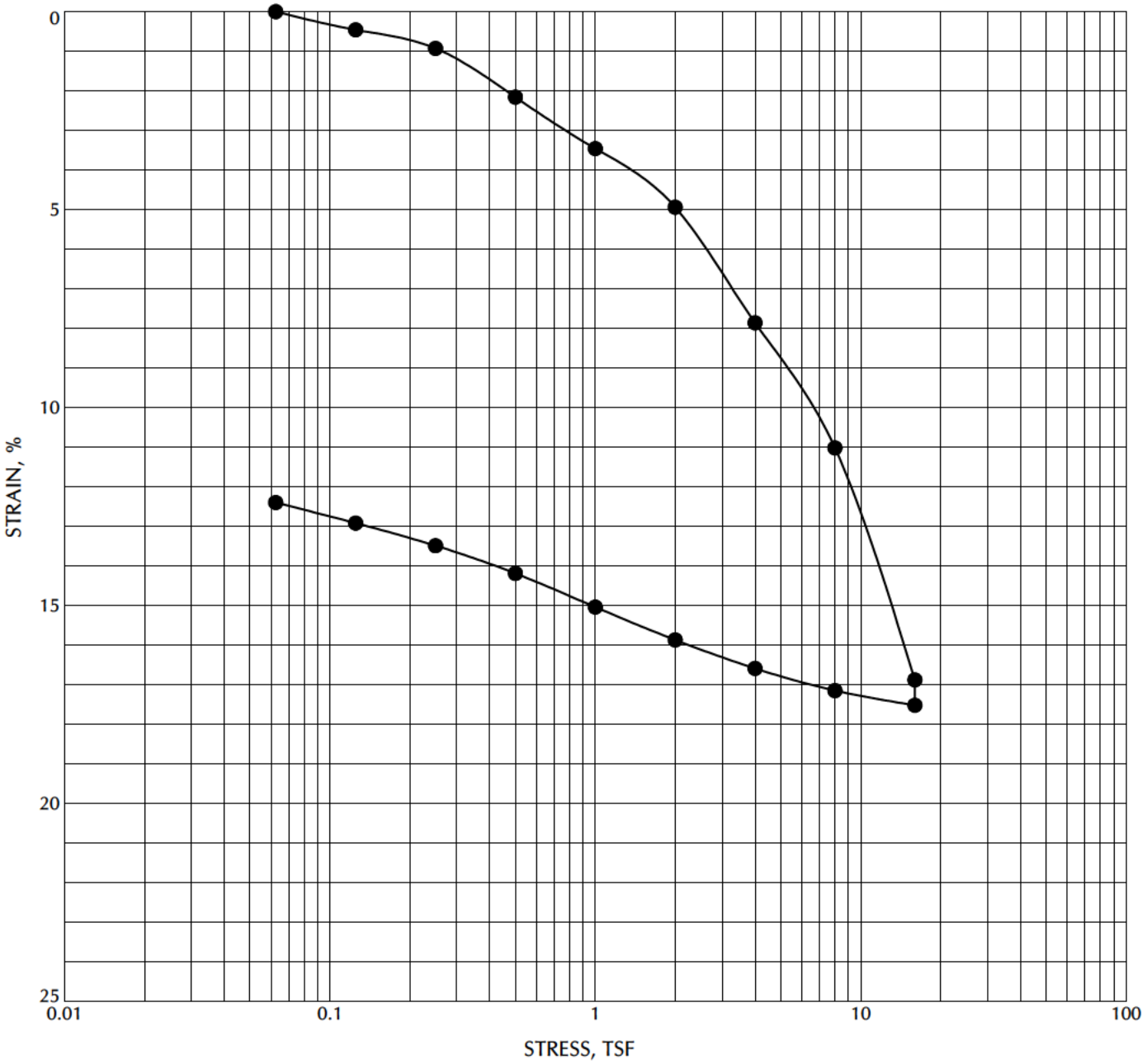
	Location	Sample	Depth, ft	Classification	Initial γ_d, pcf	Initial MC, %
●	B-04	S-7	18.1	SILT; some clay, trace sand and organics	92	30

GRI

CONSOLIDATION TEST

DEC. 2013 JOB NO. W1114 FIG. 35A

CONSOL S RA N GR -0 O 25-1 PER PAGE W1114-LAB.GPJ GR DA A EMPLA E GD 12/10/13



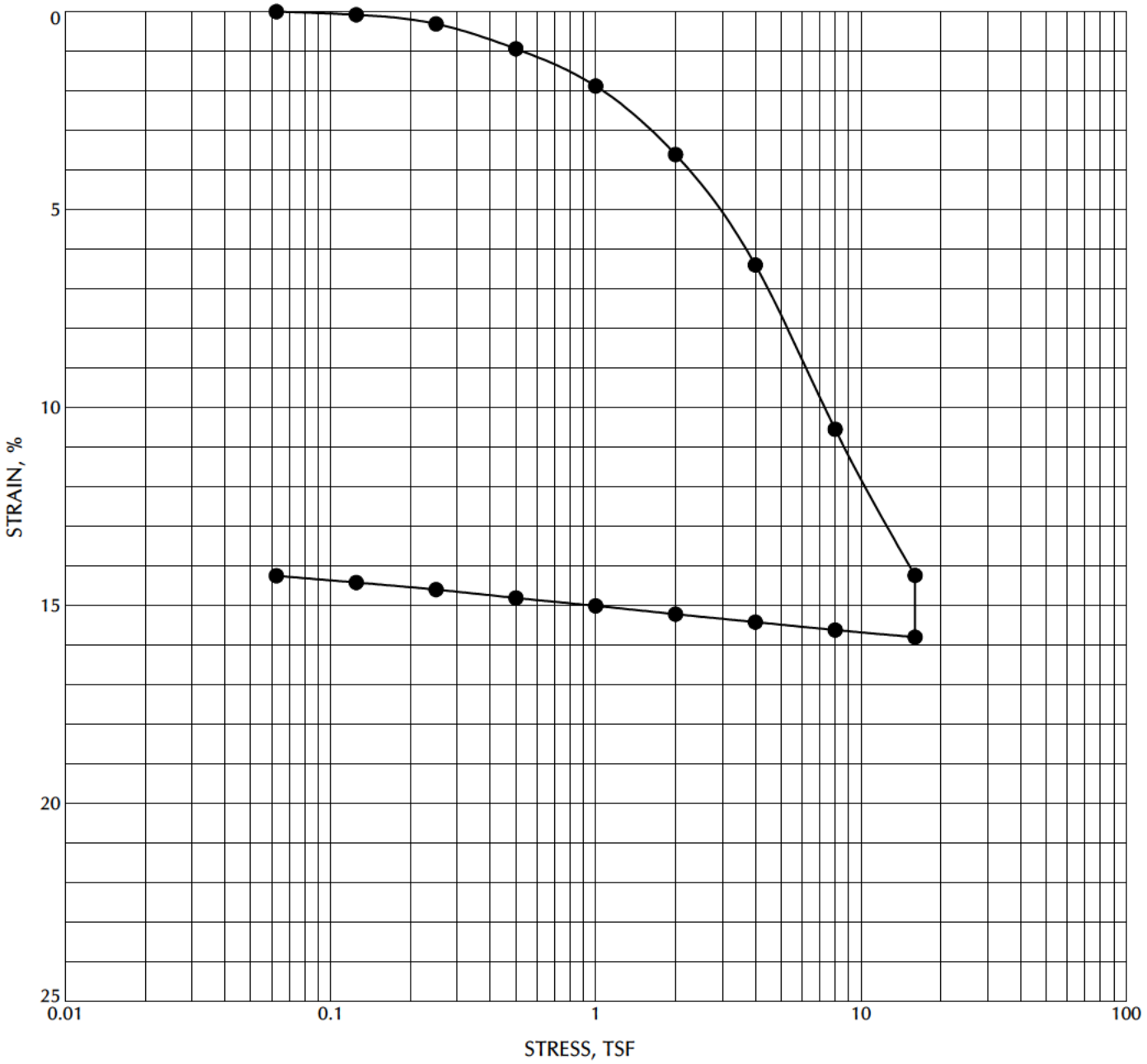
	Location	Sample	Depth, ft	Classification	Initial γ_d, pcf	Initial MC, %
●	B-05	S-6	14.7	SILT; some clay, trace sand	84	36

GRI

CONSOLIDATION TEST

DEC. 2013 JOB NO. W1114 FIG. 36A

CONSOL S RA N GR -0 O 25-1 PER PAGE W1114-LAB.GPJ GR DA A EMPLA E GD 12/10/13



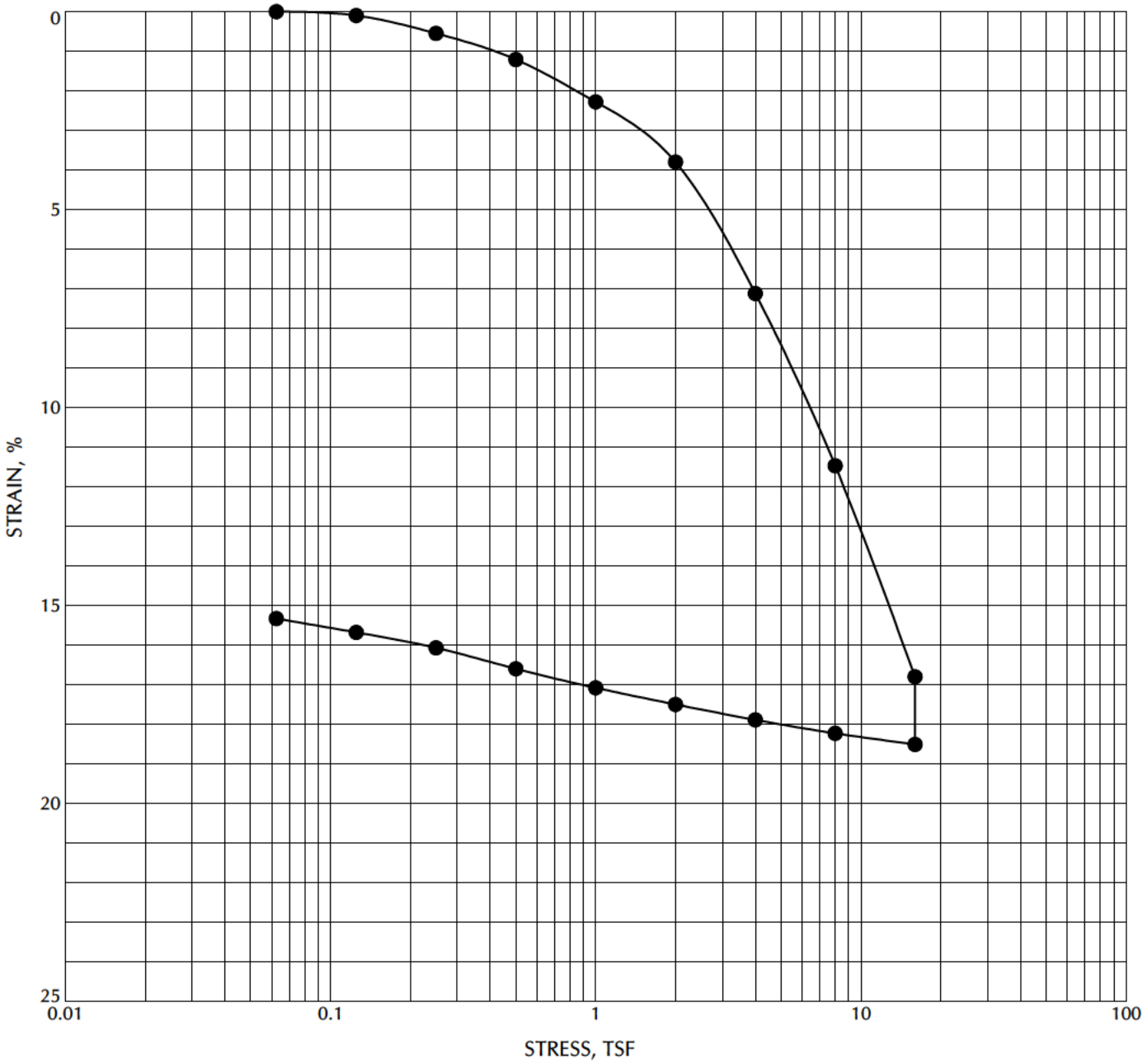
	Location	Sample	Depth, ft	Classification	Initial γ_d, pcf	Initial MC, %
●	B-07	S-12	32.0	Silty SAND	71	49

GRI

CONSOLIDATION TEST

DEC. 2013 JOB NO. W1114 FIG. 37A

CONSOL S RA N GR -0 O 25-1 PER PAGE W1114-LAB.GPJ GR DA A EMPLA E GD 12/10/13



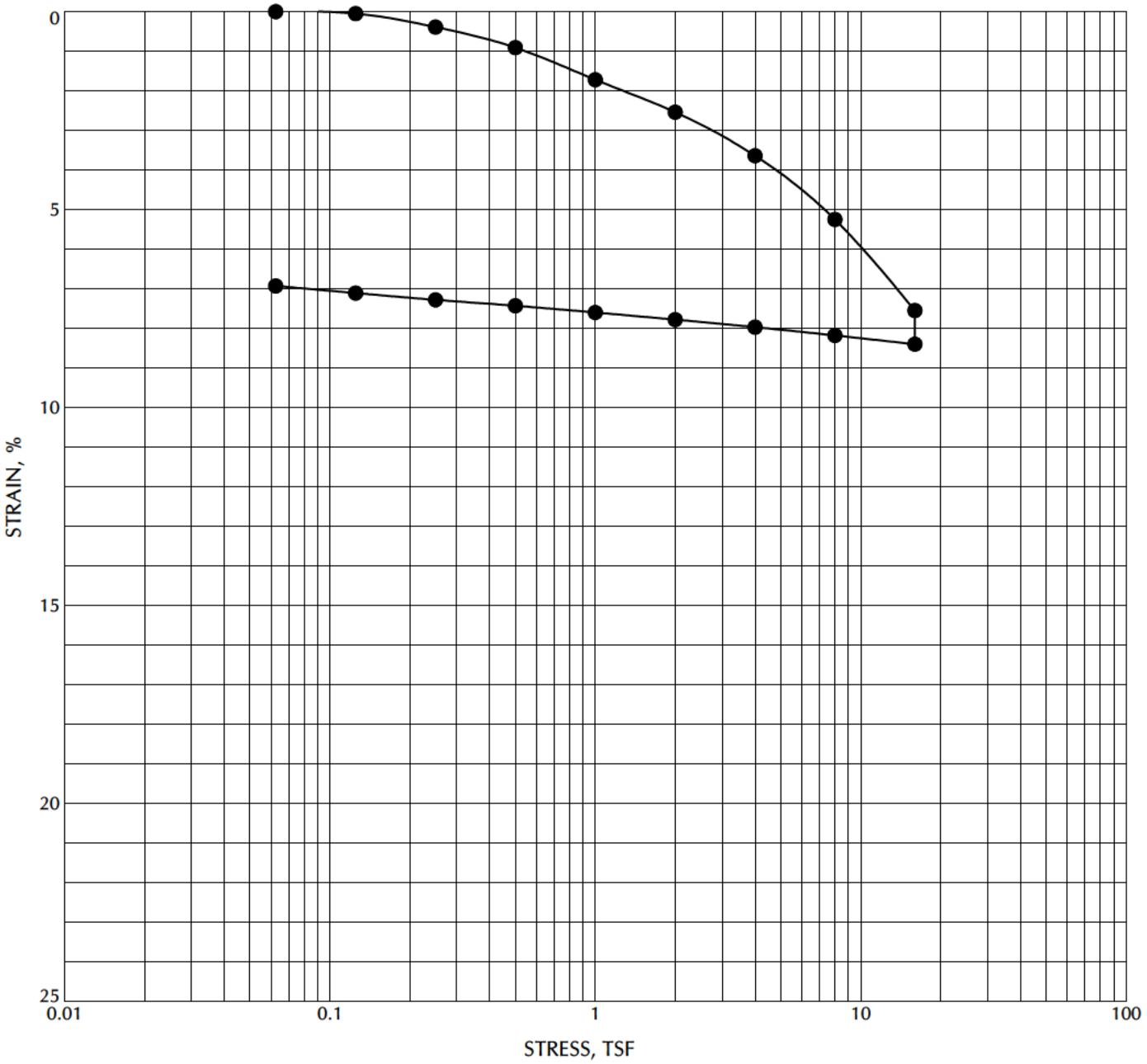
	Location	Sample	Depth, ft	Classification	Initial γ_d, pcf	Initial MC, %
●	B-08	S-9	25.3	SILT; trace to some clay, trace sand	80	41

GRI

CONSOLIDATION TEST

DEC. 2013 JOB NO. W1114 FIG. 38A

CONSOL S RA N GR -0 O 25-1 PER PAGE W1114-LAB.GPJ GR DA A EMPLA E GD 12/10/13



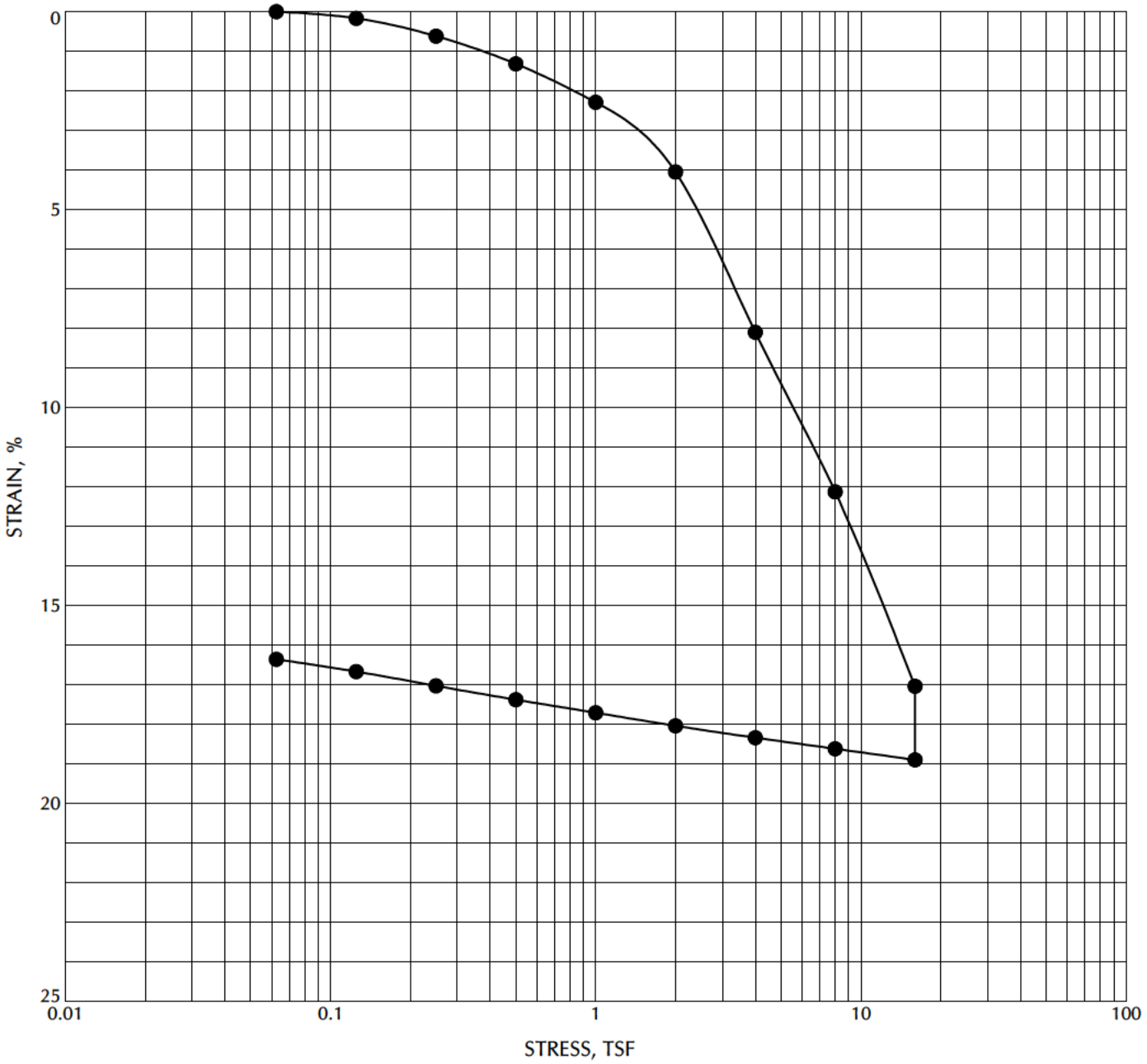
	Location	Sample	Depth, ft	Classification	Initial γ_d, pcf	Initial MC, %
●	B-11	S-4	10.0	Silty SAND	89	28

GRI

CONSOLIDATION TEST

DEC. 2013 JOB NO. W1114 FIG. 39A

CONSOL S RA N GR -0 O 25-1 PER PAGE W1114-LAB.GPJ GR DA A EMPLA E GD 12/10/13



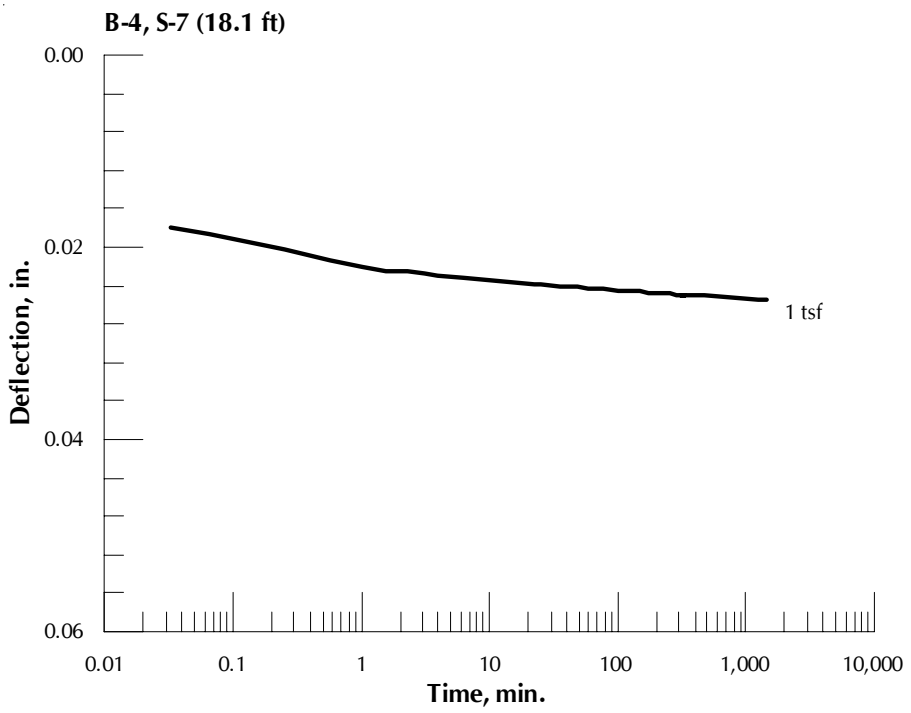
	Location	Sample	Depth, ft	Classification	Initial γ_d, pcf	Initial MC, %
●	B-19	S-8	21.5	Sandy SILT	80	41

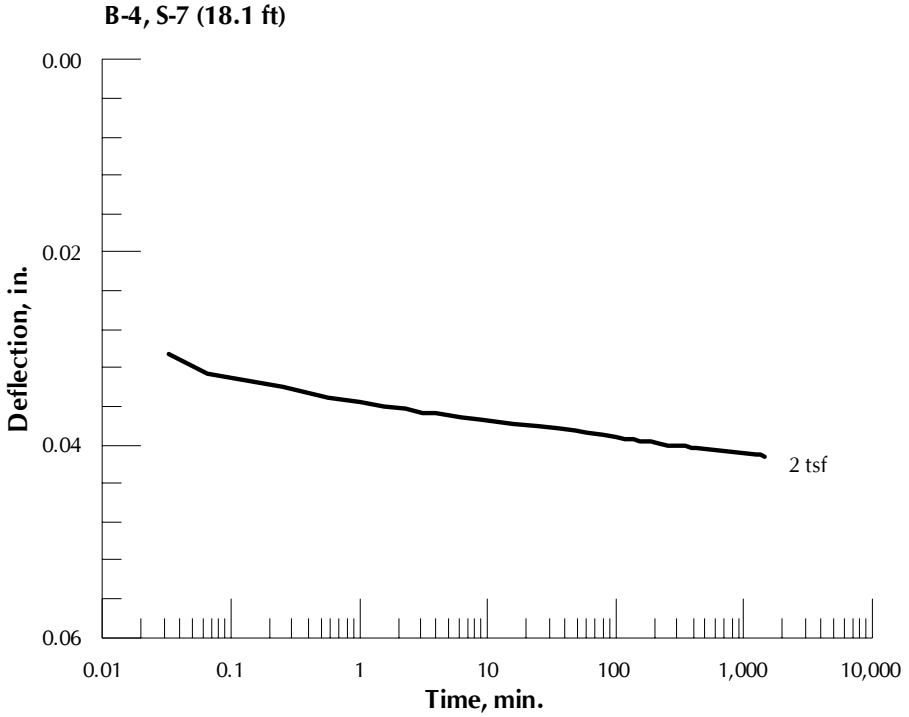
GRI

CONSOLIDATION TEST

DEC. 2013 JOB NO. W1114 FIG. 40A

CONSOL S RA N GR -0 O 25-1 PER PAGE W1114-LAB.GPJ GR DA A EMPLA E GD 12/10/13

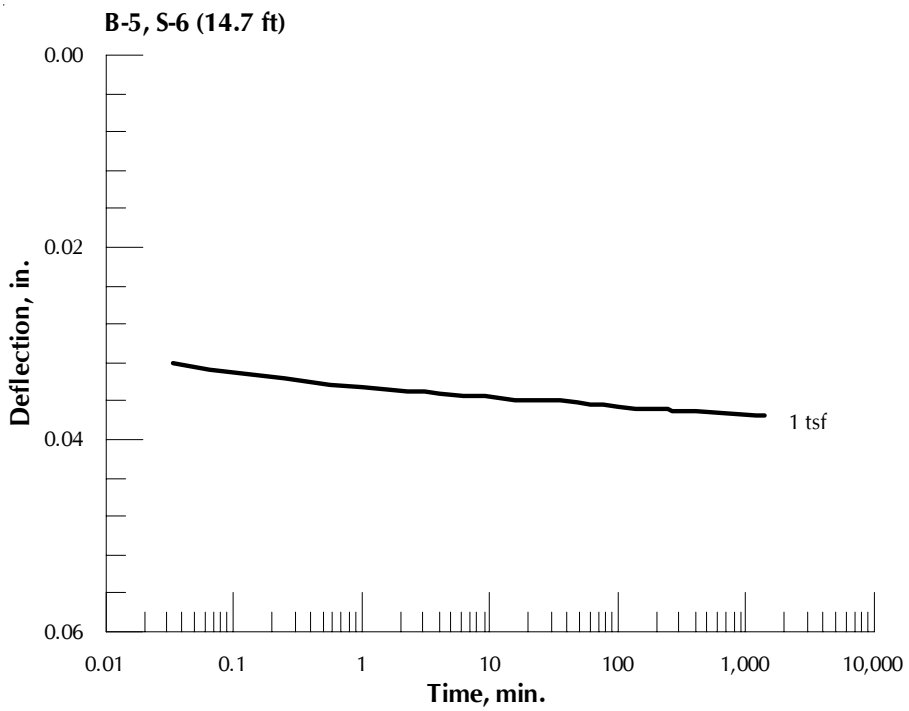


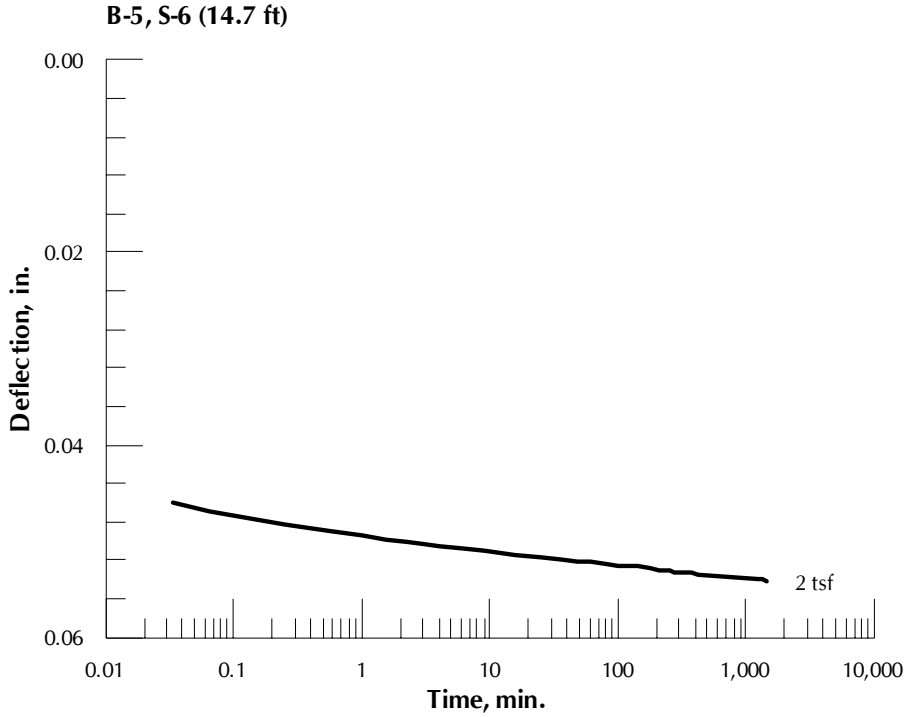


GRI

SECONDARY COMPRESSION

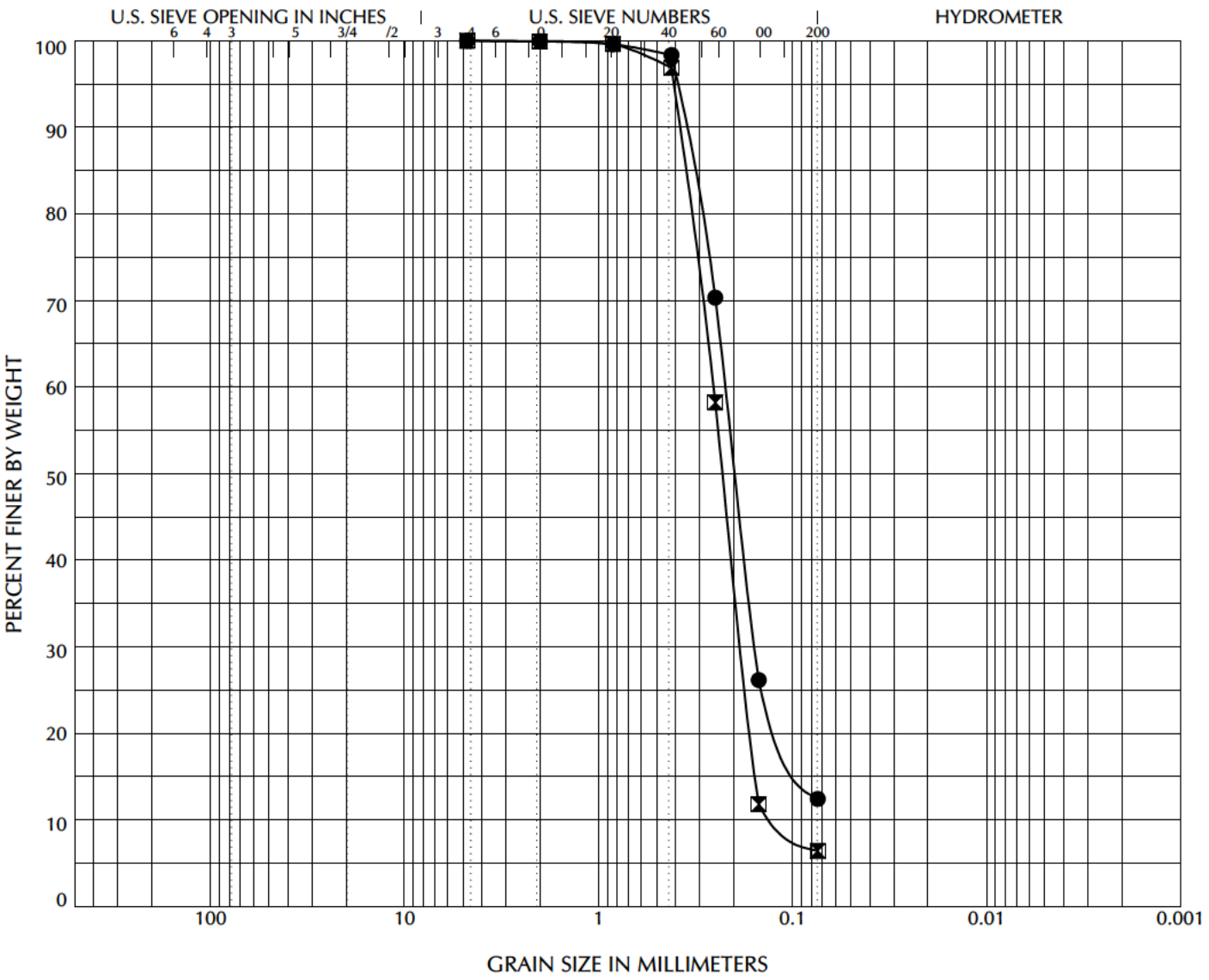
DEC. 2013 JOB NO. W1114 FIG. 41A





GRI

SECONDARY COMPRESSION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	Coarse	Fine	Coarse	Medium	Fine	

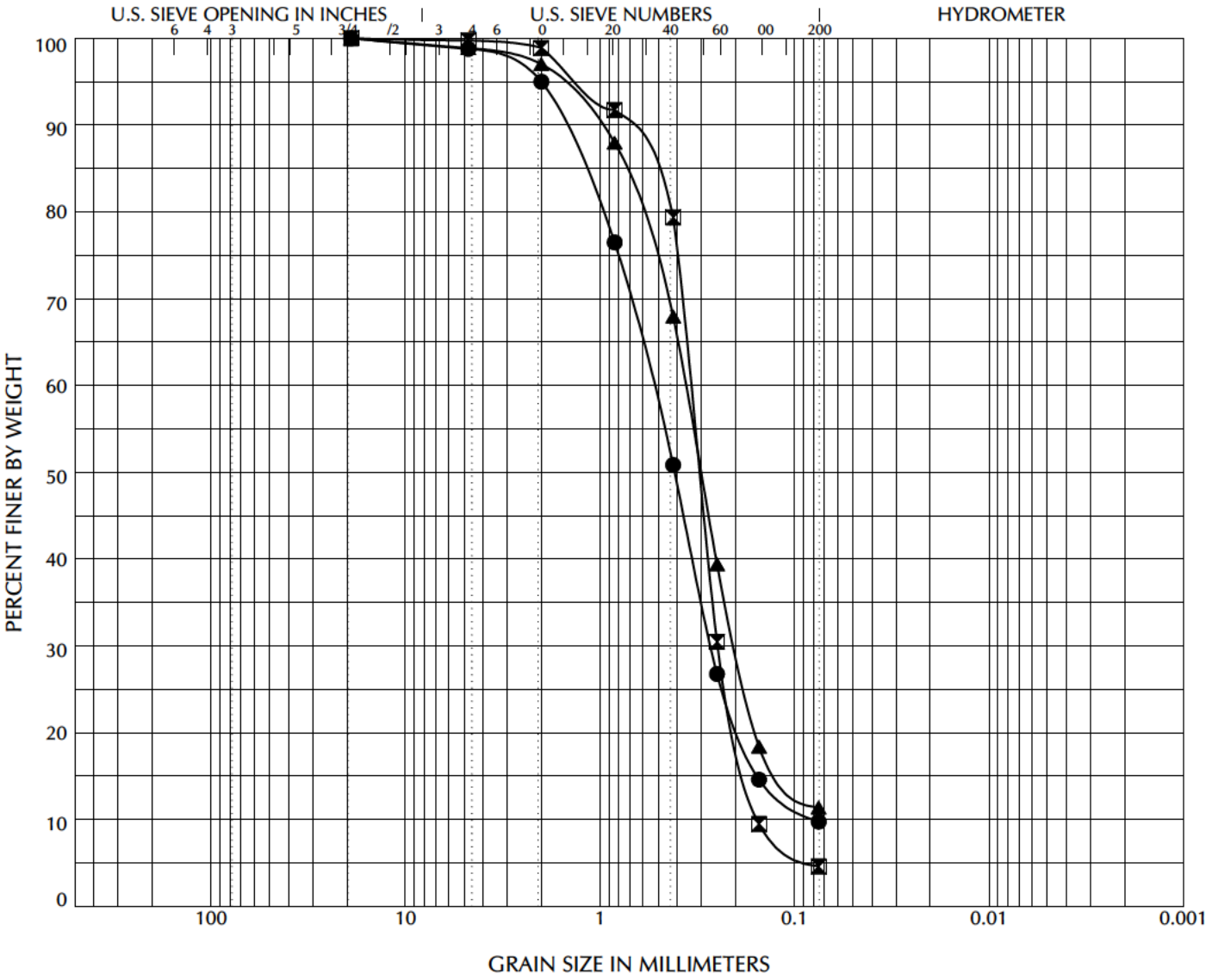
	Location	Sample	Depth, ft	Classification	Gravel, %	Sand, %	Fines, %
●	B-23	S-8	25.0	SAND; fine to medium grained, some silt	0.0	87.3	12.7
⧓	B-23	S-12	45.0	SAND; fine grained, trace silt	0.0	93.5	6.5

GRI

GRAIN SIZE DISTRIBUTION

DEC. 2013 JOB NO. W1114 FIG. 43A

GRA N S ZE GR - WO PER PAGE W1114-LAB GPJ GR DA A EMPLA E GD 12/10/13



COBBLES	GRAVEL		SAND			SILT OR CLAY
	Coarse	Fine	Coarse	Medium	Fine	

	Location	Sample	Depth, ft	Classification	Gravel, %	Sand, %	Fines, %
●	B-26	S-4	10.0	Very loose, gray SAND; fine- to coarse-grained, trace silt	1.2	89.0	9.8
⊠	B-26	S-8	25.0	Loose, gray SAND; fine- to medium-grained, trace silt, scattered wood debris	0.3	95.2	4.6
▲	B-26	S-13	41.0	Loose, gray SAND; fine- to medium-grained, some silt, scattered wood debris	1.1	87.5	11.4

GRI

GRAIN SIZE DISTRIBUTION

DEC. 2013 JOB NO. W1114 T3 FIG. 44A

GRA N S ZE GR - HREE PER PAGE W1114- 3 LAB GPJ GR DA A EMPLA E GD 12/10/13

APPENDIX B

Site-Specific Seismic Hazard Study

APPENDIX B

SITE-SPECIFIC SEISMIC HAZARD STUDY

General

GRI has completed a site-specific seismic hazard study for Areas 300 and 400 at the proposed Tesoro Savage Vancouver Energy Distribution Terminal - Upland Facility (TSVEDT) in Vancouver, Washington. The purpose of the study was to evaluate the potential seismic hazards associated with regional and local seismicity. The site-specific hazard study is intended to meet the requirements of the 2012 International Building Code (IBC), in compliance with the requirements of ASCE 7-10 Chapter 21. Our work was based on the potential for regional and local seismic activity, as described in the existing scientific literature, and on the subsurface conditions at the site, as disclosed by the geotechnical explorations completed for the project. Specifically, our work included the following tasks:

1) A detailed review of available literature, including published papers, maps, open-file reports, seismic histories and catalogs, and other sources of information regarding the tectonic setting, regional and local geology, and historical seismic activity that might have a significant effect on the site.

2) Compilation, examination, and evaluation of existing subsurface data gathered at and in the vicinity of the site, including classification and laboratory analyses of soil samples. This information was used to prepare a generalized subsurface profile for Areas 300 and 400 within the TSVEDT property.

3) Identification of the potential seismic sources appropriate for the site and characterization of those sources in terms of magnitude, distance and spectral response spectra.

4) Office studies, based on the generalized subsurface profile and the controlling seismic sources, resulting in conclusions and recommendations concerning:

    a) specific seismic events and characteristic earthquakes that might have a significant effect on Areas 300 and 400;

    b) the potential for seismic energy amplification in Areas 300 and 400; and

    c) site-specific acceleration response spectra for design of the proposed structures in Areas 300 and 400.

This appendix describes the work accomplished and summarizes our conclusions and recommendations.

Geologic Setting

General. On a regional scale, the site lies within the Willamette-Puget Sound lowland trough of the Cascadia convergent tectonic system (Blakely, et al., 2000). The lowland areas consist of broad north-south-trending basins in the underlying geologic structure between the Coast Range to the west and the

Cascade Mountains to the east. The lowland trough is characterized by alluvial plains with areas of buttes and terraces. The site lies approximately 95 km inland from the down-dip edge of the seismogenic extent of the Cascadia Subduction Zone (CSZ), an active convergent plate boundary along which remnants of the Farallon Plate (the Gorda, Juan de Fuca, and Explorer plates) are being subducted beneath the western edge of the North American continent. The subduction zone is a broad, eastward-dipping zone of contact between the upper portion of the subducting slabs and the over-riding North American Plate as shown on Figure 1B.

On a local scale, the site lies within the Portland Basin, a large, well-defined, northwest-trending structure characterized as a right-lateral pull-apart basin in the forearc of the CSZ. The Portland Basin is bounded by high-angle, northwest-trending, right-lateral strike-slip faults that are considered to be seismogenic; however, the relationship between specific earthquakes and individual faults in the area is not well understood since few of these faults are expressed clearly at the ground surface. A limited number of intrabasin faults have been mapped on the basis of stratigraphic offsets and geophysical evidence, and the site is located in close proximity to the inferred traces of the Portland Hills Fault and the East Bank Fault indicated on published geologic mapping (Personius, et al., 2003). The distribution of these crustal faults relative to the site is shown on the Regional Geologic Map and Local Fault Map, Figures 2B and 3B, respectively. The fault locations on the geologic map are inferred or approximate. Other faults may be present within the basin, but clear stratigraphic evidence regarding their location and extent is not presently available.

Because of the proximity of the site to the CSZ and its location within the Portland Basin, three seismic sources contribute to the potential for damaging earthquake motions at the site. Two of these sources are associated with tectonic activity related to the Cascadia Subduction Zone, the third is associated with movement on relatively shallow faults within and adjacent to the Portland Basin.

Site Soil and Geologic Conditions. The Area 300 and 400 portions of the project site are mantled by up to 25 ft of fill that is underlain by alluvial sand and silt deposited by the Columbia River. The alluvial deposits are underlain by gravel associated with late-Pleistocene catastrophic flood deposits that extend hundreds of feet below the ground surface in this portion of Vancouver. The catastrophic flood deposits consist of interbedded sands, silts, and gravels deposited by the repeated Missoula Flood events that occurred between 13,500 and 15,000 years ago. The flood deposits are underlain by interbedded sands and gravels of the Troutdale formation (Pliocene to Pleistocene) which are, in turn, underlain by the Columbia River Basalt bedrock (middle Miocene).

Seismicity

General. The geologic and seismologic information available for identifying the potential seismicity at the site is incomplete, and large uncertainties are associated with estimates of the probable magnitude, location, and frequency of occurrence of earthquakes that might affect the site. The available information indicates the potential seismic sources that may affect the site can be grouped into three independent categories: *subduction zone events* related to sudden slip between the upper surface of the Juan de Fuca plate and the lower surface of the North American plate, *subcrustal (intraslab) events* related to deformation and volume changes within the deeper portion of the subducted Juan de Fuca plate, and *local crustal events* associated with movement on shallow, local faults within and adjacent to the Portland Basin. Based on our review of currently available information, we have developed parameters for each of these

potential seismic sources. The seismic sources are characterized by three important parameters: magnitude, distance to the subject site, and the peak horizontal bedrock accelerations produced by the controlling earthquake on the seismic source. The size of an earthquake is commonly defined by its moment magnitude M_W. Distance is measured using the closest horizontal distance to the surface projection of the rupture plane or the closest distance to the rupture plane, in kilometers. Peak horizontal bedrock accelerations are expressed in units of gravity (1 g = 32.2 ft/sec^2 = 981 cm/sec^2).

Subduction Zone Event. Written Japanese tsunami records provide evidence that a great CSZ earthquake occurred in January 1700. Geological studies show that great megathrust earthquakes have occurred repeatedly in the past 7,000 years (Atwater et al., 1995; Clague et al., 1997; Goldfinger, 2003; and Kelsey et al., 2005), and geodetic studies (Hyndman and Wang, 1995; Savage, et al., 2000) indicate rate of strain accumulation consistent with the assumption that the CSZ is locked beneath offshore northern California, Oregon, Washington, and southern British Columbia (Fluck, et al., 1997; Wang, et al., 2001). Numerous geological and geophysical studies suggest the CSZ may be segmented (Hughes and Carr, 1980; Weaver and Michaelson, 1985; Guffanti and Weaver, 1988; Goldfinger, 1994; Kelsey, et al., 1994; Mitchell, et al., 1994; Personius, 1995; Nelson and Personius, 1996; Witter, 1999), but the most recent studies suggest that for the last great earthquake in 1700, most of the subduction zone ruptured in a single M_w 9 earthquake (Satake, et al., 1996; Atwater and Hemphill-Haley, 1997; Clague, et al., 2000). Published estimates of the probable maximum size of subduction zone events range from moment magnitude M_W 8.3 to >9.0. Numerous detailed studies of coastal subsidence, tsunamis, and turbidites yield a wide range of recurrence intervals, but the most complete records (>4,000 years) indicate average intervals of 350 to 600 years between great earthquakes on the CSZ (Adams, 1990; Atwater and Hemphill-Haley, 1997; Witter, 1999; Clague, et al., 2000; Kelsey, et al., 2002; Kelsey, et al., 2005; Witter, et al., 2003). Tsunami inundation in buried marshes along the Washington and Oregon coast and stratigraphic evidence from the Cascadia margin support these recurrence intervals (Kelsey, et al., 2005; Goldfinger, 2003).

The USGS probabilistic analysis assumes four potential locations for the eastern edge of the earthquake rupture zone for the CSZ, as shown in Figure 4B. The 2008 USGS mapping effort indicates two rupture scenarios are assumed to represent these megathrust events: 1) M9±0.2 events that rupture the entire CSZ every 500 years and 2) M8.0 to 8.7 events with rupture zones that occur on segments of the CSZ and occur over the entire length of the CSZ during a period of about 500 years (Petersen, et al., 2008). The assumed distribution of earthquake magnitudes is shown on Figure 5B. This distribution assumes the larger M9.0 earthquakes likely occur more often than the smaller segmented ruptures. Therefore, for our deterministic analysis, we have chosen to represent the subduction zone event by a design earthquake of M_W 9.0 at a focal depth of 15 km and a rupture distance of 86 km. This corresponds to a sudden rupture of the entire length of the Juan de Fuca-North American plate interface with an assumed rupture zone along the coastline due west of Vancouver. Based on an average of the attenuation relationships published by Zhao (2006), Atkinson and Macias (2009), and Abrahamson (2012), a subduction zone earthquake with these parameters would result in an average peak bedrock acceleration of approximately 0.19 g at the project site.

Deaggregation of the 2008 USGS data suggests the Cascadia Subduction Zone contributes approximately 41% to the site seismic hazard.

Subcrustal Event. There is no historic earthquake record of subcrustal, intraslab earthquakes in Southwest Washington. Although both the Puget Sound and Northern California regions have experienced many of these earthquakes in historic times, Wong (2005) hypothesizes that due to subduction zone geometry, geophysical conditions and local geology, Southwest Washington/Oregon may not be subject to intraslab earthquakes. In the Puget Sound area, these moderate to large earthquakes are deep (40 to 60 km) and over 200 km from the deformation front of the subduction zone. Offshore, along the Northern California coast, the earthquakes are shallower (up to 40 km) and located along the deformation front. Estimates of the probable magnitude, distance, and frequency of subcrustal events in Southwest Washington are generally based on comparisons of the CSZ with active convergent plate margins in other parts of the world and on the historical seismic record for the region surrounding Puget Sound, where significant events known to have occurred within the subducting Juan de Fuca plate have been recorded. Published estimates of the probable maximum size of these events range from moment magnitude M_W 7.0 to 7.5. The 1949, 1965, and 2001 documented subcrustal earthquakes in the Puget Sound area correspond to M_W 7.1, 6.5, and 6.8, respectively. Published information regarding the location and geometry of the subducting zone indicates that a focal depth of 50 km is probable (Weaver and Shedlock, 1989). We have chosen to represent the subcrustal event by a characteristic earthquake of moment magnitude M_W 7.0 at a focal depth of 50 km and a rupture distance of 50 km. Based on the attenuation relationships published by Zhao (2006), and Atkinson and Boore (2003), and Abrahamson (2012), a subcrustal earthquake of this magnitude and distance would result in a peak horizontal bedrock acceleration of approximately 0.14 g at the site.

The results of the USGS deaggregation suggest a seismic hazard contribution of 22% from a subcrustal or intraslab earthquake.

Local Crustal Event. Sudden crustal movements along relatively shallow, local faults in the southwest Washington area, although rare, have been responsible for local crustal earthquakes. The precise relationship between specific earthquakes and individual faults is not well understood, since few of the faults in the area are expressed at the ground surface, and the foci of the observed earthquakes have not been located with precision. The history of local seismic activity is commonly used as a basis for determining the size and frequency to be expected of local crustal events. Although the historical record of local earthquakes is relatively short (the earliest reported seismic event in the area occurred in 1920), it can serve as a guide for estimating the potential for seismic activity in the area.

Based on fault mapping conducted by the U.S. Geological Survey (USGS, 2008), the Portland Hills Fault is the closest mapped crustal fault to the site that is considered active in the probabilistic hazard maps. The Portland Hills Fault is located approximately 7 km from the site and has a characteristic earthquake magnitude of M_W 7.0. A crustal earthquake of this magnitude and distance would result in a peak horizontal bedrock acceleration of approximately 0.33 g at the site based on an average of the NGA ground motion relations developed by the Pacific Earthquake Engineering Research (PEER) by Boore and Atkinson (2008), Campbell and Bozorgnia (2008), Idriss (2008) and Chiou and Youngs (2008).

Deaggregation of the 2008 USGS data suggests local crustal faults contribute approximately 35% to the site seismic hazard.

Other Seismic Hazards. Based on the presence of loose sands and soft silts below the water table at the site, there is a high risk of liquefaction and lateral spreading during a design-level earthquake. More detailed discussions regarding liquefaction and lateral spreading are provided in the Seismic Considerations section of the report. Although detailed tsunami modeling of the Columbia River due to a Cascadia Subduction Zone earthquake has not been completed, we anticipate the risk of upland damage by tsunami at the site is low due to the distance from the coast. River fluctuations may result from a tsunami generated by a CSZ earthquake. Due to the proximity of the Columbia River, there is a risk of seiche. Unless occurring on a previously unmapped fault, it is our opinion the risk of ground rupture at the site is very low.

Deterministic Earthquake Parameters

As discussed above, three distinctly different seismic sources affect seismicity in the project area. Deterministic evaluation of the earthquake sources using published attenuation relations provides estimates of peak bedrock accelerations and response spectra for each seismic source. These deterministic estimates are not associated with a relative hazard level or probability of occurrence like probabilistic estimates, but simply provide an estimate of the ground motion parameters for each seismic source at a given distance from the site. The basic parameters of each earthquake source are as follows:

TABLE 1B: DETERMINISTIC EARTHQUAKE PARAMETERS

Earthquake Source	Attenuation Relationships	Magnitude, M_w	Rupture Distance, km	Focal Depth, km	Median Peak Bedrock Acceleration, g	Average Median Peak Bedrock Acceleration, g
Subduction Zone	Zhao (2006)	9.0	86	15	0.19	
	Atkinson and Macias (2009)	9.0	86	15	0.17	0.19
	Abrahamson (2012)	9.0	86	15	0.23	
	Gregor, et al.(2002)					
Subcrustal	Zhao (2006)	7.0	50	50	0.15	
	Atkinson and Boore, (2003)	7.0	50	50	0.10	0.14
	Abrahamson (2012)	7.0	50	50	0.18	
Local Crustal	Campbell and Bozorgnia (2008)	7.0	7	NA	0.32	
	Chiou and Youngs (2008)	7.0	7	NA	0.36	0.33
	Boore and Atkinson (2008)	7.0	7	NA	0.27	
	Idriss (2008)	7.0	7	NA	0.38	

The values summarized in Table 1B represent the average of median peak bedrock accelerations for the characteristic earthquake on the controlling faults. IBC and its reference document, ASCE 7-10, require evaluating the 84th percentile (median plus one standard deviation) rock response spectrum in the maximum horizontal direction for developing the deterministic MCE_R level earthquake. The risk-targeted deterministic (MCE_R) bedrock spectra shown in Figure 6B represent a weighted average of the individual spectra produced by the attenuation relationships presented in Table 1B at the 84th percentile level.

These risk-targeted deterministic spectra were compared with the deterministic lower limit on MCE_R response spectrum, constructed per Figure 21.2-1 of ASCE 7-10, for selection of the MCE_R deterministic bedrock spectrum. Figure 6B shows that the individual fault deterministic response spectra are essentially

at or lower than the deterministic lower limit on MCE_R response spectrum. Per Section 21.2.2 of ASCE 7-10, the deterministic spectrum shall be the greater of the fault deterministic spectrum or the lower limit deterministic spectrum of Figure 21.2-1. Therefore, the lower limit deterministic MCE_R response spectrum is selected to represent the bedrock deterministic (MCE_R) response spectrum.

Probabilistic Considerations

The probability of an earthquake of a specific magnitude occurring at a given location is commonly expressed by its return period, i.e., the average length of time between successive occurrences of an earthquake of that size or larger at that location. The return period of a design earthquake is calculated once a project design life and some measure of the acceptable risk that the design earthquake might occur or be exceeded are specified. These expected earthquake recurrences are expressed as a probability of exceedance during a given time period or design life. Historically, building codes have adopted an acceptable risk level by identifying ground acceleration values that meet or exceed a 10% probability of exceedance in 50 years, which corresponds to an earthquake with an expected recurrence interval of 475 years. Previous versions of the IBC developed response spectra based on ground motions associated with the Maximum Considered Earthquake (MCE), which is generally defined as a probabilistic earthquake with a 2% probability of exceedance in 50 years (return period of about 2,500 years), except where subject to deterministic limitations (Leyendecker, et al., 2000).

The current 2012 IBC develops response spectra using a Risk-Targeted Maximum Considered Earthquake (MCE_R), which is defined as the response spectrum that is expected to achieve a 1% probability of building collapse within a 50-year period. In addition, the spectral response values for the 2012 IBC are for the direction of maximum horizontal acceleration rather than the geometric mean horizontal acceleration used in previous codes. The design-level response spectrum is calculated as two-thirds of the MCE_R ground motions. The 2012 IBC changes to the site response spectra based on probability of building collapse and maximum directional accelerations result in a very slight increase in the code site response compared with the 2009 IBC. Although the MCE_R site response is similar to the previous code, it should be noted that seismic hazards, such as liquefaction and soil strength loss, are now evaluated using the MCE-level geometric mean (MCE_G) peak ground acceleration. Under previous codes, these seismic hazards were evaluated using the design-level peak ground acceleration. The design-level peak ground acceleration is two-thirds of the MCE_G peak ground accelerations, the same ratio as between the MCE_R and design response spectra.

The 2012 IBC design methodology uses two mapped spectral acceleration parameters, S_S and S_1, corresponding to periods of 0.2 and 1.0 second, to develop the Site Class B MCE_R response spectrum. The S_S and S_1 coefficients are 0.94 and 0.41 g, respectively, for the site located at the approximate latitude and longitude coordinates of 45.65°N and 122.71°W.

Target Bedrock Spectrum

Chapter 21 of ASCE 7-10, requires comparing the deterministic MCE_R response spectrum with the probabilistic MCE_R response spectrum to select the controlling spectrum. The probabilistic and deterministic MCE_R response spectra are shown in Figure 7B. The site-specific MCE_R bedrock response spectrum is taken as the lower of these two spectra per ASCE 7-10 Section 21.2.3. The probabilistic MCE_R spectrum is lower than the deterministic spectrum and, therefore, based on the above criterion, the probabilistic spectrum is defined to be the MCE_R bedrock spectrum. The risk-targeted probabilistic

spectrum is also compared with the geometric mean probabilistic bedrock spectrum (i.e., defined by 2% probability of exceedance within a 50-year period) as shown on Figure 8B. Review of Figure 8B indicates the geometric mean bedrock spectrum is comparable with the MCE_R bedrock spectrum. The 2,475-year geometric mean bedrock spectrum was chosen as the target bedrock spectrum for the TSVEDT site to allow the use of one target bedrock spectrum for both structural analysis and liquefaction evaluation.

Estimated Site Response

The effect of a specific seismic event on the site is related to the type and thickness of soil overlying the bedrock at the site and the type and quantity of seismic energy delivered to the bedrock beneath the site by the earthquake. Site response analysis was completed to estimate this site-specific behavior in accordance with section 21.1 of ASCE 7-10. The site response analysis consisted of three components: 1) selection of target bedrock response spectrum, 2) numerical modeling to analyze the site-specific behavior of the soils using horizontal ground motion acceleration time histories scaled to the approximate level of the target bedrock response spectrum over the periods of interest, and 3) calculation of the ratio of the surface response spectra values to the bedrock response spectra values, at each spectral period, to develop a recommended ground surface response spectrum. The following paragraphs describe details of the site response modeling.

The target bedrock response spectrum for the site was developed for Site Class B, or rock site, conditions in accordance with the method outlined in the Target Bedrock Spectrum section of this report. A series of earthquake acceleration-time histories have been selected to estimate the earthquake motions in D-MOD 2000 (D-MOD), a non-linear site response program. From the available records, corrected free-field and basement/ground floor accelerograms were selected for input as bedrock time histories. Wherever possible, earthquakes of similar magnitude and duration to the characteristic earthquakes were selected. These records were checked for obvious errors, missing data points, and other anomalies and were transformed into a uniform data format. The selected strong-motion records are as follows:

Earthquake	Recording Station	Magnitude	Fault Distance, km	Peak Bedrock Acceleration, g
Loma Preita (1989)	San Jose - Santa Teresa Hills	6.9	14.7	0.28
Nisqually (2001)	Olympia, WSDOT Test Lab	6.8	18.3	0.22
Chile (2010)	Curico	8.8	65.1	0.47
Chile (2010)	Hualane	8.8	50	0.46
Japan (2011)	Kuroiso (TCG001)	9	102	0.42
Japan (2011)	Yamatsuri (FKS 014)	9	76	0.23
Japan (2011)	Hachinohe (AOM 012)	9	99	0.19

The time histories were scaled to reasonably match the bedrock target spectrum at periods of interest including the site fundamental period.

A generalized subsurface profile for the site was developed for use in D-MOD based on our subsurface explorations. To estimate shear wave velocities for the soil profiles for Areas 300 and 400, probes CPT-1 and CPT-6, respectively, were operated with an accelerometer fitted to the probe that allows measuring the arrival times of shear waves at the probe from impulses generated at the ground surface. Based on the arrival times, a shear wave velocity profile was generated for Areas 300 and 400. These assumed soil profiles are tabulated below.

AREA 300 SUBSURFACE PROFILE

Material	Thickness, ft	Total Unit Weight, pcf	Estimated Shear Wave Velocity, ft/sec
FILL (Dense silty SAND or GRAVEL)	6	120	800
FILL (Dense silty SAND or GRAVEL)	6	120	800
FILL (Dense silty SAND or GRAVEL)	6	120	800
Soft SILT	5	110	500
Soft SILT	4	110	500
Soft SILT	4	110	500
Soft SILT	4	110	500
SAND	5	120	950
SAND	5	100	950
SAND	5	100	950
SAND	5	110	950
Gravel with sand	8	125	1,300
Gravel with sand	7	125	1,325
Gravel with sand	7	125	1,350
Gravel with cobbles	8	130	1,425
Gravel with cobbles	8	130	1,500
Gravel with cobbles	8	130	1,550
Gravel with cobbles	8	130	1,625
Gravel with cobbles	8	130	1,700
Gravel with cobbles	12	130	1,775
Gravel with cobbles	12	130	1,850
Gravel with cobbles	12	130	1,925
Gravel with cobbles	12	130	1,975
Gravel with cobbles	12	130	2,050
Gravel with cobbles	12	130	2,125
Gravel with cobbles	12	130	2,200
Gravel with cobbles	12	130	2,250
Gravel with cobbles	12	130	2,325
Gravel with cobbles	12	130	2,400
Gravel with cobbles	12	130	2,475
Troutdale	N/A	140	2,500

AREA 400 SUBSURFACE PROFILE

Material	Thickness, ft	Total Unit Weight, pcf	Estimated Shear Wave Velocity, ft/sec
Medium dense SAND	3	110	473
Medium dense SAND	3	110	473
Medium dense SAND	3	110	534
Medium dense SAND	4	110	615
Medium dense SAND	3	110	520
Medium dense SAND	4	110	573

Material	Thickness, ft	Total Unit Weight, pcf	Estimated Shear Wave Velocity, ft/sec
Medium dense SAND	3	110	573
Medium dense SAND	3	110	678
Loose SAND	4	110	532
Loose SAND	3	110	475
Loose SAND	3	110	555
Medium dense SAND	4	110	690
Medium dense SAND	3	110	686
Medium dense SAND	3	110	653
Medium dense SAND	3	110	560
Medium dense SAND	4	110	680
Medium dense SAND	3	110	830
Medium dense SAND	3	110	920
Medium dense SAND	3	110	1,034
Medium dense SAND	4	110	865
Medium dense SAND	3	110	1,034
Medium dense SAND	3	110	950
Medium dense SAND	3	110	950
Medium dense SAND	4	110	860
Medium dense SAND	3	110	1,000
Very dense GRAVEL	5	125	1,200
Very dense GRAVEL	5	125	1,400
Very dense GRAVEL	5	125	1,450
Very dense GRAVEL	5	125	1,500
Very dense GRAVEL	10	125	1,550
Very dense GRAVEL	10	125	1,600
Very dense GRAVEL	10	125	1,650
Very dense GRAVEL	10	125	1,700
Very dense GRAVEL	10	125	1,750
Very dense GRAVEL	10	125	1,800
Very dense GRAVEL	10	125	1,850
Very dense GRAVEL	10	125	1,900
Very dense GRAVEL	10	125	1,950
Very dense GRAVEL	10	125	2,000
Very dense GRAVEL	10	125	2,100
Very dense GRAVEL	10	125	2,150
Very dense GRAVEL	10	125	2,200
Very dense GRAVEL	10	125	2,250
Very dense GRAVEL	10	125	2,350
Very dense GRAVEL	10	125	2,400
Troutdale	N/A	140	2,500

Using the generalized subsurface profiles for Areas 300 and 400, the peak bedrock accelerations estimated for the design event, and the strong-motion records listed in the preceding tables, pseudo acceleration response spectra were calculated with D-MOD. The spectra were produced for a ground surface elevation damped at 5% of critical damping. The ground surface spectra were compared to the input rock spectra to

quantify amplification and/or attenuation through the soil column at the site. The ratio of ground surface to bedrock spectral accelerations, defined as the spectral amplification ratio (SAR), is shown on Figure 9B for Areas 300 and 400. To estimate ground surface site response throughout the range of spectral periods, the target response spectra is multiplied by the SAR to determine the ground surface response spectrum in accordance with Section 21.1.3 of ASCE 7-10. The results of the site-specific response modeling are shown on Figures 10B and 11B for Areas 300 and 400, respectively.

Figures 10B and 11B also include the code-based MCE_R hazard level spectrum, developed using site amplification factors based on the appropriate Site Class type. A discussion of the code-based site amplification factors and site class is provided in the following paragraph.

Area 300 is designated as Site Class D based on the average shear wave velocity (Vs_{100}) in the upper 100 ft per Section 20.4 of ASCE 7-10. However, Area 300 would be designated as Site Class E based on the average standard penetration resistance for the upper 100 ft of the soil profile in accordance with Section 20.4 of ASCE 7-10. Area 400 is designated Site Class D, based on the average shear wave velocities and average standard penetration resistance in the upper 100 ft. Short- and long-period site coefficients, F_a and F_v, of 1.12 and 1.59, respectively, were used to develop the MCE_R Site Class D spectrum. The MCE_R Site Class E spectrum was developed using F_a and F_v of 0.97 and 2.40, respectively.

Sites that are underlain by soils subject to liquefaction are designated as Site Class F per Section 20.3.1 of ASCE 7-10 and are required to have a site response analysis performed to develop the ground surface response spectrum. Structures that have a fundamental period less than 0.5 second are exempted from this requirement. Ground surface response spectrum developed from site response analysis for Site Class F may not be less than 80% of Site Class E spectral acceleration values per Section 21.3 of ASCE 7-10. Both Site Class D and 80% of Site Class E spectra are shown on Figures 10B and 11B for comparison with the site-specific spectra. For Area 300, the site-specific response modeling resulted in a ground surface response spectrum with peak spectral acceleration values greater than the Site Class D peak spectral value. Per Section 21.4 of ASCE 7-10, the short-period spectral acceleration value is taken as 90% of the peak spectral acceleration that occurs at a period greater than 0.2 second. The site-specific peak spectral value, multiplied by 90%, is essentially the Site Class D peak spectral value. Therefore, the Site Class D curve is recommended for estimation of the spectral accelerations at short periods. The site-specific spectral response parameter at 1 second is selected as the greater of the spectral value at 1 second or two times the spectral value at 2 seconds. The site-specific response spectrum has a 1-second spectra value greater than twice the 2-second spectral value and is thus the 1-second spectral value. The peak horizontal portion of the Site Class D curve was extended to a period of 1 second to encompass the site-specific 1-second value. For periods in excess of 1 second, the site-specific response spectrum was used to the period where site-specific values are below 80% of Site Class E (approximately 1.5 seconds). At periods in excess of 1.5 seconds, 80% of Site Class E provides the spectral acceleration values that meet the requirement of ASCE 7-10.

For Area 400, the site-specific response modeling provided a ground surface response spectrum with peak spectral acceleration values lower than that of Site Class D. Site Class D peak spectral values were recommended for estimating short-period spectral accelerations to be consistent with Area 300. At longer periods, the Site Class D curve was modified to encompass the higher site-specific spectral values. At periods in excess of approximately 1.75 seconds, where the site-specific response spectrum falls below

80% if Site Class E, response spectral values corresponding to 80% of the Site Class E response spectrum is used to satisfy the requirement of ASCE 7-10.

Conclusions

The site specific response modeling for the TSVEDT site was completed using the 2,475-year geometric mean spectral accelerations as a target bedrock spectrum with spectral acceleration values of S_s and S_1, corresponding to periods of 0.2 and 1.0 second, equal to 0.96 and 0.37 g respectively.

For Area 300, the results of the site-specific modeling in accordance with ASCE 7-10 indicate the 2012 IBC code-based Site Class D spectrum provides an appropriate estimate of the spectral accelerations for short periods. For longer periods, a response spectrum consisting of the site-specific spectral response values and the spectral values corresponding to 80% of the Site Class E response spectrum is appropriate. The design-level spectral acceleration recommended for Area 300 is shown on Figure 12B.

For Area 400, the results of the site-specific modeling indicate the 2012 IBC code-based Site Class D spectrum provides an appropriate estimate of the spectral accelerations at short periods, while a response spectrum encompassing the site-specific spectral response values and 80% of the Site Class E response spectrum is appropriate. The design-level spectral acceleration spectrum for Area 400 is shown on Figure 12B.

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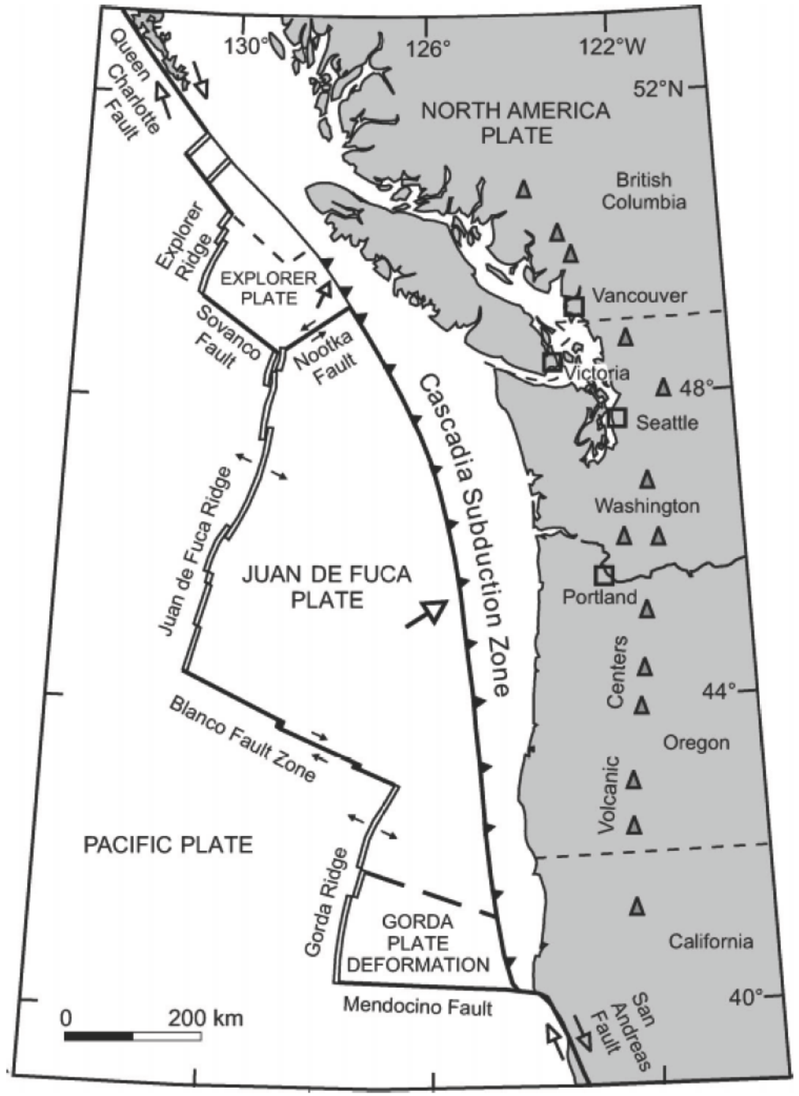
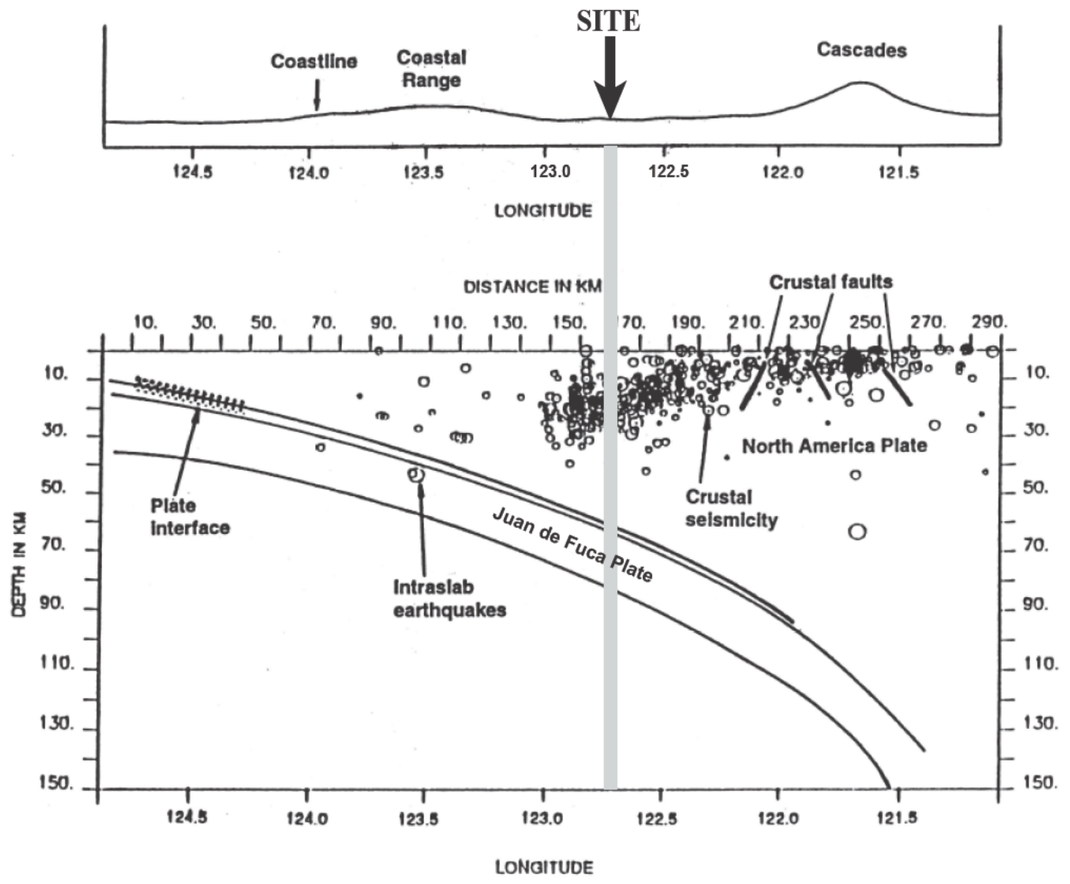


A) TECTONIC MAP OF PACIFIC NORTHWEST, SHOWING ORIENTATION AND EXTENT OF CASCADIA SUBDUCTION ZONE (MODIFIED FROM DRAGERT AND OTHERS, 1994)

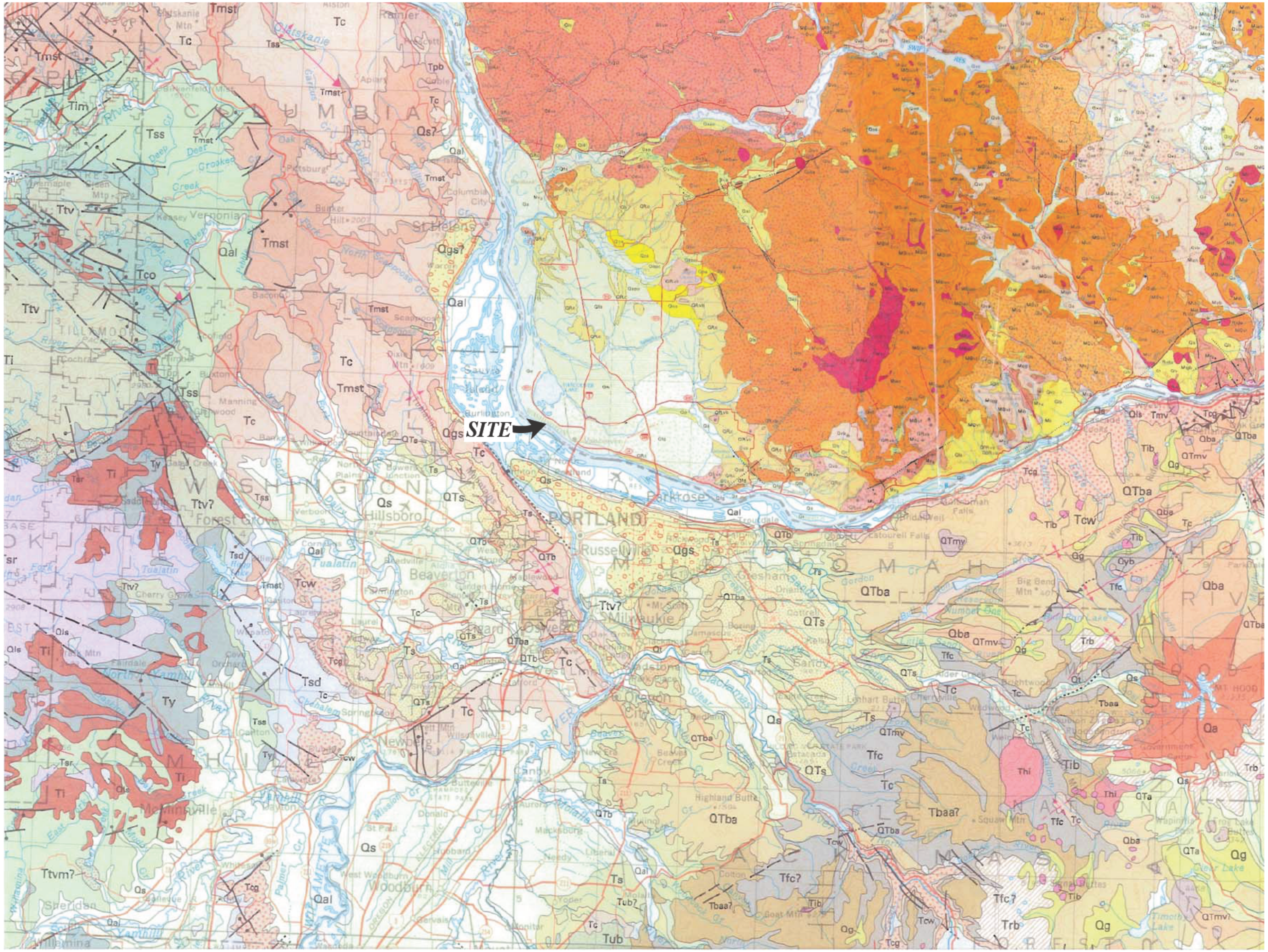


B) EAST-WEST CROSS-SECTION THROUGH WESTERN WASHINGTON AT THE LATITUDE OF VANCOUVER, SHOWING THE SEISMIC SOURCES CONSIDERED IN THE SITE-SPECIFIC SEISMIC HAZARD STUDY (MODIFIED FROM GEOMATRIX, 1995)

GRI

TECTONIC SETTING SUMMARY

DEC. 2013 JOB NO. W1114 FIG. 1B



——— **Contact** — Approximately located

Fault — Dashed where inferred; dotted where concealed; queried where doubtful; ball and bar on downthrown side

Thrust fault — Dashed where inferred; dotted where concealed; queried where doubtful; sawteeth on upper plate

7 Strike and dip of bed

FROM:

WALSH, T.J., KOROSEC, M.A., PHILLIPS, W.M., LOGAN, R.L., AND SCHASSE, H.W., 1987, GEOLOGIC MAP OF WASHINGTON-SOUTHWEST QUADRANT; 1:250,000: WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES, GM-34

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North

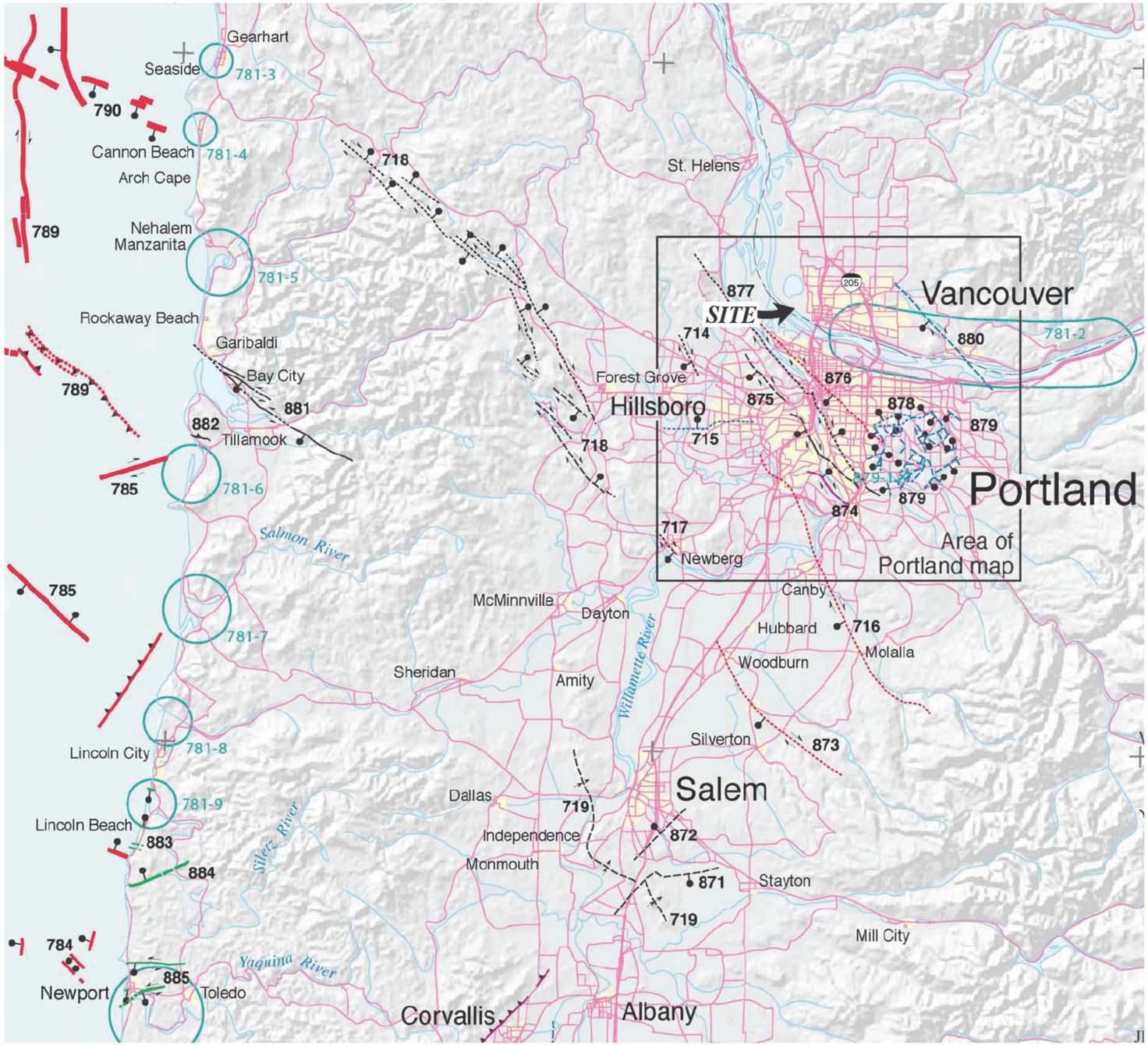
0 10 20 MILES

0 10 20 KILOMETERS

GRI

REGIONAL GEOLOGIC MAP

DEC. 2013 JOB NO. W1114 FIG. 2B



MAP EXPLANATION

TIME OF MOST RECENT SURFACE RUPTURE

- Holocene (<10,000 years) or post last glaciation (<15,000 years; 15 ka); no historic ruptures in Oregon to date
- Late Quaternary (<130,000; post penultimate glaciation)
- Late and middle Quaternary (<750,000 years; 750 ka)
- Quaternary, undifferentiated (<1,600,000 years; <1.6 Ma)
- Class B structure (age or origin uncertain)

SLIP RATE

- >5 mm/year
- 1.0-5.0 mm/year
- 0.2-1.0 mm/year
- <0.2 mm/year

TRACE

- Mostly continuous at map scale
- Mostly discontinuous at map scale
- Inferred or concealed

STRUCTURE TYPE AND RELATED FEATURES

- Normal or high-angle reverse fault
- Strike-slip fault
- Thrust fault
- Anticlinal fold
- Synclinal fold
- Monoclinal fold
- Plunge direction of fold
- Fault section marker

DETAILED STUDY SITES

- 731-2 Trench site
- 781-2 Subduction zone study site

CULTURAL AND GEOGRAPHIC FEATURES

- Divided highway
- Primary or secondary road
- Permanent river or stream
- Intermittent river or stream
- Permanent or intermittent lake

FAULT NUMBER	NAME OF STRUCTURE
876	EAST BANK FAULT
877	PORTLAND HILLS FAULT
880	LACAMAS LAKE FAULT
878	GRAND BUTTE FAULT

FROM: PERSONIUS, S.F., AND OTHERS, 2003, MAP OF QUATERNARY FAULTS AND FOLDS IN OREGON, USGS OPEN FILE REPORT OFR-03-095.

North

0 5 10 MILES

0 5 10 KILOMETERS

GRI

LOCAL FAULT MAP

DEC. 2013 JOB NO. W1114 FIG. 3B

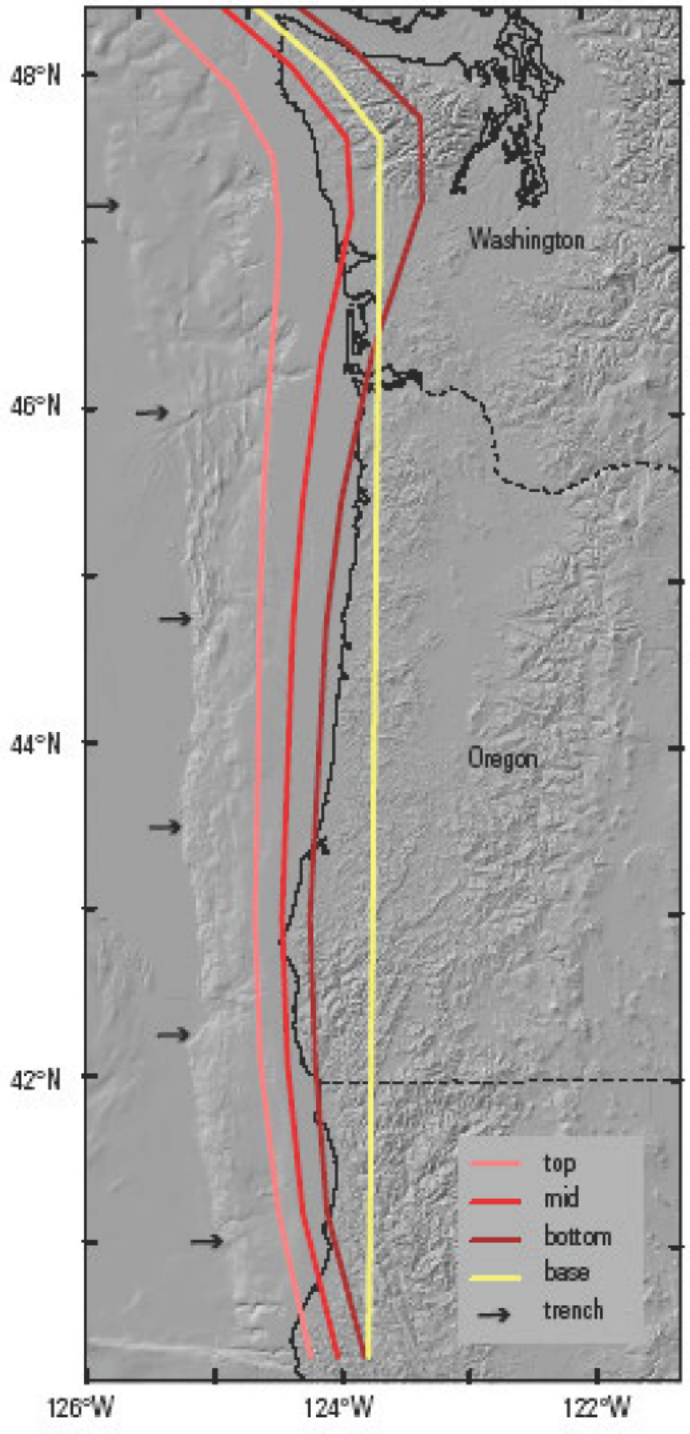


Figure 21. Location of the eastern edge of earthquake-rupture zones on the Cascadia subduction zone for the various models used in this study relative to the surficial expression of the trench: top, base of the elastic zone; mid, midpoint of the transition zone; bottom, base of the transition zones; base, base of the model that assumes ruptures extend to about 30-kilometers depth. Figure provided by Ray Weldon.

FROM: PETERSEN, MD, FRANKEL, AD, HARMSEN, SC, AND OTHERS, 2008, DOCUMENTATION FOR THE 2008 UPDATE OF THE UNITED STATES NATIONAL SEISMIC HAZARD MAPS: US GEOLOGICAL SURVEY, OPEN FILE REPORT 2008-1128

GRI

ASSUMED RUPTURE LOCATIONS

(CASCADIA SUBDUCTION ZONE)

DEC. 2013 JOB NO. W1114 FIG. 4B

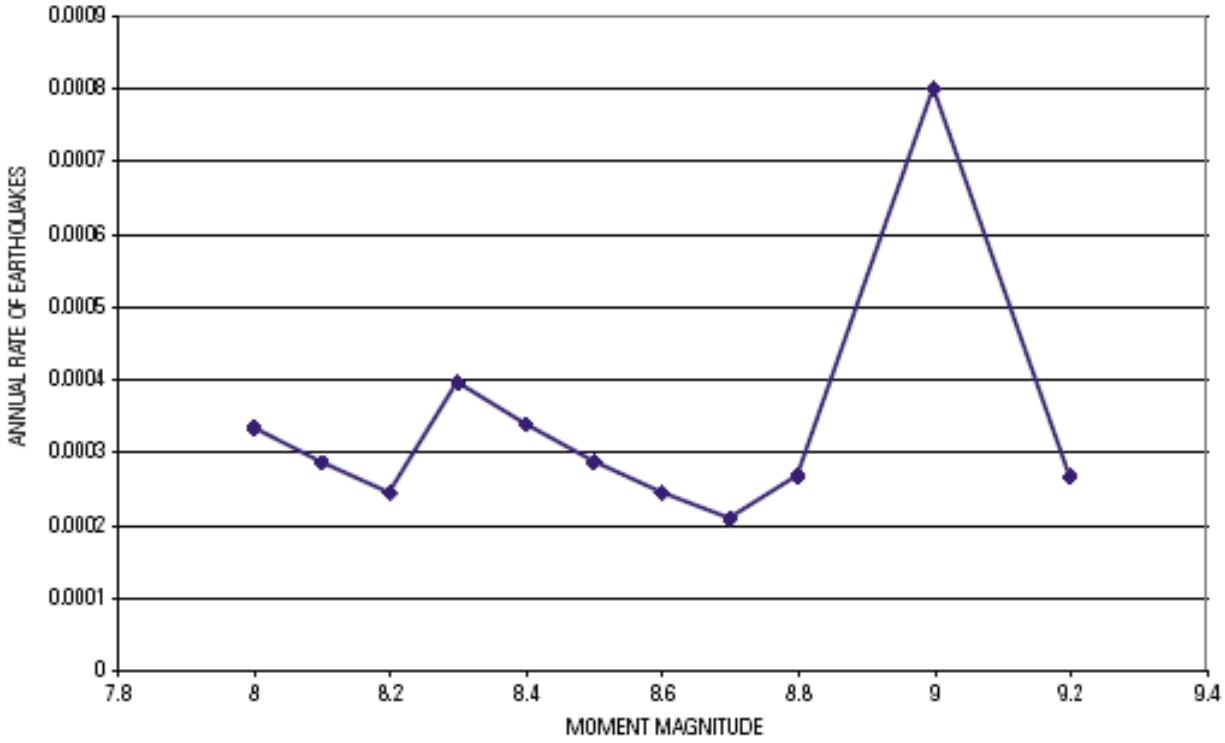


Figure 22. Magnitude-frequency distribution of the Cascadia subduction zone.

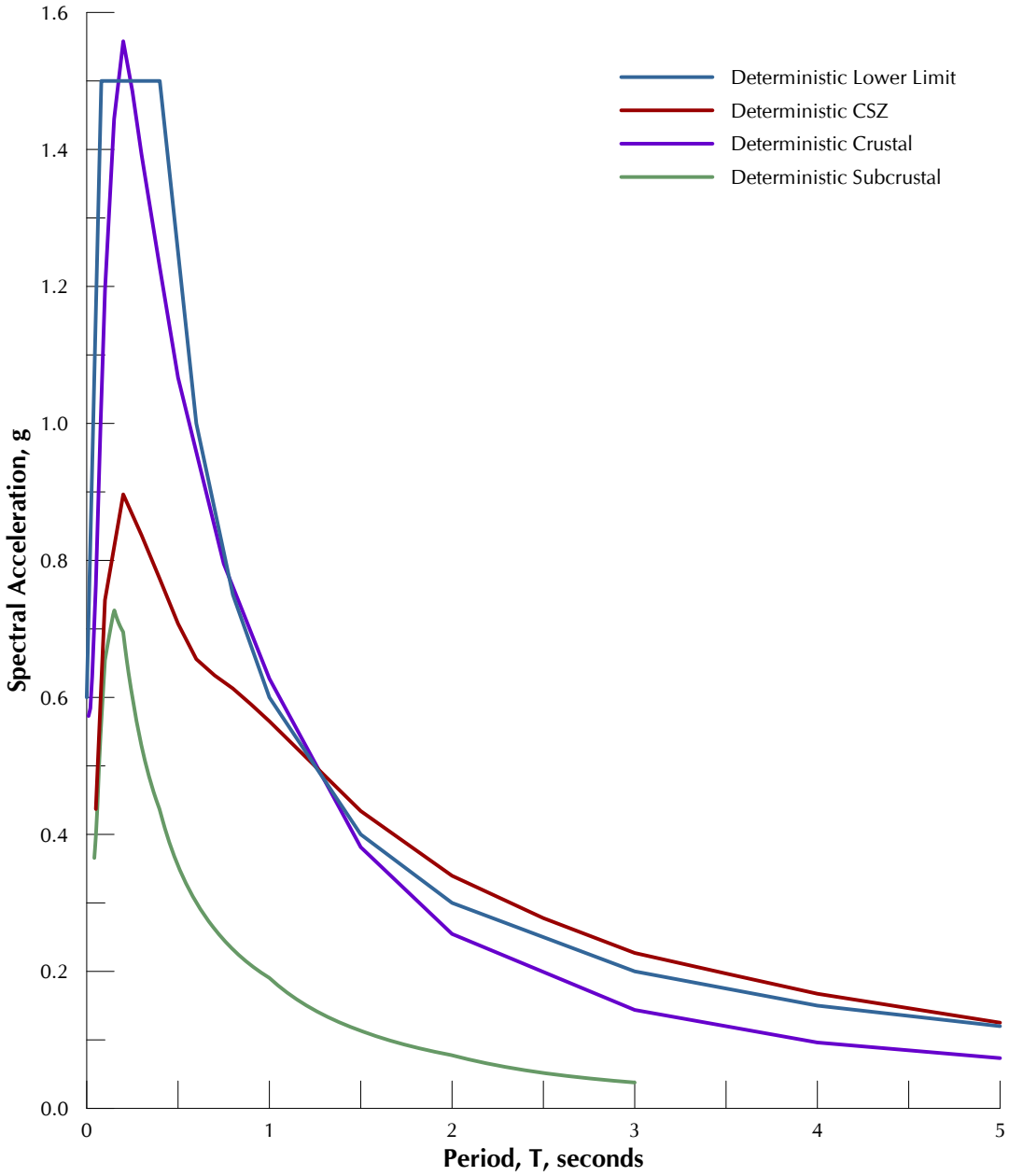
FROM: PETERSEN, M, FRANKEL, A, HARMSEN, S, AND OTHERS, 2008, DOCUMENTATION FOR THE 2008 UPDATE OF THE UNITED STATES NATIONAL SEISMIC HAZARD MAPS: US GEOLOGICAL SURVEY, OPEN FILE REPORT 2008-1128

GRI

ASSUMED MAGNITUDE-FREQUENCY DISTRIBUTION

(CASCADIA SUBDUCTION ZONE)

DEC. 2013 JOB NO. W1114 FIG. 5B

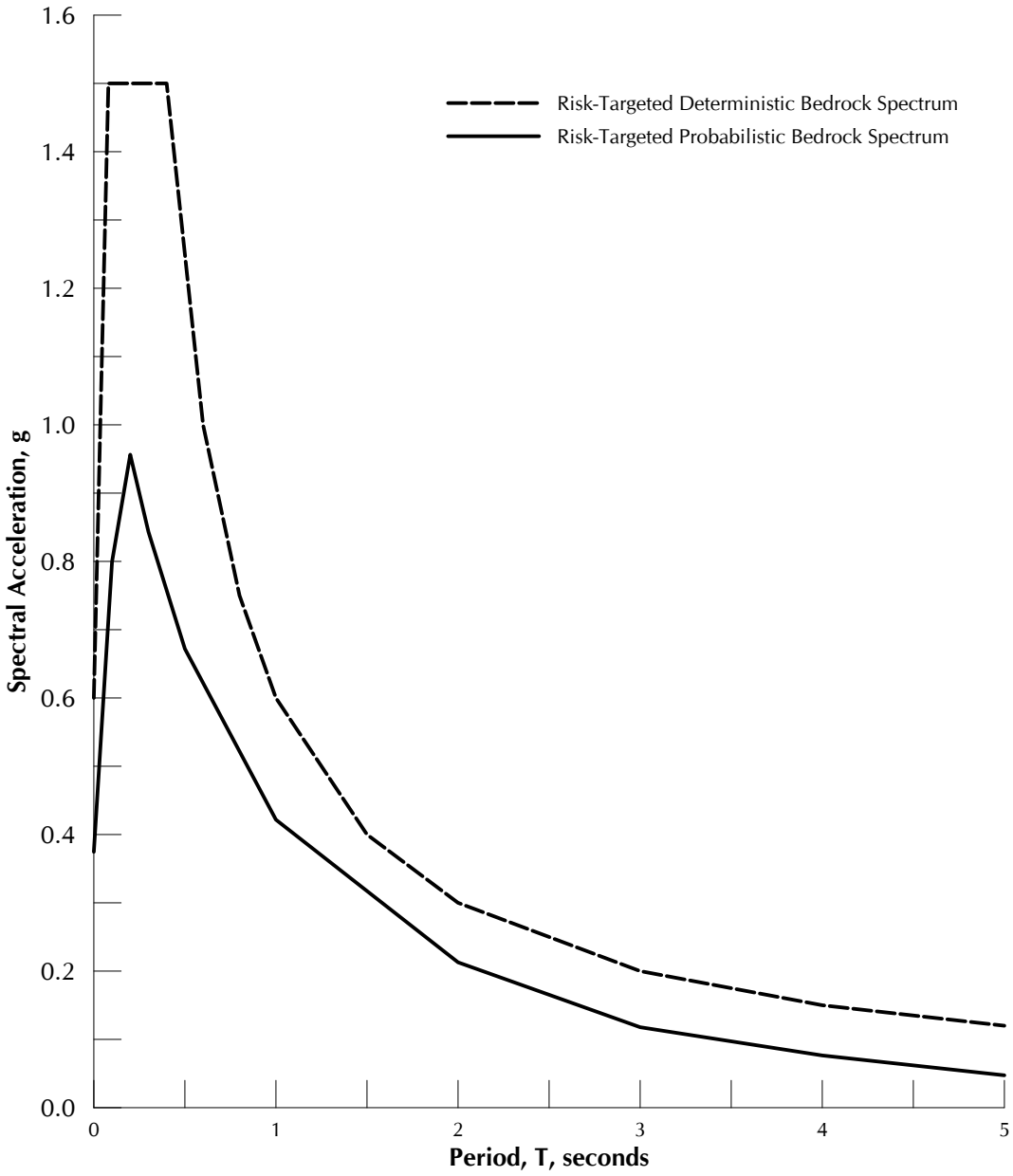


GRI

RISK-TARGETED DETERMINISTIC (MCE_R) BEDROCK RESPONSE SPECTRA

(5% DAMPING)

DEC. 2013 JOB NO. W1114-T2 FIG. 6B

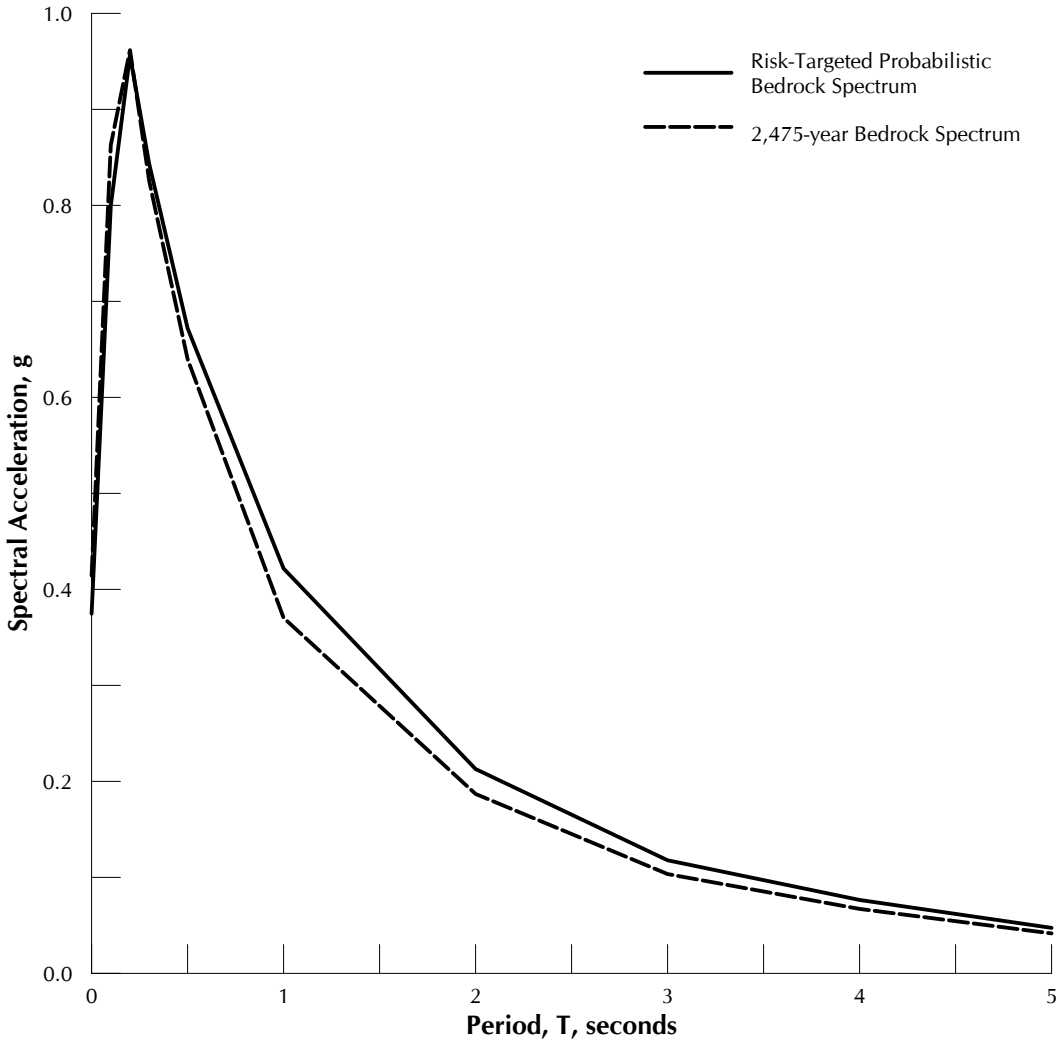


GRI

RISK-TARGETED DETERMINISTIC AND PROBABLILISTIC (MCE_R) BEDROCK RESPONSE SPECTRA

(5% DAMPING)

DEC. 2013 JOB NO. W1114-T2 FIG. 7B

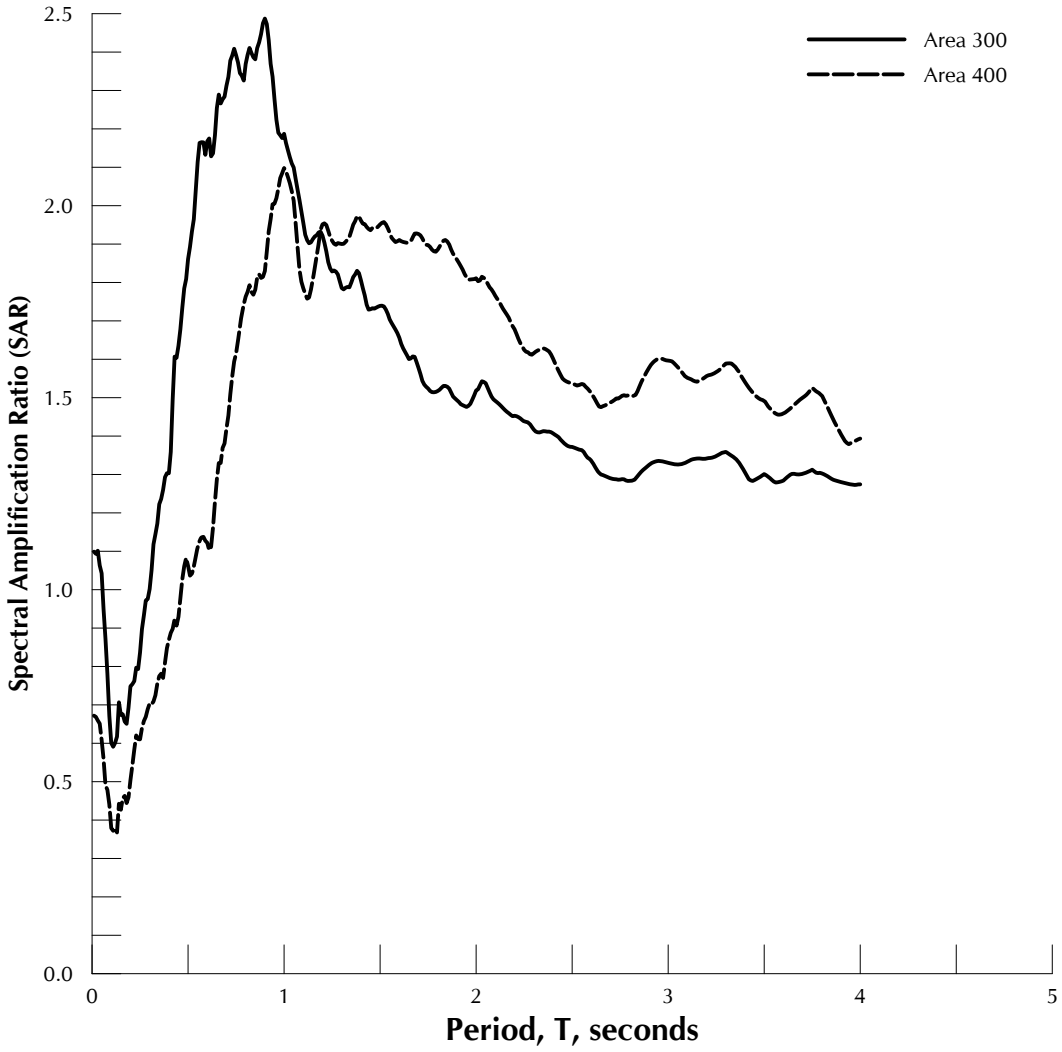


GRI

COMPARISON OF RISK-TARGETED PROBABILISTIC AND 2,475-YEAR HAZARD LEVEL BEDROCK RESPONSE SPECTRA

(5% DAMPING)

DEC. 2013 JOB NO. W1114-T2 FIG. 8B

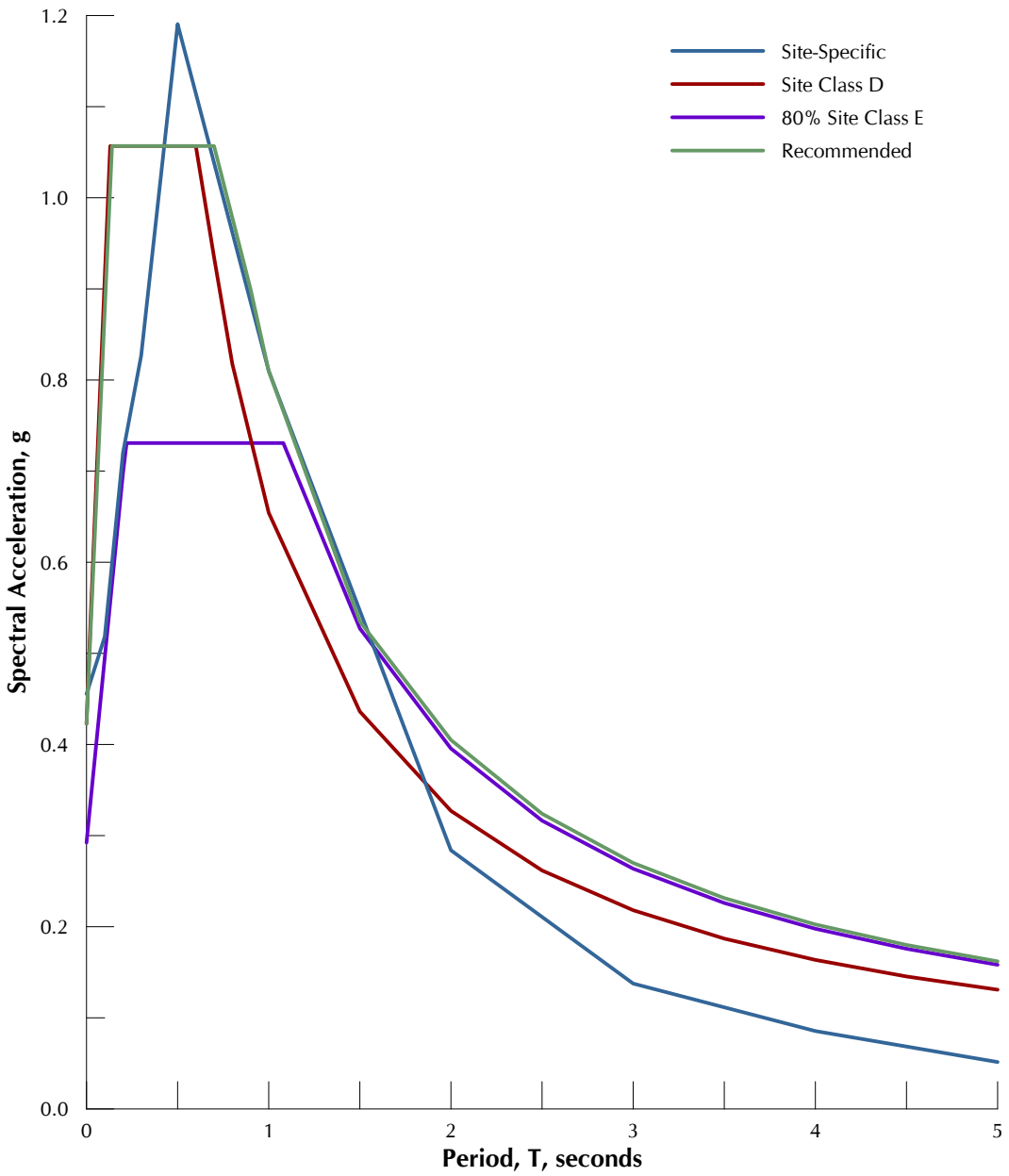


GRI

AREA 300 AND 400

SPECTRAL AMPLIFICATION RATIO (SAR)

DEC. 2013 JOB NO. W1114-T2 FIG. 9B



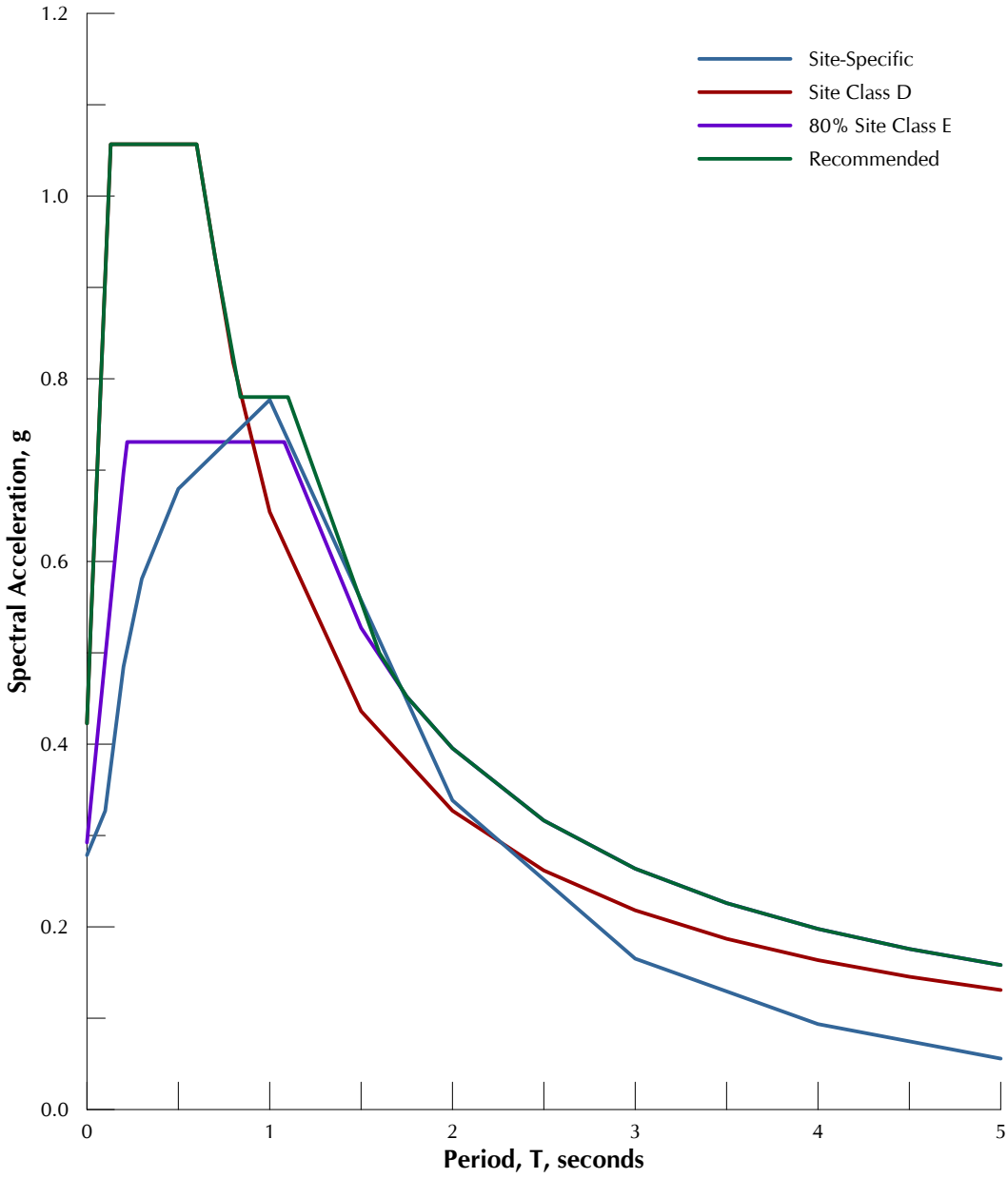
GRI

AREA 300

GROUND SURFACE DESIGN SPECTRA

(5% DAMPING)

DEC. 2013 JOB NO. W1114-T2 FIG. 10B



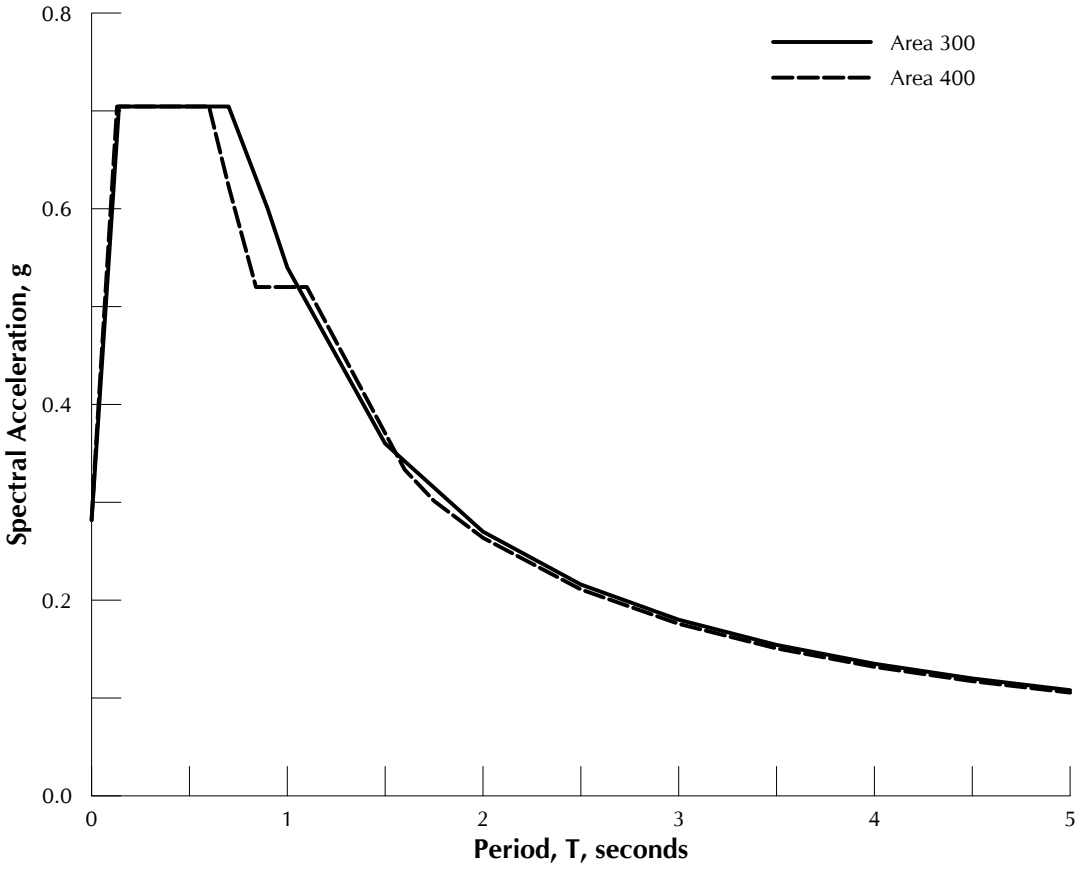
GRI

AREA 400

GROUND SURFACE RESPONSE SPECTRA

(5% DAMPING)

DEC. 2013 JOB NO. W1114-T2 FIG. 11B



GRI

AREA 300 AND 400

DESIGN RESPONSE SPECTRA

(5% DAMPING)

DEC. 2013 JOB NO. W1114-T2 FIG. 12B

Geotechnical Investigation

BergerABAM
1111 Main Street, Suite 300
Vancouver, WA 98660-2958

Tesoro Savage Vancouver Energy Distribution Terminal – Dock Facility Port of Vancouver, USA

Prepared by

GRI
Washington & Oregon

September 5, 2014

TABLE OF CONTENTS

Page

INTRODUCTION 1
PROJECT DESCRIPTION 1
Overview 1
SITE CONDITION AND BACKGROUND 2
Topography, Bathymetry, and Site Background 2
Geology 2
SUBSURFACE CONDITIONS 2
General 2
Soils 3
Groundwater 3
CONCLUSIONS AND RECOMMENDATIONS 4
General 4
Seismic Considerations 4
Slope Grading and Protection 9
Pile Support 9
Trestle Abutment Earth Pressures 13
Design Review and Construction Services 14
LIMITATIONS 15

Figures
Figure 1: Vicinity Map
Figure 2: Site Plan
Figure 3: Liquefaction Hazard Analysis – Contingency Level Earthquake
Figure 4: Liquefaction Hazard Analysis – Design Earthquake
Figure 5: Berth 13 Trestle and Dock Profile
Figure 6: Lateral Spreading Loads Trestle and Dock Piles
Figure 7: Surcharge-Induced Lateral Pressure

Appendix A: Field Explorations and Laboratory Testing

Appendix B: Site-Specific Seismic Hazard Study

INTRODUCTION

At your request, GRI has completed a geotechnical investigation at the Port of Vancouver (Port) Berth 13 dock and trestle as part of the Tesoro Savage Vancouver Energy Distribution Terminal (TSVEDT). The Vicinity Map, Figure 1, shows the general location of the project. The investigation was conducted to evaluate subsurface conditions at the site and provide our conclusions and recommendations for design and construction of the proposed modifications. Our investigation has included a review of available geotechnical information, subsurface explorations, laboratory testing, and engineering analyses.

The following geotechnical information has been reviewed for this investigation:

> GRI, December 2013, Geotechnical Report, Tesoro Savage Vancouver Energy Distribution Terminal - Upland Facility, Port of Vancouver, USA; prepared for BergerABAM
>
> Dames and Moore, March 31, 1993, Geotechnical Investigation, Proposed T-Docks/Dolphins, Port of Vancouver, Washington; prepared for URS Consultants
>
> GRI, May 18, 2011, Geotechnical Report, NW Gateway Avenue Rail Bridge and Access to Terminal 5, Port of Vancouver, USA; prepared for HDR, Inc.
>
> Goble, Rauche, Likins and Associates, Inc., 1993, Dynamic Pile Measurements, October 11, 1993, T1 and T2 Dock, Port of Vancouver, Vancouver, Washington

PROJECT DESCRIPTION

Overview

Modifications to the existing Berth 13 dock and trestle are being designed to update the facility to current seismic design standards. Berth 13 consists of a T-shape dock and trestle, as shown on Figure 2. Proposed modifications will be primarily located between an area of proposed ground improvement on the riverbank and the Columbia River channel. We have assumed the area of ground improvement will include the trestle abutment. BergerABAM has indicated the channel depth in front of the dock is a minimum of elevation -43 ft Columbia River Datum (CRD). All elevations within this report reference NGVD29 datum, which is the project datum. Elevations can be converted to NGVD29 by adding approximately 1.78 ft to CRD.

Modifications include reconstruction of the existing deck; strengthening the existing dock, trestle, and mooring structures; and installation of ground anchors inside existing dock and dolphin piles. Landward of the Ordinary High Water Mark (OHWM), there will be two new dolphin pile structures located on the riverbank, new pile structures to support walkways that access existing dolphins, and new piles for the trestle abutment foundation. Additional improvements in the dock area (Area 400) are described in our above-referenced December 2013 report for the upland facility.

Seismic design of the dock modifications is intended to meet the requirements of the upcoming American Society of Civil Engineers (ASCE) standard, *Seismic Design of Pile-Supported Piers and Wharves*.

The proposed riverbank ground improvement is being designed by Hayward Baker, Inc., a ground improvement specialty contractor, to meet specified seismic performance criteria. The ground

improvement design will affect the performance of the proposed Berth 13 modifications along the shore. We anticipate the impact of ground improvement on design of the dock elements will be further evaluated as the ground improvement design is developed.

SITE CONDITION AND BACKGROUND

Topography, Bathymetry, and Site Background

The existing site topography and bathymetry in the vicinity of Berth 13 is shown on Figure 2. The ground surface in the upland area located behind the trestle abutment is relatively flat at about elevation +27 ft and is typically surfaced with AC pavement, gravel, or grass. Two shallow stormwater infiltration swales with a bottom elevation of about +21 to +22 ft are located north of the paved areas and are mantled with grass and shrubs. The riverbank is protected with riprap and slopes down at about 2H:1V to a sandy beach at about elevation +17 ft. The sandy beach is relatively flat and slopes down at about 6H:1V to elevation +3 ft. Below elevation +3 ft, the slope increases to about 2.5H:1V. The existing mudline at the face of the dock is in the range of elevation -35 to -38 ft.

Geology

Based on our understanding of the geology at the site, our experience with nearby sites, and the available exploration data, the upland portion of the project area is mantled by fill that is underlain by recent alluvial soils. The fill typically consists of fine- to coarse-grained sand with silt, silty sand, sandy silt, and gravel. The alluvial soils beneath the fill and the mudline in the river typically consist of loose to medium dense sand and very soft to medium stiff silt. Gravel ranging from gravel in a matrix of sand to open-graded gravel with cobbles and possible boulders is present below elevations ranging from about -50 to -60 ft. Geologic investigations for the proposed Interstate 5 bridge replacement, about 3 miles upstream from the project site, indicate the alluvial gravels on the Washington side of the Columbia River can be up to 100 ft thick.

Available geologic information indicates the alluvial gravels are underlain by the Troutdale Formation, a Pliocene-age unit of well-consolidated or cemented conglomerate and sandstone (Beeson et al., 1991).

SUBSURFACE CONDITIONS

General

Subsurface materials and conditions at the dock site were investigated between July 29 and October 29, 2013, with four borings, designated B-23 through B-26, and one cone penetration test (CPT) probe, designated CPT-6. The borings were advanced to depths of 80 to 104 ft, and the probe was advanced to a depth of about 83 ft. The locations of the borings and CPT probe are shown on Figure 2.

The field exploration and laboratory testing programs completed for this investigation are described in Appendix A. Logs of the borings and CPT probe are shown on Figures 1A through 5A. The terms used to describe the soils encountered in the borings and CPTs are defined in Tables 1A and 2A.

In addition to the borings and CPT probe for this investigation, GRI also reviewed and utilized the logs of previous explorations made by GRI and others for other nearby projects. The soils encountered in the explorations for this investigation are consistent with previous investigations.

Soils

For the purpose of discussion, the materials disclosed by the explorations have been grouped into three units based on their physical characteristics, geologically significant features, and engineering properties. Listed as they were encountered from the ground surface downward, the units are:

1. **FILL**
2. **SAND**
3. **GRAVEL**

1. FILL. Fill was encountered at the ground surface in the upland explorations (Borings B-23 through B-25 and CPT-6) and extends to depths ranging from about 20 to 25 ft (about elevation +7 to +2 ft). Asphaltic-concrete pavement between 4 and 12 in.-thick over 10 to 24 in. of crushed rock base course was encountered at the ground surface in boring B-23 and B-25. Below the pavement and base course in boring B-23 and B-25, and at the ground surface of the other upland explorations, the fill consists of fine to coarse-grained sand with a trace of silt and scattered gravel and organic debris. Interbedded layers of silt and sandy silt up to about 4 in. thick were encountered in the fill. Based on N-values of 9 to 36 blows/ft and CPT tip resistances of about 50 to 240 tsf, the relative density of the fill ranges from loose to dense and is more typically medium dense. The moisture content of fill ranges from 7 to 27% and generally increases with increasing silt content.

2. SAND. Sand was encountered below the fill in the upland borings and at the ground surface in boring B-26. The sand extends to depths ranging from 64 to 87 ft (elevation -51 ft to -60 ft). The sand is fine to coarse grained and contains a trace to some silt. Interbedded layers of sandy silt and silt ranging from 1 in. to 5-ft-thick are present in the sand. The sand contains scattered a trace of gravel in all of the borings except boring B-24. Scattered wood debris was encountered below a depth of 25 ft in boring B-26. Based on N-values of 6 to 33 blows/ft and CPT tip resistances of about 50 to 150 tsf, the relative density of the sand typically ranges from loose to dense. More typically, the sand is medium dense with the exception of the sand in boring B-26 which has N-values of 2 to 10 blows/ft in the upper 40 ft indicating the upper 40 ft of sand is relatively loose. The moisture content of the sand ranges from 21 to 39%. The moisture content of silt layers ranges from 41 to 46%.

3. GRAVEL. Gravel was encountered beneath the sand in all four new borings. The gravel has a matrix of sand and silt and contains scattered cobbles and possible boulders. Loss of drilling fluid and caving of the borehole in Boring B-26 indicates that there are open-graded gravels. Based on N-values of 38 blows/ft and 50 blows for less than 6 in. of penetration, the relative density of the gravel ranges from dense to very dense.

Groundwater

Groundwater levels in the project area fluctuate in response to seasonal river levels, precipitation, and daily tidal fluctuations in the river. It should be anticipated the groundwater level in the project area will reflect the water levels in the Columbia River. Shallow perched groundwater conditions can develop above the less-permeable silty deposits at the site and approach the ground surface during periods of prolonged or intense rainfall.

The Columbia River level is lowest in late summer and early fall and is highest during winter storm events and the spring freshet, when snowmelt runoff causes high river flows. Historical low water in the last 20 years is about elevation +2.5 ft. The 100-year flood and OHWM is about elevation +27 and +17 ft, respectively.

CONCLUSIONS AND RECOMMENDATIONS

General

The borings and CPT probe completed for this investigation indicate the upland area is mantled with about 20 to 25 ft of sand fill that is underlain by alluvial sand and gravel that extend into the Columbia River. The top of a dense gravel unit ranges from about elevation -51 to -60 ft. Groundwater levels at the site will fluctuate in response to precipitation and levels in the nearby Columbia River. Shallow perched groundwater conditions may develop in the fill and approach the ground surface during periods of prolonged precipitation.

The primary geotechnical considerations for the Berth 13 modifications include axial and lateral capacity of proposed and existing piles and seismic hazard considerations. As discussed with BergerABAM, we understand new piles or foundation elements will be installed landward of the OHWM.

The loose to medium dense sand below the water table is liquefiable for the larger seismic hazard levels evaluated. Liquefaction of these soils will result in settlement, a reduction of soil strength, and significant lateral spreading near the riverbank. Lateral spreading is the horizontal displacement of large volumes of soil toward the river as a result of the liquefaction of underlying layers. Lateral ground movement will cause lateral loading and deformation of piles located within the zone of movement. Ground improvement is planned along the riverbank to mitigate the impacts of liquefaction-induced settlement and lateral spreading deformation on the TSVEDT facility improvements near the river. Although the ground improvement design is under development, we have assumed ground improvement will be completed upland of the trestle abutment to limit deformation of the abutment. Ground improvement will not be completed waterward of the OHWM; therefore, seismic-induced ground deformations will impact design of the riverside dock and trestle piles. Further evaluation of the dock modifications may be required as the ground improvement design is developed.

The following sections of this report provide our conclusions and recommendations for design and construction of the proposed modifications.

Seismic Considerations

General. The upcoming ASCE standard, *Seismic Design of Pile-Supported Piers and Wharves* (ASCE SSDPW), defines ground motions for three seismic hazard levels: the Operating Level Earthquake (OLE), the Contingency Level Earthquake (CLE), and the Design Earthquake (DE).

> OLE is defined by 50% probability of exceedance in 50 years, which corresponds to an earthquake with an expected recurrence interval of 72 years and represents a performance level with minimal structural damage.

CLE is defined by 10%probability of exceedance in 50 years, which corresponds to an earthquake with an expected recurrence interval of 475 years, and represents a performance level of controlled and repairable structural damage.

DE is defined per ASCE 7-05 which develops the response spectra based on ground motions associated with the Maximum Considered Earthquake (MCE), which is generally represented by a probabilistic earthquake with a 2% probability of exceedance in 50 years (return period of about 2,500 years), except where subject to deterministic limitations (Leyendecker et al., 2000). The design-level response spectrum that represents the DE is obtained by taking two-thirds of the MCE level ground motions.

The bedrock earthquake motions for each of the hazard levels were selected from the 2008 U.S. Geologic Survey (USGS) probabilistic seismic hazard maps for the coordinates of 45.65° N latitude and 122.71° W longitude. The code-based spectra are developed using two spectral response coefficients, S_S and S_1, corresponding to periods of 0.2 and 1.0 second. These bedrock spectral ordinates are adjusted for Site Class with the short- and long-period site coefficients, F_a and F_v, based on subsurface conditions or with a site-specific response analysis. A summary of the OLE, CLE, and DE hazard level S_S and S_1 coefficients for the dock are tabulated below.

SUMMARY OF SEISMIC DESIGN PARAMETERS

Hazard Level	Ss	S1
Operating Level Earthquake (OLE)	0.11	0.03
Contingency Level Earthquake (CLE)	0.45	0.16
Design Earthquake (DE)	0.94	0.41

The site is generally designated as Site Class D based on the average shear wave velocity (V_s100) in the upper 100 ft per Section 20.4 of ASCE 7-05. Based on our evaluation, the seismic shaking from the OLE is insufficient to cause liquefaction, and the code-based Site Class D is recommended to estimate the ground response spectral acceleration. However, our analysis has identified a potential risk of liquefaction for the CLE and DE hazard levels. In accordance with ASCE SSDPW, sites with subsurface conditions identified as vulnerable to failure or collapse, such as liquefiable soils, shall be classified as Site Class F. For Site Class F sites, ASCE SSDPW Section 4.3.2 requires completion of a site-specific ground motion analysis for structures with a fundamental period of vibration greater than 0.5 second. BergerABAM has indicated the fundamental period of the dock is between 0.5 and 1.0 second. Due to these anticipated longer periods, a site-specific seismic ground motion analysis was completed for CLE and DE hazard levels at the dock and trestle area. The ground motion analysis was completed with the aid of the computer software D-MOD2000, a non-linear seismic soil response software developed by GeoMotions, LLC. The D-MOD2000 analyses are further discussed in Appendix B.

The site-specific response modeling results were compared with both Site Class D and E spectra due to the liquefaction considerations. The modeling indicates that 80% of code-based Site Class E spectral accelerations provide an appropriate estimate of the CLE hazard level in accordance with the ASCE SSDPW. The site-specific response modeling indicates the MCE hazard level spectral accelerations are greater than Site Class D spectral accelerations at periods less than 1.8 seconds. However, based on the

research by Youd and Carter (2005), Site Class D is likely conservative for structures with a period less than 1 second. In this regard, the code-based Site Class D is recommended to estimate the spectral accelerations at short periods ($T < 0.89$ second). At periods between 0.89 and 1.8 seconds, we conservatively recommend the design spectrum include an increase above Site Class D and E to transition to longer periods and envelop the estimated site-specific ground surface response. At periods greater than approximately 1.8 seconds, the site-specific response spectrum is less than 80% of Site Class E, which is the minimum spectral amplification allowed by ASCE 7-05 for liquefied conditions. The DE is determined by taking two-thirds of the MCE. The results of our site-specific ground motion analysis, including plots of the spectral amplification ratio and recommended response spectra, are provided in Appendix B.

Liquefaction. Liquefaction is a process by which saturated, granular materials, such as sand, and non-plastic silts, temporarily lose strength during and immediately after a seismic event. Liquefaction occurs as seismic shear stresses propagate through a saturated soil and distort the soil structure causing loosely packed groups of particles to contract or collapse. If drainage is impeded and cannot occur quickly, the collapsing soil structure increases the pore water pressure between the soil grains. If the pore water pressure increases to a level approaching the weight of the overlying soil, the granular layer temporarily behaves as a viscous liquid rather than a solid. As strength is lost, there is an increased risk of settlement, lateral spread, and/or slope instability, particularly along waterfront areas. Liquefaction-induced settlement occurs as the elevated pore water pressures dissipate and the soil consolidates after the earthquake.

The potential for liquefaction at the site was evaluated with the simplified method based on two methodologies. The first methodology is based on the simplified procedure by Youd, et al. (2001). The analysis was completed with the aid of the computer software LiquefyPro, a seismically induced liquefaction and settlement analysis software developed by CivilTech Corporation. The second methodology is based on the simplified procedure by Idriss and Boulanger (2008). Both methodologies utilize the peak ground acceleration (PGA) adjusted for site amplification to estimate the cyclic shear stress ratio (CSR) experienced by the soil and in situ test data from the borings or CPTs to estimate the cyclic resistance ratio (CRR) of the soil. The factor of safety (FS) against liquefaction is estimated as the CRR divided by the CSR. The OLE PGA was based on the USGS 2008 interactive deaggregations. The CLE and DE PGAs were based on the results of site-specific ground motion analyses. The earthquake magnitudes chosen to represent the earthquake hazard levels for our liquefaction studies were based on the 2008 USGS interactive deaggregations for the OLE, CLE, and DE return intervals as well as the results of our site-specific ground motion analysis for the CLE and DE hazard level. The input values used for our liquefaction studies are tabulated below.

Hazard Level	PGA, g	Earthquake Magnitude, M
Operating Level Earthquake (OLE)	0.07	5.8
Contingency Level Earthquake (CLE)	0.26	8.4
Design Earthquake (DE)	0.28	9.0

For the purpose of liquefaction studies, we have conservatively assumed a groundwater level at elevation +12 ft, which corresponds to the seasonal high average daily river level. Based on our liquefaction studies, we estimate the risk of liquefaction for the OLE hazard level is low, i.e., the FS against liquefaction is greater than 1. The output from our liquefaction studies indicates the loose to medium dense sands

below the groundwater level have a factor of safety against liquefaction less than 1 and could liquefy during the CLE and DE hazard level. A maximum free-field seismic settlement of about 24 in. was estimated for both the CLE and DE hazard levels based on the existing unimproved soil profile at boring B-26. The factor of safety against liquefaction for the CLE and DE hazard levels is summarized on Figures 3 and 4.

Lateral Spreading. Lateral spreading involves the horizontal displacement of large volumes of soil as a result of the liquefaction of underlying soil layers. Ground displacement occurs in response to the combination of gravitational forces and inertial forces generated by an earthquake acting upon the soil mass. Lateral spread can develop on shallow sloping ground or as a flow slide moving toward a moderately steep to steep free face, such as a river channel or lake bottom. Differential internal movement within the spreading mass usually creates surface features, such as ground cracks or fissures, scarps, and/or grabens, in overlying unsaturated or non-liquefied soils. Lateral displacement may range from a few inches to many feet depending on soil conditions, the steepness of the slope, and the magnitude and epicentral distance of the earthquake. Associated differential vertical movements, or ground surface subsidence, may range up to about half of the total horizontal movement.

The method of analysis summarized in Idriss and Boulanger (2008) were used to estimate lateral spreading deformations in free-field conditions. The methodology utilizes the same inputs as the simplified method for liquefaction hazard evaluation. Additionally, lateral spreading deformations were estimated using the methods of Youd et al. (2002). The basic inputs for Youd et al. (2002) include a characterization of the soil profile in terms of grain size, fines content (silt and clay), and Standard Penetration Test N-values; the overall geometry of the riverfront slope; and the magnitude and epicentral distance of the design-basis earthquakes. The risk of liquefaction at the OLE hazard level was estimated to be very low and therefore lateral spreading was not evaluated for the OLE. The range of estimates of lateral deformation for the CLE and DE hazard levels are tabulated below.

LATERAL SPREADING ESTIMATES
(without ground improvement)

Hazard Level	Earthquake Magnitude, M	Epicentral Distance, km	Estimated Range of Lateral Deformation, ft
Contingency Level Earthquake (CLE)	8.4	86	5 to 12
Design Earthquake (DE)	9.0	86	12 to 20

The methods used to estimate the seismically induced horizontal and vertical ground displacement at the site are largely based on empirical methods and, consequently, do not provide a precise estimate of the actual ground movement that may occur. Seismic events of a lesser magnitude, or of the same magnitude but occurring at a greater epicentral distance from the site, would be expected to produce lesser horizontal and vertical ground displacements.

Design Estimates for Lateral Displacement Forces. Earthquake-induced damage to waterfront structures at sites with liquefiable soils is well documented. Stresses induced on piles are typically generated from the inertial mass of the structure and lateral soil loading from both the lateral spreading liquefied soils and the non-liquefied crust of soil generally present above the groundwater table. Case histories have shown that the forces or displacements induced by the non-liquefied soil crust are generally significantly larger than

the forces generated from the liquefied soils with reduced strengths. Design for the lateral spreading soils is typically completed by either applying estimates of soil displacements or forces to the structure. The displacement approach is commonly applied if the structure is somewhat flexible and can accommodate some deformation. The force approach is applied if the structure is more rigid and cannot accommodate the estimated movement. Based on discussions with BergerABAM, we understand the evaluation of the dock and trestle piles will likely be based on a force-based approach. Because the seismic lateral movements of the trestle abutment will be mitigated by ground improvement, we understand the abutment will be evaluated based on a displacement-based approach. The magnitude of displacement at the abutment will depend on the ground improvement design and should be evaluated as the design is developed. Preliminary earth pressures for the abutment are provided in the Trestle Abutment Earth Pressures section of this report.

A schematic cross section of the trestle alignment with the estimated lateral spreading failure surface is shown on Figure 5. The failure surface shown on Figure 5 assumes that sufficient ground improvement will be installed to limit lateral spreading at the trestle to the area below the OHWM at the CLE and DE hazard levels, which is discussed subsequently. Based on the soil profile and bathymetry, it should be assumed that lateral spreading will occur to a depth of about 35 ft below the mudline or ground surface, but no deeper than elevation -48 ft, for the CLE and DE hazard levels.

For the purpose of lateral spreading studies, we have assumed a groundwater level at elevation +7.5 ft that corresponds to the average level of the Columbia River. Based on our assumptions, the estimated soil movements will result in two different pressures acting on the trestle and dock piles: 1) unsaturated sand moving against the piles, and 2) saturated loose, liquefied sand moving against the piles. For the unsaturated sand above the ground water table, a lateral earth pressure based on an equivalent fluid unit weight of 400 pcf may be assumed to act against the trestle piles in the direction of the river for the CLE and DE hazard levels. Where the sand is saturated, a uniform rectangular pressure distribution of 250 psf may be assumed to act against the trestle piles in the direction of the river. In non-liquefied soils, passive lateral earth pressures tend to "arch" or develop a larger tributary area against piles. In this regard, we recommend assuming the lateral earth pressure against piles in the unsaturated sand material will act over an equivalent of two pile diameters. The lateral pressure against piles in the saturated liquefied sand material will act over one pile diameter. The recommended seismically induced lateral pressures are summarized on Figure 6. The extents of lateral spreading and the lateral spreading forces should be further evaluated as the ground improvement design is developed.

As noted in the ASCE SSDPW peak inertial forces do not necessarily occur at the same time as the peak soil (kinematic) loading on the structure. For this reason, consideration can be given to applying only a portion of the peak inertial loading at the same time as the kinematic loads. Design methods for evaluating combined inertial and kinematic loads are not well documented in the available literature, and ASCE SSDPW does not provide a recommended loading combination. However, another marine structures code, the Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS), includes recommended load combinations for inertial and kinematic loading. In our opinion, it is reasonable to use inertial and kinematic load combinations similar to those provided in MOTEMS to evaluate the dock design.

Ground Improvement. Lateral spreading is often mitigated by constructing a zone, or buttress, of improved soil along the riverbank that will not liquefy. The buttress needs to be of sufficient width and extend to adequate depth to maintain stability following ground shaking and minimize or prevent lateral displacement toward the river of the upland portion of the site behind the buttress.

Due to the potential for large lateral spreading deformations, ground improvement will be designed and constructed to mitigate the impact of large seismic lateral displacements on the proposed transfer pipeline and structures located near the river.

Other Seismic Considerations. In our opinion, the potential for earthquake-induced fault displacement and ground rupture at the site is low unless occurring on a previously unknown or unmapped fault. Due to the topography of the site, it is our opinion the risk of damage by seiche is low. We are not aware of rigorous tsunami modeling for the Columbia River in available literature. However, based on the paper, "Tsunami Hydrodynamics in the Columbia River" (Yeh, 2012), the amplitude of potential tsunami waves at the Port is anticipated to be small at this distance from the Pacific Ocean.

Slope Grading and Protection

We understand the existing riprap and concrete debris slope protection will be left in place wherever possible. We anticipate this slope protection will have to be removed and replaced in the vicinity of the new piles to minimize the risk of obstructions during installation. Depending on the degree of disturbance and the subgrade conditions underlying the existing slope protection, a graded filter material may need to be placed prior to replacing the slope protection. GRI should observe the subgrade conditions during construction to recommend and appropriate filter gradation.

Pile Support

General. New 24-in.-diameter pipe piles (plumb and battered) are being considered for two proposed landside mooring dolphins, the reconstructed abutment, and walkway support piles. New driven piles will be located landward of the OHWM. Some strengthening of the existing 18-in.-diameter dock, trestle, and dolphin pipe piles is planned that includes installing grouted anchors or micropiles through the pipe piles into the gravel, and filling the piles with concrete. Based on discussions with the team, we understand the installation and testing of micropiles or grouted anchors will be through an assumed 10 1/2-in.-diameter hole in the plate at the tip of the existing pipe pile. Our recommendations regarding axial and lateral capacity of the new and existing piles are summarized below.

Proposed Dolphin Piles. The locations of two proposed landside mooring dolphins are shown on Figure 2. At the request of BergerABAM, GRI evaluated 24-in.-diameter pipe piles at the proposed dolphin locations. We anticipate the piles will be driven open-end into the underlying gravel unit. We estimate 24-in.-diameter pipe piles driven with sufficiently large hammers to adequate penetration resistance can develop an ultimate compression capacity of at least 750 kips. The explorations and our experience in the area indicate the sand content and the relative density of the underlying gravel unit tend to be highly variable. As a result, it is difficult to accurately predict the actual penetration of piles into the gravel to develop the estimated ultimate capacities. However, based on our experience, we anticipate the piles will develop the design capacity at a depth of about 15 ft into the gravel plus or minus 10 ft. Assuming penetration of 15 ft into the dense gravel, the resulting pile tips will be at about elevation -68 to -70 ft based

on the available explorations. Due to the variation in subsurface conditions we recommend the piles are ordered at least 10 ft longer than the estimated tip elevation to limit the risk of splices.

Since a significant portion of the estimated ultimate compression pile capacity is derived from end-bearing resistance, the uplift capacity of the piles will be significantly less than the compressive capacity. For preliminary purposes, we estimate the 24-in.-diameter piles can develop an ultimate vertical uplift capacity of about 300 kips assuming the piles will penetrate a minimum of 15 ft into relatively dense gravel.

As discussed in the Liquefaction section of this report, the sand below the groundwater level is subject to liquefaction and/or seismically induced strength loss during the two larger hazard level events. Liquefaction-induced settlements will result in downdrag loads on the piles. In this regard, we recommend assuming a downward skin friction acting along the outside perimeter of the piles of 250 psf above elevation +12 ft and 150 psf from elevation +12 ft to the top of the gravel unit. The top of the gravel unit is estimated at about elevation -57 ft. For seismic conditions the ultimate axial capacities estimated above should be reduced to 280 kips in compression, and 170 kips uplift to account for seismically-induced loss of strength. For piles located within the zone of ground improvement, the depth of liquefaction and magnitude of the downdrag loads will depend on the ground improvement design. The effects of ground improvement on the potential for downdrag induced loads should be evaluated as the ground improvement design is developed.

Recommended factors of safety for allowable capacity are discussed in the Recommended Factor of Safety section of this report.

Trestle Abutment Piles. As currently planned, new 24-in.-diameter pipe piles are being considered at the reconstructed trestle abutment to resist seismic inertial loads from the dock and trestle structure. We have assumed that ground improvement will be designed to extend around the abutment piles to a sufficient depth to mitigate liquefaction and lateral spreading. In this regard the non-seismic axial capacity estimates presented in the previous section for dolphin piles can be used to preliminarily design abutment piles for the non-seismic and seismic loading conditions. The pile capacities at the abutment should be reevaluated as the ground improvement design is developed.

Existing Trestle, Dock, and Dolphin Piles. The existing piles are 18-in.-diameter pipe piles with 3/8-in.-thick walls. The piles were reportedly fitted with a type of endplate that included a 10 1/2-in.-diameter center cut-out. The trestle piles are all plumb piles. The dock and dolphin piles are a combination of plumb and batter (5H:12V and 6H:12V) piles. The total embedded length of the piles typically ranged from about 34 to 100 ft depending primarily on the mudline elevation at the pile location. The piles at the dock typically have the least embedment and range from about 34 to 52 ft. The length of pile embedment into the gravel unit is typically in the range of 10 to 25 ft.

GRI evaluated the axial capacity of the existing piles based on available geotechnical data including pile driving logs and results of Pile Driving Analyzer (PDA) re-strike testing completed when the piles were installed. The PDA results are summarized in the above-referenced report by GRL (1993). The ultimate capacity computed from restrike PDA tests ranges from 435 to 550 kips. The PDA estimated skin friction resistance values of 210 kips and 225 kips for piles 91 and 96, respectively. Pile 91 and 96 were

embedded 36 and 48 ft, and it is our opinion that the estimated ultimate skin friction is representative for the range of pile embedment at Berth 13.

Based on the wide variation in pile embedment depths we recommend an ultimate compression capacity of 435 kips. We estimate the pile tip provides about 200 kips of resistance and the skin friction on the outside of the pile provides the remaining resistance. Since a significant portion of the estimated ultimate compression pile capacity is derived from end-bearing resistance on the partially closed-end plate, the uplift capacity of the piles will be significantly less than the compressive capacity. To consider decreased skin friction values for tension piles relative to compression piles (FHWA, 2006), we recommend an ultimate uplift capacity of about 150 kips for the range of pile embedments at Berth 13.

As discussed in the Liquefaction section of this report, the sand below the groundwater level is subject to liquefaction and/or seismically induced strength loss. Liquefaction-induced settlements will result in downdrag loads on the piles. For the existing dock and trestle piles, we recommend assuming a downward skin friction of 100 psf acting along the outside perimeter of the piles from the mudline to the top of the gravel unit. The top of the gravel unit can be estimated at about elevation -57 ft for this purpose. For seismic conditions, the ultimate axial capacities estimated above should be reduced to 400 kips (compression) and 100 kips (uplift) to account for seismically induced loss of strength.

Recommended Factor of Safety. We recommend applying a factor of safety to the ultimate pile capacities provided above based on soil support properties. A minimum FS of 2 is recommended for typical non-seismic conditions. For seismic conditions we recommend a factor of safety of 1 in accordance with the ASCE SSDPW. For extreme moorage loading combinations such as flood and extreme wind conditions a FS of 1.5 is appropriate for dolphin piles.

Pile Installation. The new dolphin piles should be driven with a pile hammer of sufficient energy to develop the pile ultimate capacity and obtain adequate penetration into the gravel. During installation, we anticipate the top of the gravel can be identified by a noticeable increase in penetration resistance. Based on our experience on adjacent sites with similar soils, a vibratory hammer will likely not be effective in penetrating the gravel layer to the design embedment. In this regard, the contractor should assume final installation of steel pipe piles will require an air, steam, or diesel, impact hammers.

As discussed previously, our experience in the area indicates the driving resistance in the gravel tends to be highly variable. There is some risk that piles may encounter practical refusal before reaching the planned tip elevations.

We recommend an indicator-pile installation program as the initial step in the installation of production piles. The purpose of the program would be to evaluate the contractor's equipment and develop terminal pile driving resistance criteria. We recommend dynamic pile testing of two or three piles with the PDA during initial driving. As a guide, if 24-in.-diameter piles are being considered for the pile program, we recommend using a pile hammer with rated energy of at least 100,000 ft-lbs. The contractor should provide an impact hammer submittal and installation plan for the project team to review at least 2 weeks prior to pile driving.

We understand the pipe piles will likely have a 0.5-in. wall thickness. All piles should be fitted with commercially available tip protection that fit flush with the outside wall of the pile.

Lateral Pile Capacity. Lateral structural loads can be resisted by the piles in bending. The lateral load behavior of the piles can be analyzed using the computer program L-Pile 5.0 by Ensoft, Inc. We recommend using the input parameters summarized in the following tables to model the soils at the site.

SOIL PROPERTIES FOR L-PILE ANALYSIS [1]
Berth 13 Dock, Trestle, and Riverbank Dolphin Piles

Static, Frequently Applied Live Loads, and Operating Level Earthquake (72-year Return Interval)[2]

				Soil Properties				
Soil Unit	Elevation, ft	L-Pile Soil Type	Condition	K, pci	γ′, pci	ϕ′	c, psi	ε_{50}
Fill: SAND	Above +17	Sand (Reese)	Non-Liquefied	25	0.067	32	N/A	N/A
Submerged Fill: SAND	+17 to +2	Sand (Reese)	Non-Liquefied	20	0.03	32	N/A	N/A
Submerged SAND	+2 to -38	Sand (Reese)	Non-Liquefied	20	0.030	32	N/A	N/A
Submerged SAND	-38 to -57	Sand (Reese)	Non-Liquefied	60	0.030	35	N/A	N/A
Submerged GRAVEL	Below -57	Sand (Reese)	Non-Liquefied	125	0.040	40	N/A	N/A

Contingency Level and Design Level Earthquakes (475-year and 2/3 MCE Return Intervals, respectively) [3] [4]

				Soil Properties				
Soil Unit	Elevation, ft	L-Pile Soil Type	Condition	K, pci	γ′, pci	ϕ′	c, psi	ε_{50}
Fill: SAND	Above +7.5	Sand (Reese)	No Lateral Resistance	N/A	0.067	N/A	N/A	N/A
Submerged Fill: SAND	+7.5 to +2	Sand (Reese)	Liquefied	10	0.030	6	N/A	N/A
Submerged SAND	+2 to -38	Sand (Reese)	Liquefied	10	0.030	6	N/A	N/A
Submerged SAND	-38 to -57	Sand (Reese)	Liquefied	10	0.030	12	N/A	N/A
Submerged GRAVEL	Below -57	Sand (Reese)	Non-Liquefied	125	0.040	40	N/A	N/A

Notes:

1) Applicable for the river side of the trestle abutment.
2) Design groundwater level assumed at OHWM Columbia River Elevation +17 ft (NGVD).
3) Design groundwater level assumed at Average Columbia River Elevation +7.5 ft.
4) Lateral spreading occurs to depths/elevations shown on Figure 5.
5) Submerged soils are below the design groundwater level.

For preliminary planning we have assumed that ground improvement will be installed around the abutment and will be sufficient to mitigate liquefaction. In this regard, the lateral resistance of abutment piles can be estimated based on the static L-Pile parameters presented in the above table. Ground slope effects can be taken into consideration with the input of an appropriate slope angle.

It should be noted that L-Pile provides isolated, single-pile capacities. Depending on the direction of the loading and orientation of the piles, group effects should be considered for spacings less than eight (8) pile diameters. This reduction is often applied as a group efficiency or a p-multiplier. L-Pile uses a p-multiplier as a reduction of the k_h value for pile spacing less than eight pile diameters. The following table provides a summary of p-multipliers and reported group efficiencies in sand.

LATERAL PILE GROUP ANALYSIS

Center-to-Center Pile Spacing	Calculated p-multipliers for Rows 1, 2, and 3	Reported Group Efficiency
3d	0.80, 0.40, 0.30	0.75
5d	1.0, 0.85, 0.70	0.95
8d	1.0, 1.0, 1.0	1.0

Caution should be used when applying the reported group efficiencies to pile groups with significantly more than three rows of piles. Additional design methodology of laterally loaded pile groups is provided in the Federal Highway Administration (FHWA) publication entitled, "Design and Construction of Driven Pile Foundations."

Micropiles or Ground Anchors. Micropiles or ground anchors drilled through the tip of the existing piles are being considered to increase the existing pile capacity. We estimate micropiles or ground anchors in the gravel may develop ultimate capacities on the order of 350 kips. Larger capacities may be possible but could be limited by structural design considerations. The micropiles or ground anchors would be drilled and installed through the existing pipe piles and into the underlying gravel.

Drilling through the gravel at the tip of the existing pipe piles will alter the pile tip resistance. For preliminary planning purposes, we recommend considering no tip resistance for the existing pipe piles if micropiles or ground anchors are installed through the pile tip. Installation of micropiles or ground anchors will not reduce the skin friction of the existing pipe piles.

Grouted micropiles or ground anchors are typically designed by specialty contractors to meet specified performance criteria. As a general guideline, we recommend a minimum bonded length of 30 ft into the relatively dense gravel. Micropiles or ground anchors should be designed with a minimum factor of safety of 1.5 in compression and 2 in tension, based on soil support properties.

Micropile or ground anchor capacities should be evaluated by field testing which will be challenging because the existing piles are supporting the dock structure. The maximum test loads and the number of test anchors will depend on the total number and design of the micropiles or ground anchors. The testing program should be developed with the final plans and specifications. The unbonded and bonded lengths may need to be modified based on the actual gravel conditions encountered during drilling and the contractor's equipment and procedures. Micropiles and ground anchors should be provided with permanent corrosion protection.

Trestle Abutment Earth Pressures

Design lateral earth pressures for the trestle abutment depend on the type of construction, i.e., the ability of the abutment to yield. For static conditions, we anticipate the trestle abutment will be relatively rigid and

can be designed to resist an at-rest lateral earth pressure computed on the basis of an equivalent fluid having a unit weight of 50 pcf. Additional lateral earth pressures due to surcharge loadings may be estimated using the guidelines presented on Figure 7.

Additional lateral loads due to seismic forces on retaining walls will be dependent on design of the ground improvement around the abutment and the seismic hazard level. Our studies indicate that liquefaction induced seismic deformations are not likely for the OLE hazard level. Based on this assumption, the abutment may be designed on the basis of static at-rest earth pressure plus an additional seismic load increment during the OLE seismic event. The additional load due to seismic forces can be evaluated based on a rectangular lateral earth pressure distribution with a uniform pressure equal to $H*\gamma$, where H is the height of the wall and γ is an equivalent unit weight of 2 pcf for the OLE.

We have assumed that ground improvement will be designed around the trestle abutment to mitigate liquefaction and lateral spreading loads and deformations at the CLE and DE hazard levels to meet a specified ground movement performance criteria. We understand that the final seismic performance criteria have not yet been selected. Seismic lateral ground deformations toward the river will cause lateral spreading loads on the abutment wall and foundations. Lateral spreading loads should be applied to the wall and piles until the wall has displaced the amount specified by the performance criteria. For preliminary planning, lateral spreading loads can be estimated based on an equivalent fluid unit weight of 400 pcf for the unsaturated sand above elevation 7.5 ft. Below elevation 7.5 ft where the sand is saturated and susceptible to liquefaction, a uniform rectangular pressure distribution of 250 psf may be assumed to act in the direction of the river. The depth of seismic deformation and lateral spreading loads will depend on the ground improvement design and the seismic design of the abutment should be re-evaluated once the ground improvement design is complete. We recommend assuming the lateral earth pressure against piles in the unsaturated sand material will act over an equivalent of two pile diameters due to arching. The lateral pressure against piles in the saturated liquefied sand material will act over one pile diameter. Once the seismic deformation has occurred, the earth pressures can be estimated based on the static at-rest earth pressures provided above.

Based on our discussion with the project team, we understand lateral loads at the trestle abutment may be resisted by battered piles or tieback anchors. Anchor capacities can be provided during final design if needed.

The above criteria assume drained conditions and that the abutment is backfilled with relatively clean, granular material, i.e., medium sand, sand and gravel, or well-graded gravel, with not more than 5% passing the No. 200 sieve (washed analysis). We recommend that this material be compacted to about 95% of the maximum dry density as determined by ASTM D 698. Heavy compaction equipment should not operate within 5 ft of the abutment.

Design Review and Construction Services

We welcome the opportunity to review and discuss construction plans and specifications for this project as they are being developed. In addition, GRI should be retained to review all geotechnical-related portions of the plans and specifications to evaluate whether they are in conformance with the recommendations provided in our report. Additionally, to observe compliance with the intent of our recommendations, design concepts, and the plans and specifications, we are of the opinion that all construction operations

dealing with pile installation should be observed by a GRI representative. Our construction-phase services will allow for timely design changes if site conditions are encountered that are different from those described in this report. In our opinion, this is of particular importance during pile-driving operations. If we do not have the opportunity to confirm our interpretations, assumptions, and analyses during construction, we cannot be responsible for the application of our recommendations to subsurface conditions that are different from those described in this report.

LIMITATIONS

This report has been prepared to assist BergerABAM and the design team in the design of this project. The scope is limited to the specific project and location described herein. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of the trestle, platform, dolphins, and other supports. In the event that any changes in the design and location of the facilities, as outlined in this report, are planned, we should be given the opportunity to review the changes and to modify or reaffirm the conclusions and recommendations of this report in writing.

The analyses and recommendations submitted in this report are based on the data obtained from the borings made at the locations indicated on the Site Plan and from other sources of information discussed in this report. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is acknowledged that variations in soil conditions may exist between the boring locations, and groundwater levels fluctuate seasonally. This report does not reflect any variations that may occur between these explorations. The nature and extent of variations may not become evident until construction. If, during construction, subsurface conditions different from those encountered in the exploratory holes are observed or encountered, or appear to be present beneath or beyond foundations, we should be advised at once so that we can observe these conditions and reconsider our recommendations where necessary.

Submitted for GRI,

Expires 4/2016

Matthew S. Shanahan, PE
Associate

Scott M. Schlechter, PE
Principal

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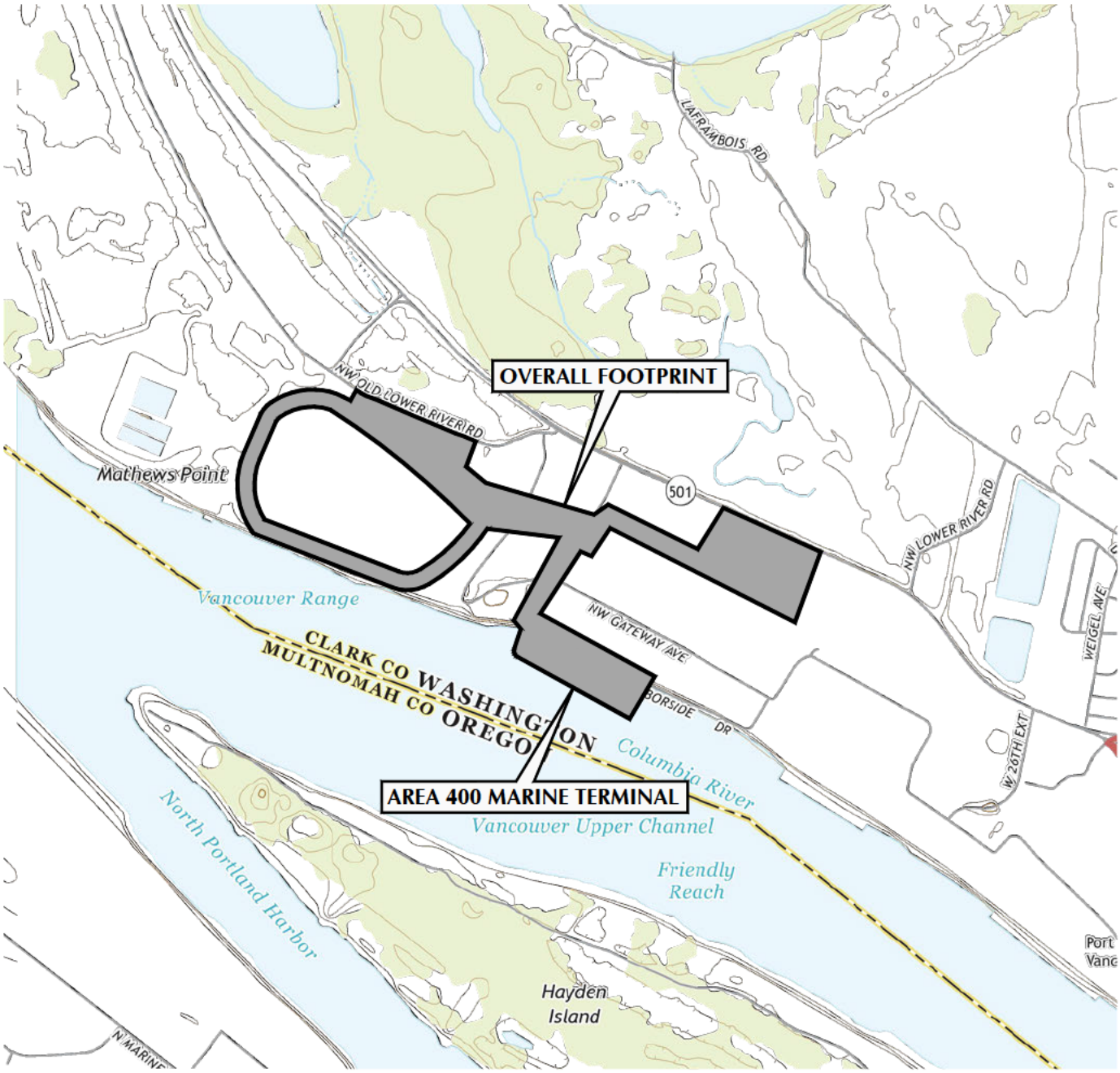


USGS TOPOGRAPHIC MAP
VANCOUVER, WASHINGTON (2011)

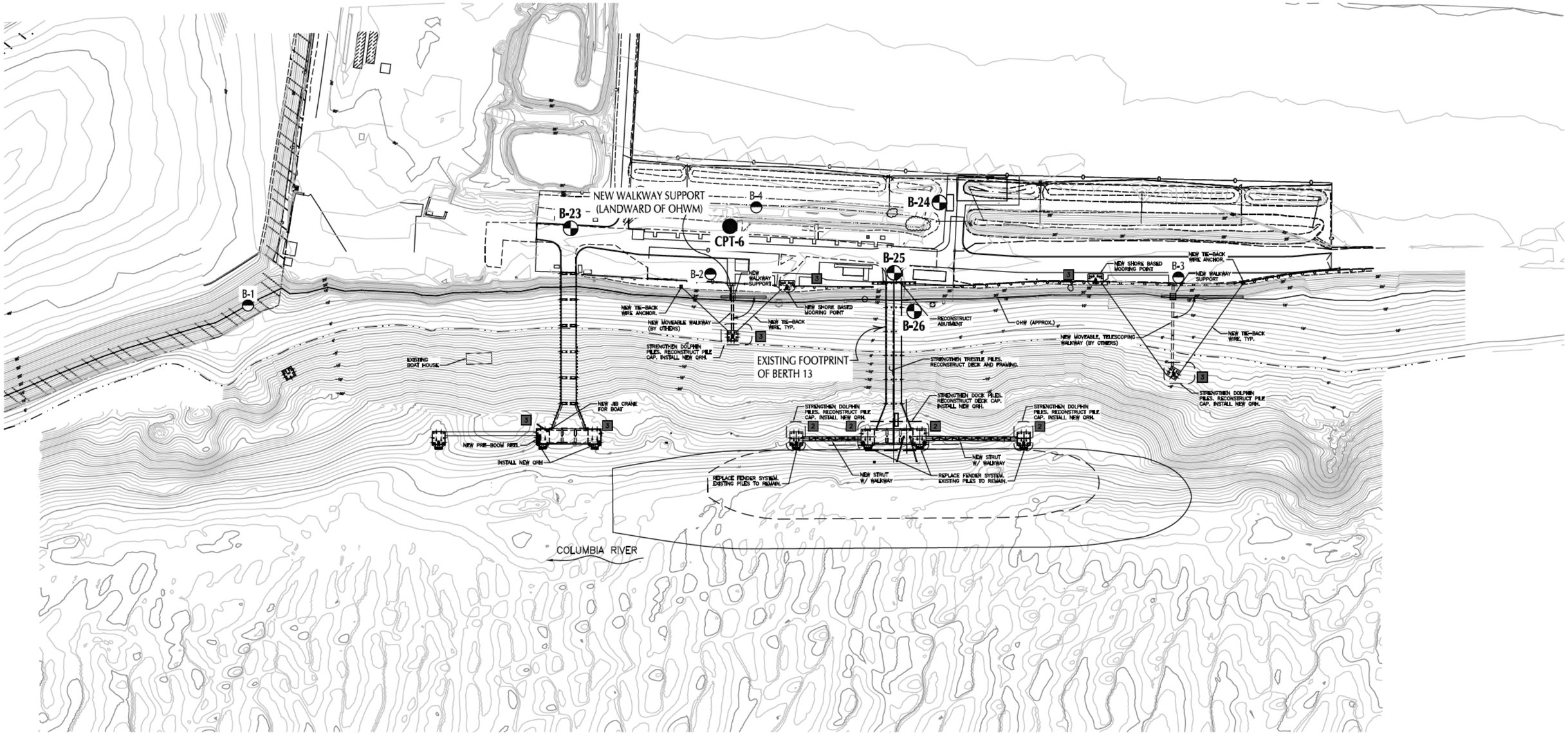
North

0 1/2 1 MILE

GRI BERGERABAM
TSVEDT DOCK STRUCTURE

VICINITY MAP

SEP. 2014 JOB NO. W1114-T3 FIG. 1



North

0 150 300 FT

- BORING MADE BY GRI (JULY 29 - OCTOBER 29, 2013)
- CONE PENETRATION TEST MADE BY GRI (JULY 29 - AUGUST 5, 2013)
- BORING MADE BY DAMES & MOORE (1993)

SITE PLAN FROM FILE BY MACKAY + SPOSITO

GRI

BERGERABAM
TSVEDT DOCK STRUCTURE

SITE PLAN

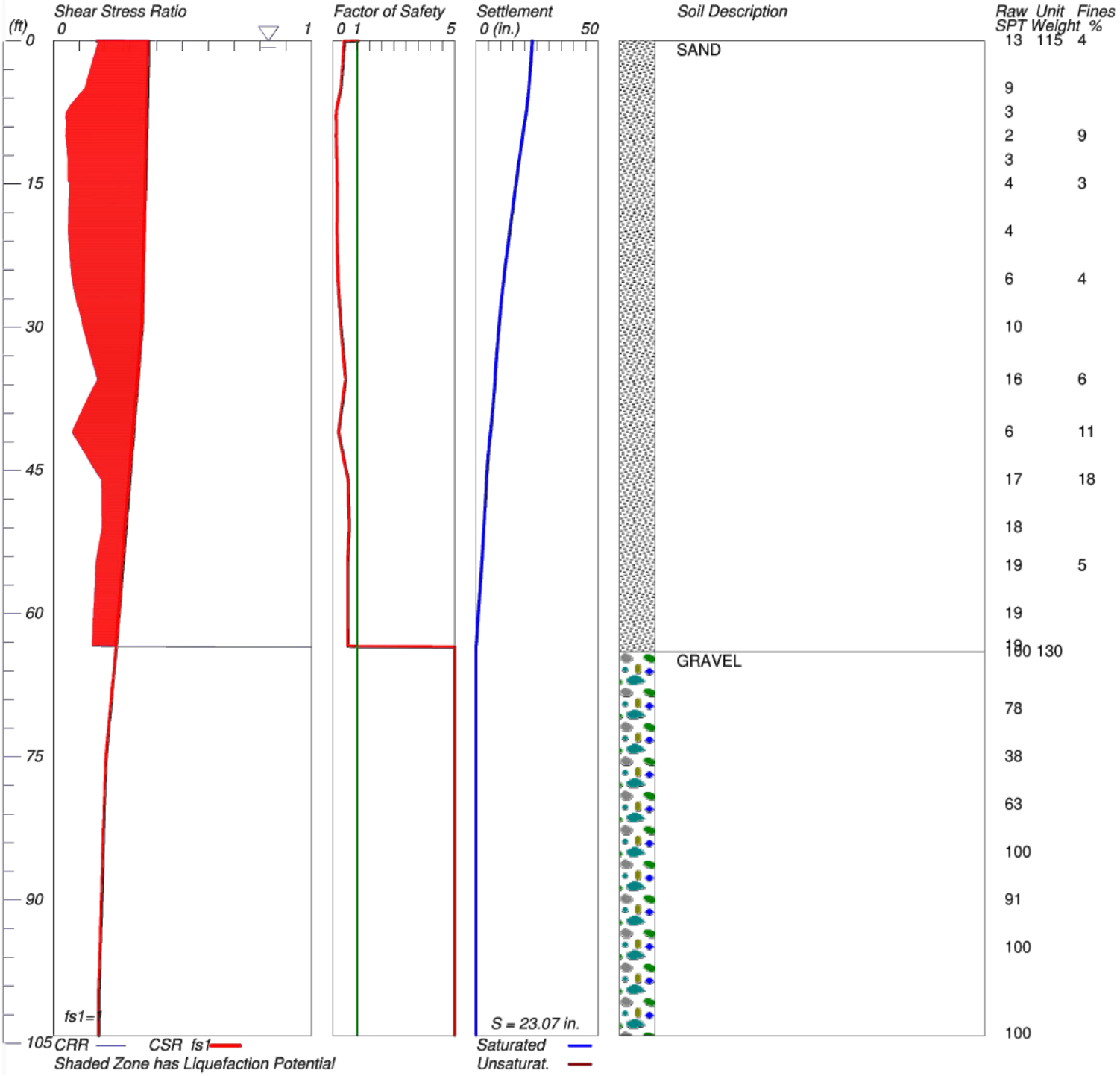
SEP. 2014 JOB NO. W1114-T3 FIG. 2

LIQUEFACTION ANALYSIS

Tesoro Savage Vancouver Energy Distribution Terminal

Hole No.=B-26 Water Depth=0 ft Surface Elev.=7

Magnitude=8.4
Acceleration=0.26g



Contingency Level Earthquake (CLE)

BERGERABAM
TSVEDT DOCK STRUCTURE

LIQUEFACTION HAZARD ANALYSIS

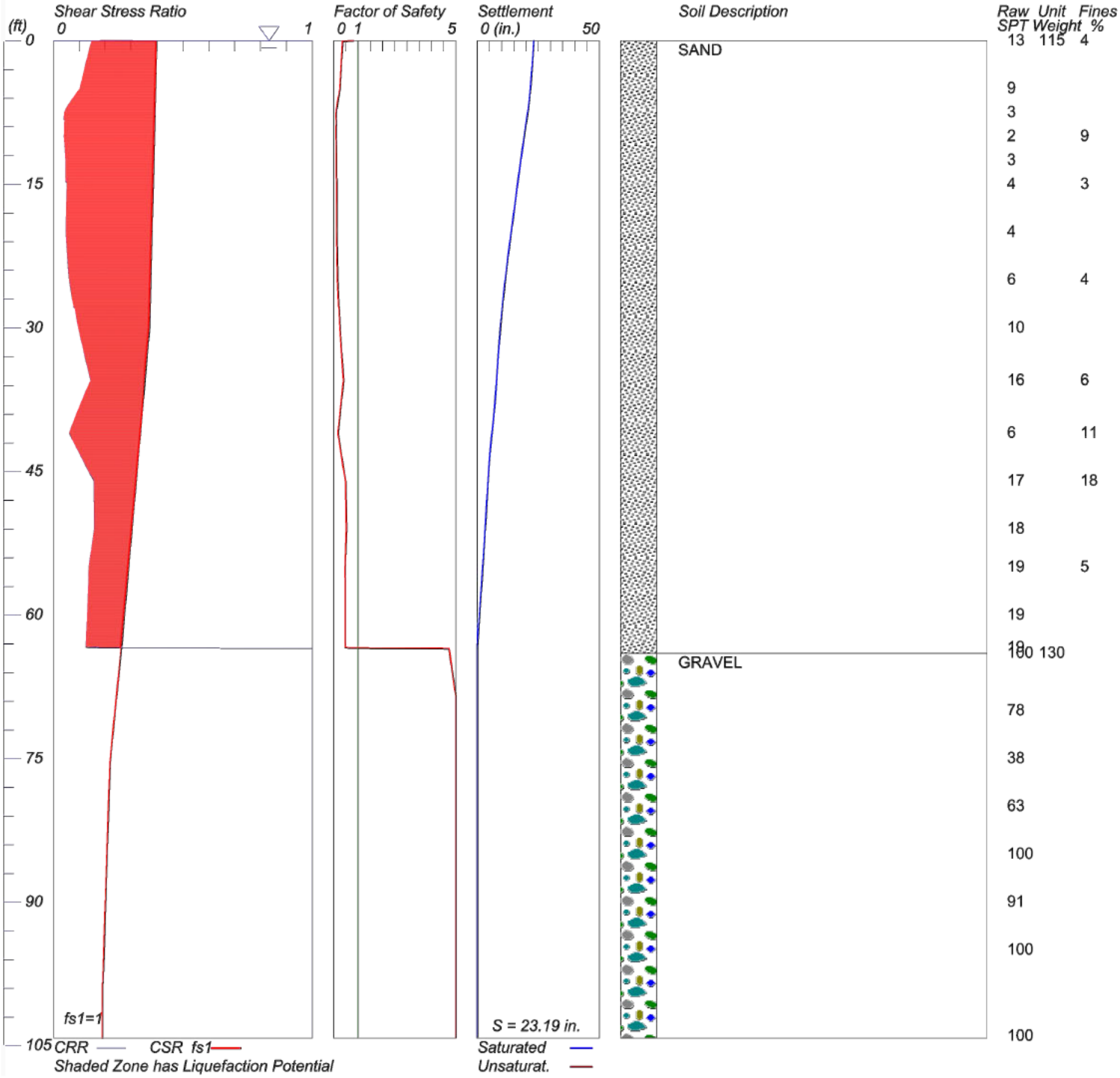
SEP. 2014 JOB NO. W1114-T3 FIG. 3

LIQUEFACTION ANALYSIS

Tesoro Savage Vancouver Energy Distribution Terminal

Hole No.=B-26 Water Depth=0 ft Surface Elev.=7

Magnitude=9.0
Acceleration=0.28g

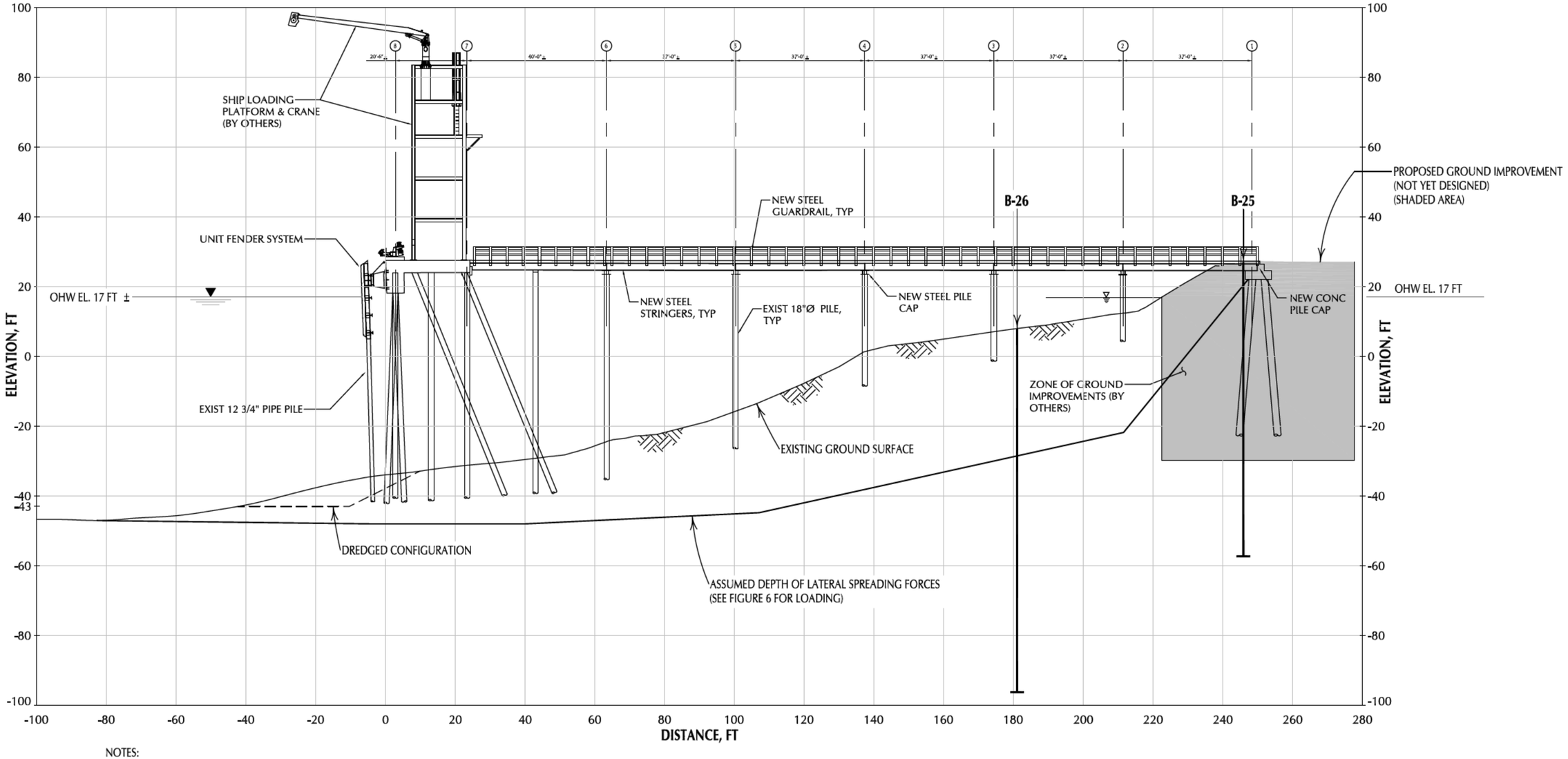


Design Earthquake (DE)

GRI BERGERABAM TSVEDT DOCK STRUCTURE

LIQUEFACTION HAZARD ANALYSIS

SEP. 2014 JOB NO. W1114-T3 FIG. 4



NOTES:

1) THE EXTENT OF LATERAL SPREAD SHOULD BE FURTHER EVALUATED AS THE GROUND IMPROVEMENT DESIGN IS DEVELOPED.

2) DATUM IS NGVD29.

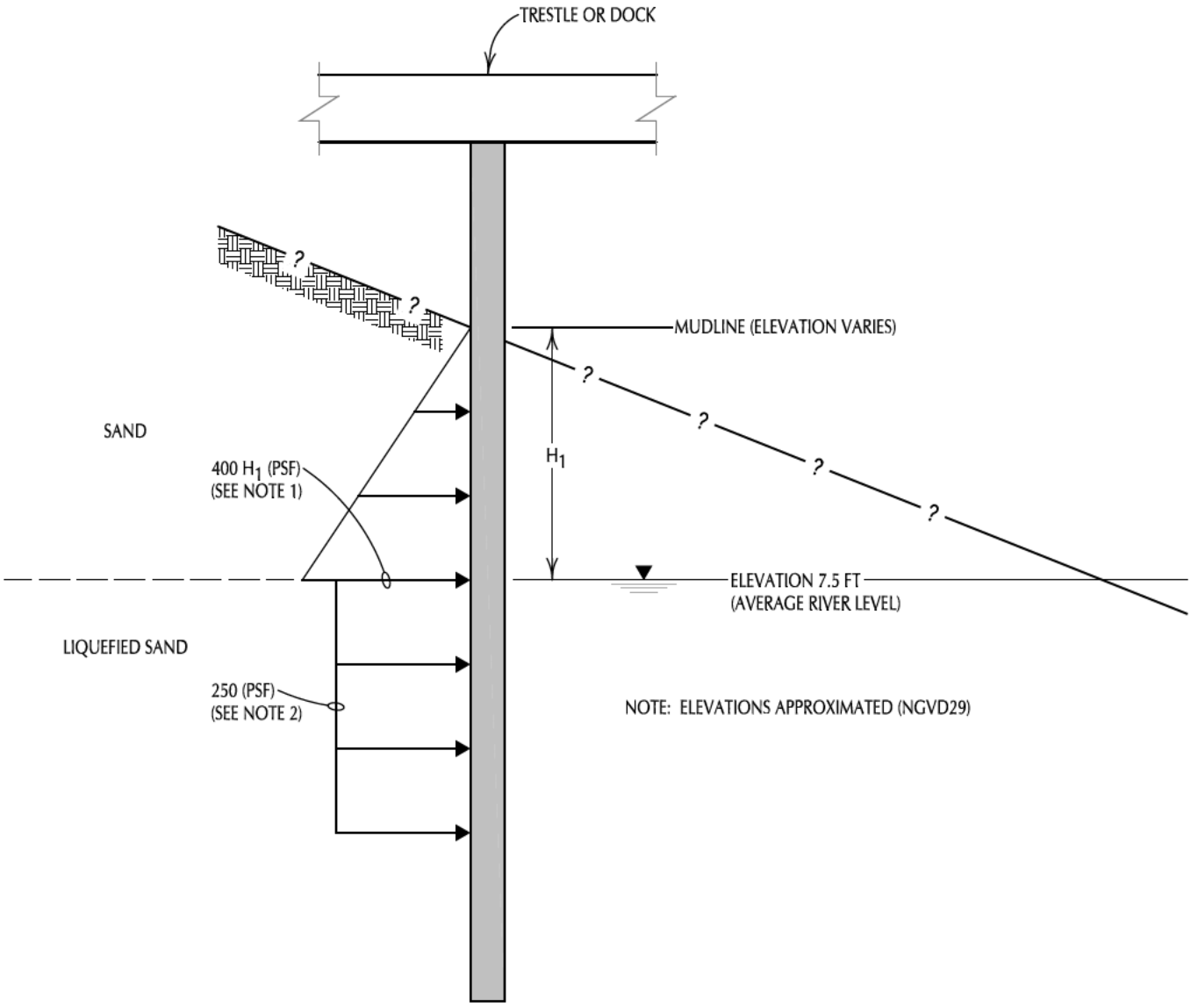
3) EXISTING PILE TIPS ESTIMATED TO RANGE FROM ELEVATION -69 TO -93 FT BASED ON AVAILABLE PILE DRIVING RECORDS.

ELEVATION LOOKING WEST

GRI BERGERABAM TSVEDT DOCK STRUCTURE

BERTH 13 TRESTLE AND DOCK PROFILE

SEP. 2014 JOB NO. W1114-T3 FIG. 5



NOTES:

1) ACTS OVER TWO PILE DIAMETERS.

2) ACTS OVER ONE PILE DIAMETER. LATERAL SPREADING FORCES ARE ASSUMED TO ACT ON THE PILES TO THE DEPTH SHOWN ON FIGURE 3.

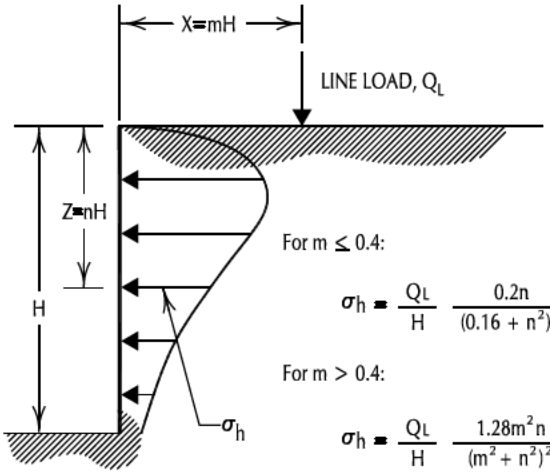
3) FORCES ARE FOR CONTINGENCY LEVEL (475 YEAR RETURN PERIOD) AND DESIGN EARTHQUAKE (⅔ MCE) HAZARD LEVELS.

4) THE LATERAL SPREADING FORCES INDICATED ABOVE ARE FOR TRESTLE AND DOCK PILES ONLY. LATERAL SPREADING FORCES ON THE TRESTLE ABUTMENT WILL DEPEND ON THE GROUND IMPROVEMENT DESIGN WHICH HAS NOT BEEN COMPLETED AT THIS TIME.

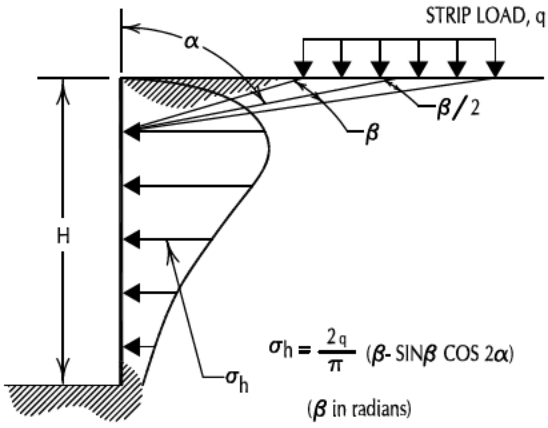
GRI BERGERABAM
TSVEDT DOCK STRUCTURE

LATERAL SPREADING LOADS TRESTLE AND DOCK PILES

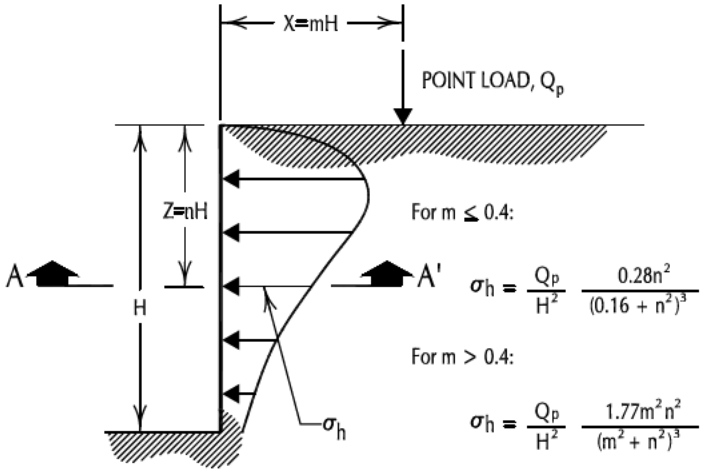
SEP. 2014 JOB NO. W1114-T3 FIG. 6

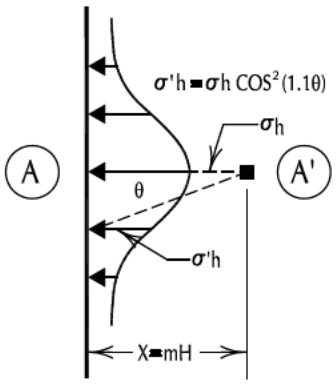


LINE LOAD PARALLEL TO WALL



STRIP LOAD PARALLEL TO WALL





DISTRIBUTION OF HORIZONTAL PRESSURES

VERTICAL POINT LOAD

NOTES:

1. THESE GUIDELINES APPLY TO RIGID WALLS WITH POISSON'S RATIO ASSUMED TO BE 0.5 FOR BACKFILL MATERIALS.

2. LATERAL PRESSURES FROM ANY COMBINATION OF ABOVE LOADS MAY BE DETERMINED BY THE PRINCIPLE OF SUPERPOSITION.

GRI BERGERABAM TSVEDT DOCK STRUCTURE

SURCHARGE-INDUCED LATERAL PRESSURE

SEP. 2014 JOB NO. W1114-T3 FIG. 7

APPENDIX A

Field Explorations and Laboratory Testing

APPENDIX A

FIELD EXPLORATIONS AND LABORATORY TESTING

FIELD EXPLORATIONS

General

Subsurface materials and conditions in the marine terminal project area were investigated between July 29 and October 29, 2013 with four borings and one electric cone penetration test (CPT) probe. The approximate locations of the explorations are shown on Figure 2. An experienced geotechnical engineer from GRI directed the drilling and maintained a detailed log of the materials and conditions disclosed during the course of the work. The locations of the borings with respect to areas of the proposed facility are discussed below.

Borings

The borings were advanced to depths of approximately 80 to 104 ft with mud-rotary drilling methods. Borings B-23 through B-25 were completed using a truck-mounted drill rig provided and operated by Western States Soil Conservation of Hubbard, Oregon. Boring B-26 was completed using a track-mounted drill rig provided and operated by Hardcore Drilling Inc. of Dundee, Oregon. Disturbed and undisturbed soil samples were typically obtained at 2.5-ft intervals of depth in the upper 15 ft and at 5-ft intervals below this depth. Disturbed samples were obtained using a standard split-spoon sampler. At the time of sampling, the Standard Penetration Test was conducted. This test consists of driving a standard split-spoon sampler into the soil a distance of 18 in. using a 140-lb hammer dropped 30 in. The number of blows required to drive the sampler the last 12 in. is known as the standard penetration resistance, or N-value. The N-values provide a measure of the relative density of granular soils, such as sand or gravel, and the relative consistency, or stiffness, of cohesive soils, such as silt or clay. The split-spoon samples were carefully examined in the field and representative portions were saved in airtight jars. All samples were returned to our laboratory for further examination and physical testing.

Relatively undisturbed samples were obtained by pushing 3-in.-O.D. Shelby tubes into the undisturbed soil a maximum distance of 24 in. using the drill rig. The soils exposed in the ends of the Shelby tubes were examined and classified in the field. After classification, the ends of the tubes were sealed with plastic end caps and tape to preserve the natural moisture content of the soils. All samples were returned to our laboratory for further examination and testing.

Logs of the borings are provided on Figures 1A through 4A. Each log presents a descriptive summary of the various types of materials encountered in the boring and notes the depth at which the materials and/or characteristics of the materials change. To the right of the descriptive summary, the numbers and types of samples are indicated. Farther to the right, N-values are shown graphically, along with natural moisture contents and percent passing the No. 200 sieve. The terms used to describe the soils encountered in the borings are defined in Table 1A.

Electric Cone Penetration Test (CPT) Probes

One CPT probe, designated CPT-6, was advanced to practical refusal at a depth of about 83 ft below the ground surface using a truck-mounted Dutch Cone unit provided and operated by Vandehey Exploration,

Inc. of Banks, Oregon. The equipment is mounted on a truck and operated from within an enclosure on the back of the truck that houses the electrical equipment. The electrical cone probe has a cone and a sleeve that are similar to a mechanical probe, but the forces are measured electronically. In addition to the cone and sleeve transducers, a piezometer is fitted between the cone and the sleeve, which allows measurement of pore water pressure and rate of dissipation as the probe is advanced. An accelerometer can also be fitted within the electrical probe. The accelerometer is used to measure the arrival times of shear waves produced at the ground surface as the exploration is advanced. Using these measurements, the shear wave velocity of the soils penetrated can be estimated. The shear wave velocities characterize the soils for the purpose of seismic studies. Shear wave measurements were made during advancement of probe CPT-6. The terms used to describe the soils encountered in the CPT probes are defined in Table 2A. A log of the CPT probe is provided on Figure 5A.

LABORATORY TESTING

General

All samples obtained from the field were returned to our laboratory where the physical characteristics of the samples were noted, and the field classifications were modified where necessary. At the time of classification, the natural moisture content of each sample was measured. Additional testing included washed sieve analysis, sieve analysis, and dry unit weight determinations. The following sections describe the testing program in more detail.

Natural Moisture Content

Natural moisture content determinations were made in conformance with ASTM D 2216. The results are provided on Figures 1A through 4A.

Dry Unit Weight

The dry unit weight of four undisturbed samples was determined in the laboratory in accordance with ASTM D 2937 by cutting a cylindrical specimen of soil from a Shelby tube sample. The dimensions of the specimen were carefully measured, the volume calculated, and the specimen weighed. After oven-drying, the specimen was reweighed and the moisture content calculated. The dry unit weight was then computed. The dry unit weights are summarized below.

SUMMARY OF DRY UNIT WEIGHT DETERMINATIONS

Boring	Sample	Depth, ft	Natural Moisture Content, %	Dry Unit Weight, pcf	Soil Type
B-24	S-18	70	29	88	SAND; fine grained, trace silt
B-26	S-12	40	39	80	SAND; some silt, scattered wood debris
	S-14	45	34	81	SAND; some silt, scattered wood debris
	S-16	50	31	90	SAND; some silt, scattered wood debris

Grain Size Analysis

Washed-Sieve Method. Washed sieve analyses were performed on representative soil samples to assist in their classification. The test is performed by taking a sample of known dry weight and washing it over a No. 200 sieve. The material retained on the sieve is oven-dried and weighed, and the percentage of material passing the No. 200 sieve is calculated. The test results are shown on the Boring Logs, Figures 1A through 4A.

Dry Sieve Method. Sieve analyses were performed on five representative samples of sand in substantial conformance with ASTM D 6913. The test is performed by taking a sample of known dry weight and washing it over a No. 200 sieve. The material retained on the sieve is oven-dried and weighed, and the percentage of material passing the No. 200 sieve is calculated. The soil retained on the No. 200 sieve is then screened through a series of sieves of various sizes using a sieve shaker. The weight of each sieve is measured prior to and after the soil has been run through the shaker. The weight of the soil retained on each sieve is recorded and expressed as a percentage of the total sample weight. The test data are summarized on Figures 6A and 7A in the form of curves showing the percent of the total soil sample by weight finer versus sieve number or grain size in millimeters.

Table 1A: GUIDELINES FOR CLASSIFICATION OF SOIL

RELATIVE DENSITY FOR GRANULAR SOIL

Relative Density	Standard Penetration Resistance (N-values) blows per foot
very loose	0 - 4
loose	4 - 10
medium dense	10 - 30
dense	30 - 50
very dense	over 50

CONSISTENCY FOR FINE-GRAINED (COHESIVE) SOIL

Consistency	Standard Penetration Resistance (N-value) blows per foot	Torvane or Undrained Shear Strength, tsf
very soft	0 - 2	less than 0.125
soft	2 - 4	0.125 - 0.25
medium stiff	4 - 8	0.25 - 0.50
stiff	8 - 15	0.50 - 1.0
very stiff	15 - 30	1.0 - 2.0
hard	over 30	over 2.0

Sandy silt materials which exhibit general properties of granular soils are given relative density description.

Grain-Size Classification	Modifier for Subclassification	
Boulders		
>12 in.		
	Adjective	**Percentage of Other Material In Total Sample**
Cobbles		
3 - 12 in.	clean	0 - 2
Gravel	trace	2 - 10
1/4 - 3/4 in. (fine)		
3/4 - 3 in. (coarse)	some	10 - 30
Sand	sandy, silty,	30 - 50
No. 200 - No. 40 sieve (fine)	clayey, etc.	
No. 40 - No. 10 sieve (medium)		
No. 10 - No. 4 sieve (coarse)		
Silt/Clay - pass No. 200 sieve		

Table 2A

SOIL CLASSIFICATION
BASED ON CONE PENETRATION TEST

Friction Ratio (Percent)	Soil Classification
0 to 2	Clean sand or slightly silty sand
2 to 5	Silty sand, clayey sand, or silt
> 5	Clayey silt, silty clay, or clay

COHESIVE SOILS

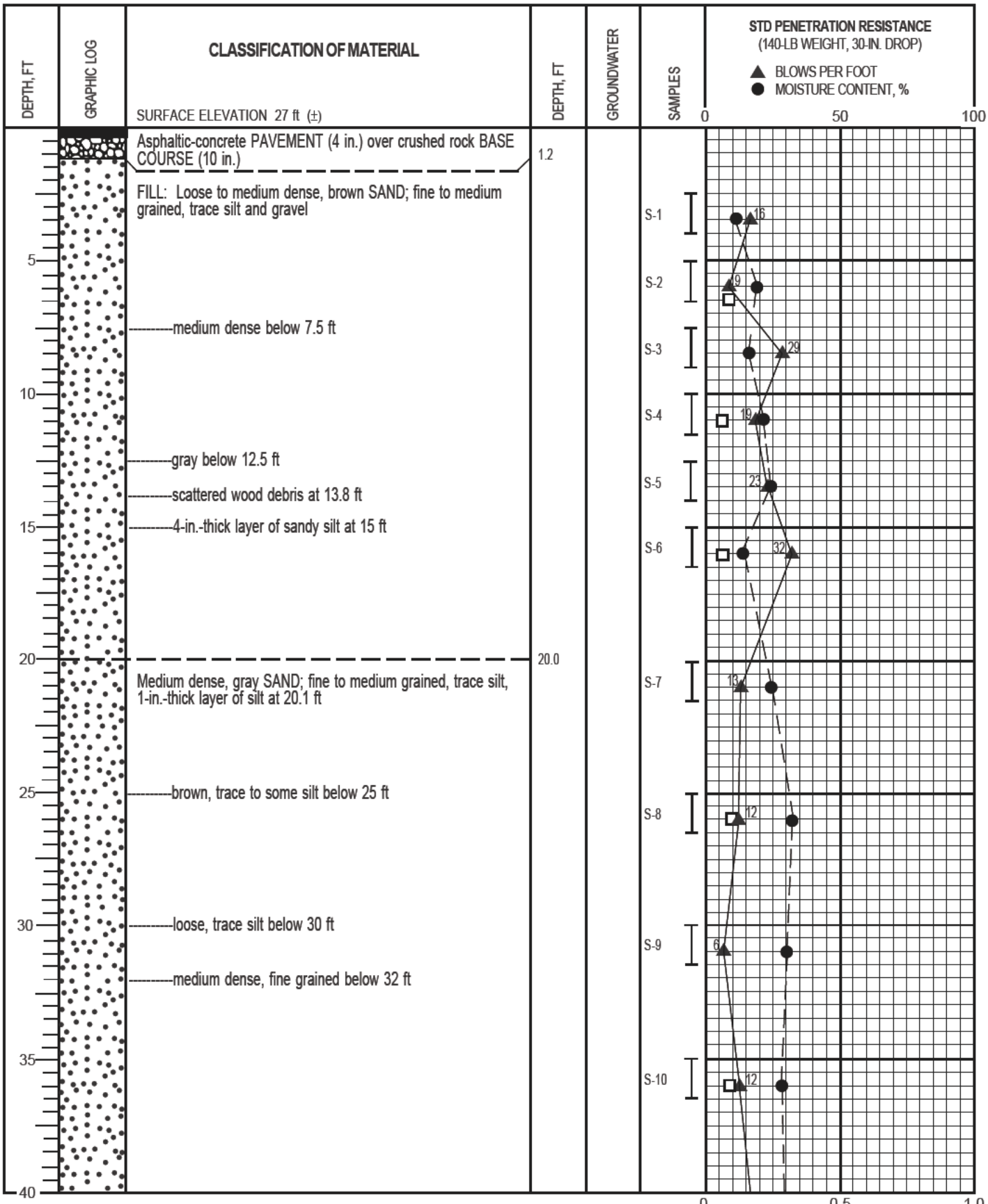
Sleeve Friction, tsf	Relative Consistency
< 0.12	Very Soft
0.12 to 0.25	Soft
0.25 to 0.50	Medium Stiff
0.50 to 1.00	Stiff
1.00 to 2.00	Very Stiff
> 2.00	Hard

COHESIONLESS SOILS

	Soil Type*			
	ML, SM	SM, SP, SW	SP, SW, GW	SW, GP
Relative Density	**Cone Penetration Resistance, tsf**			
Very Loose	0 - 8	0 - 14	0 - 20	0 - 24
Loose	8 - 20	14 - 35	20 - 50	24 - 60
Med. Dense	20 - 60	35 - 105	50 - 150	60 - 180
Dense	60 - 100	105 - 175	150 - 250	180 - 300
Very Dense	> 100	> 175	> 250	> 300

* Unified Soil Classification System

1) Friction ratio is equal to sleeve friction (tsf) divided by cone penetration (tsf) expressed as a percent.



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

NX CORE RUN

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

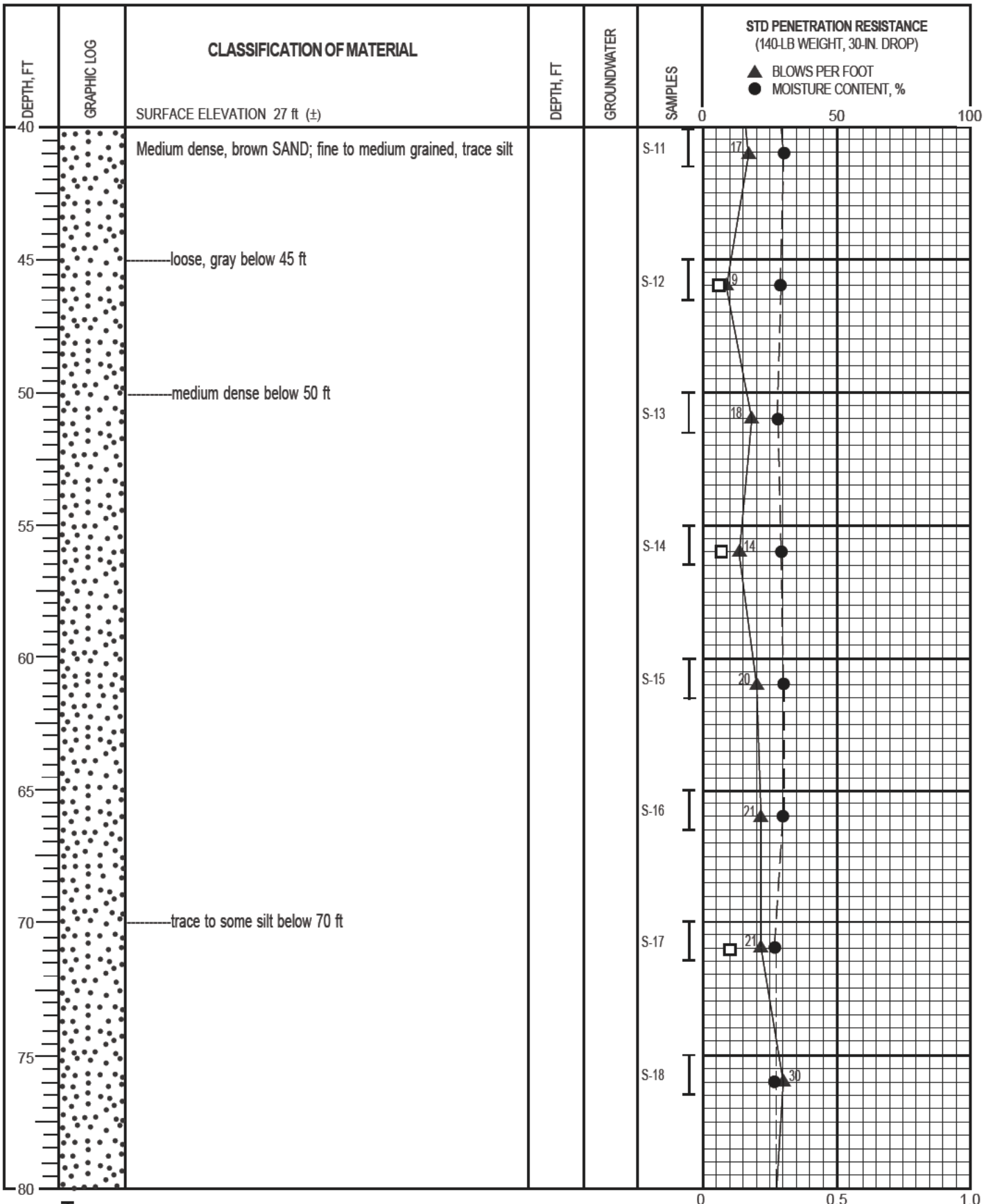
Moisture Content

Plastic Limit

GRI

BORING B-23

SEP. 2014 JOB NO. W1114 FIG. 1A

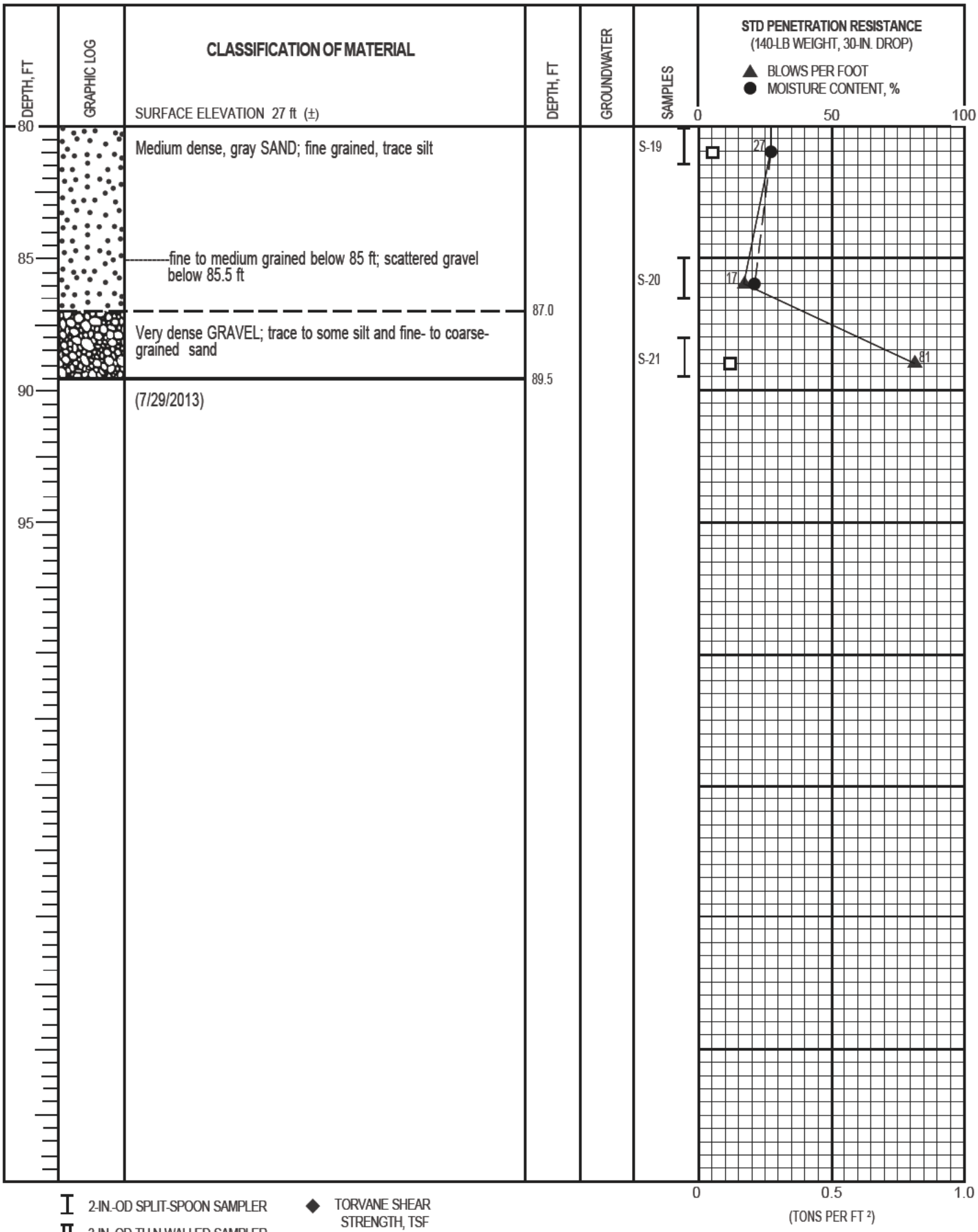


2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-23 (cont.)

SEP. 2014 JOB NO. W1114 FIG. 1A

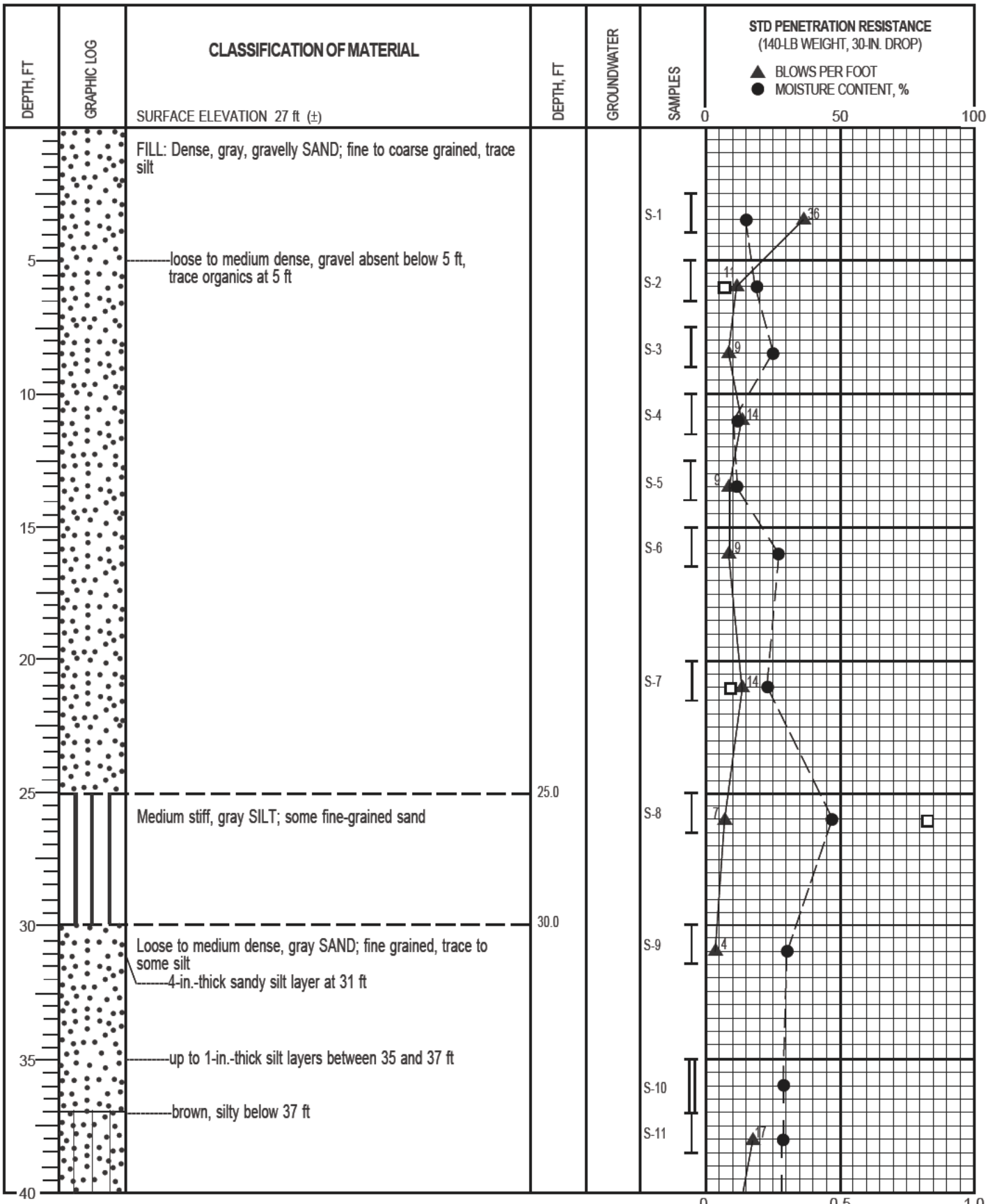


2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-23 (cont.)

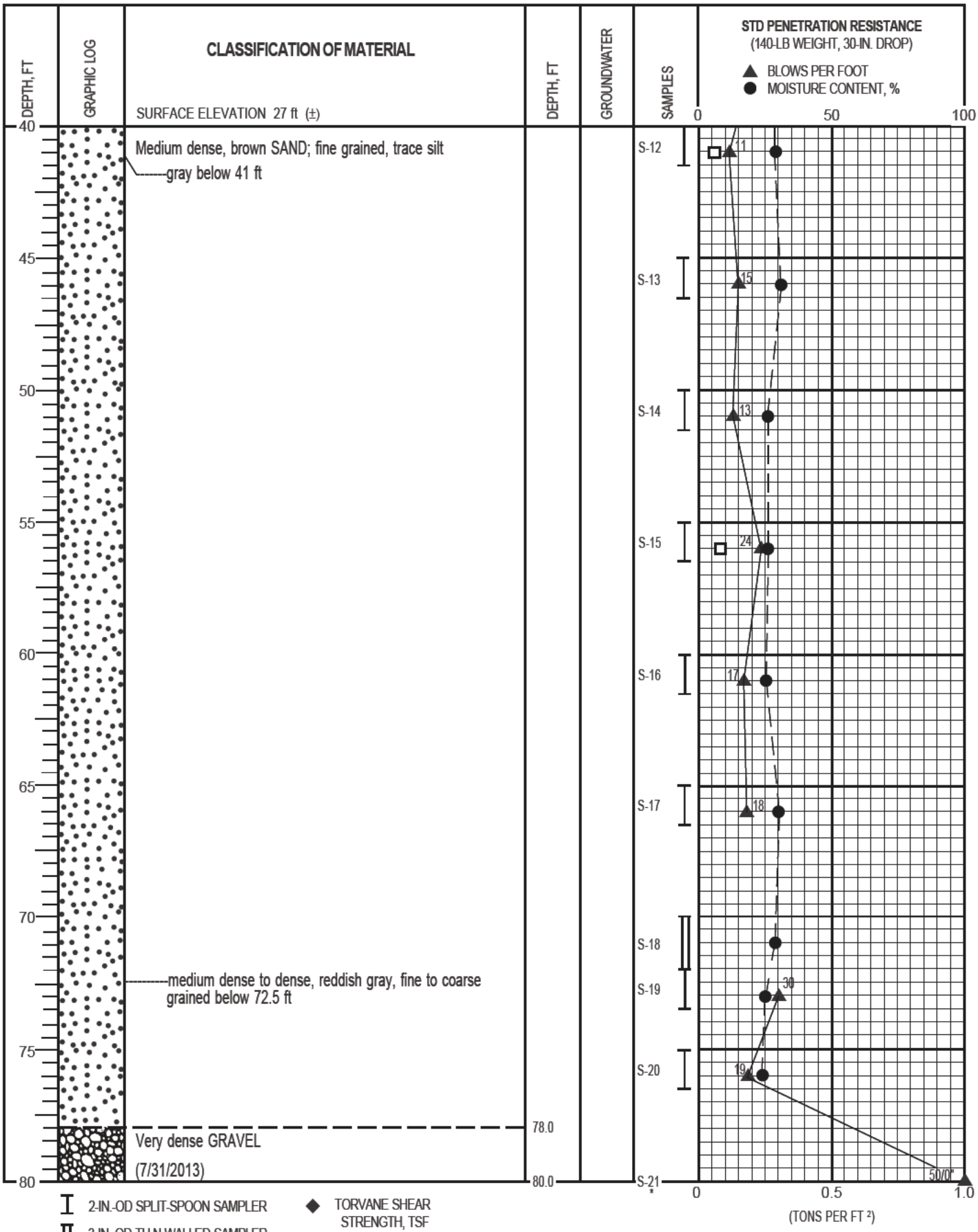
SEP. 2014 JOB NO. W1114 FIG. 1A



GRI

BORING B-24

SEP. 2014 JOB NO. W1114 FIG. 2A

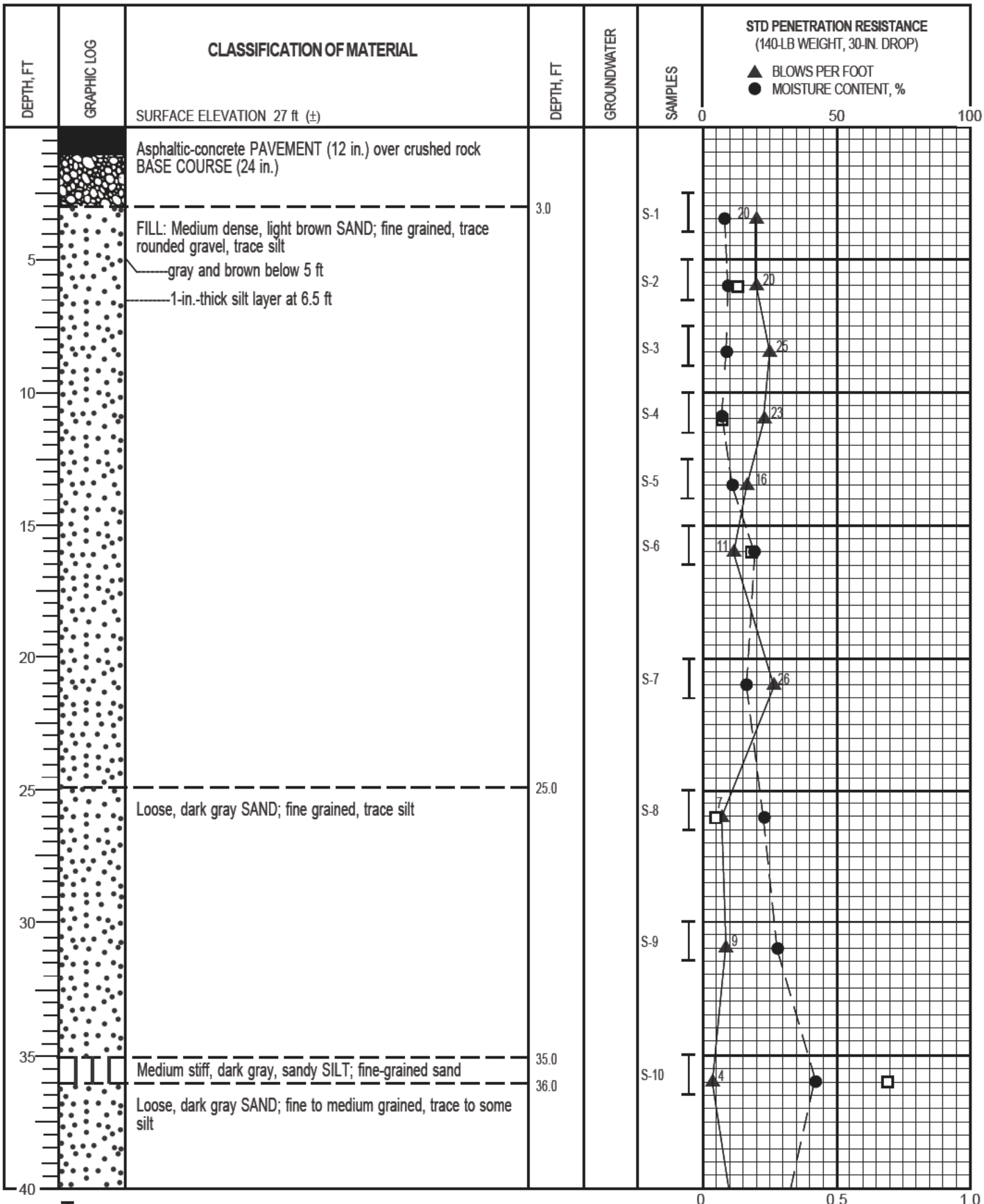


2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-24 (cont.)

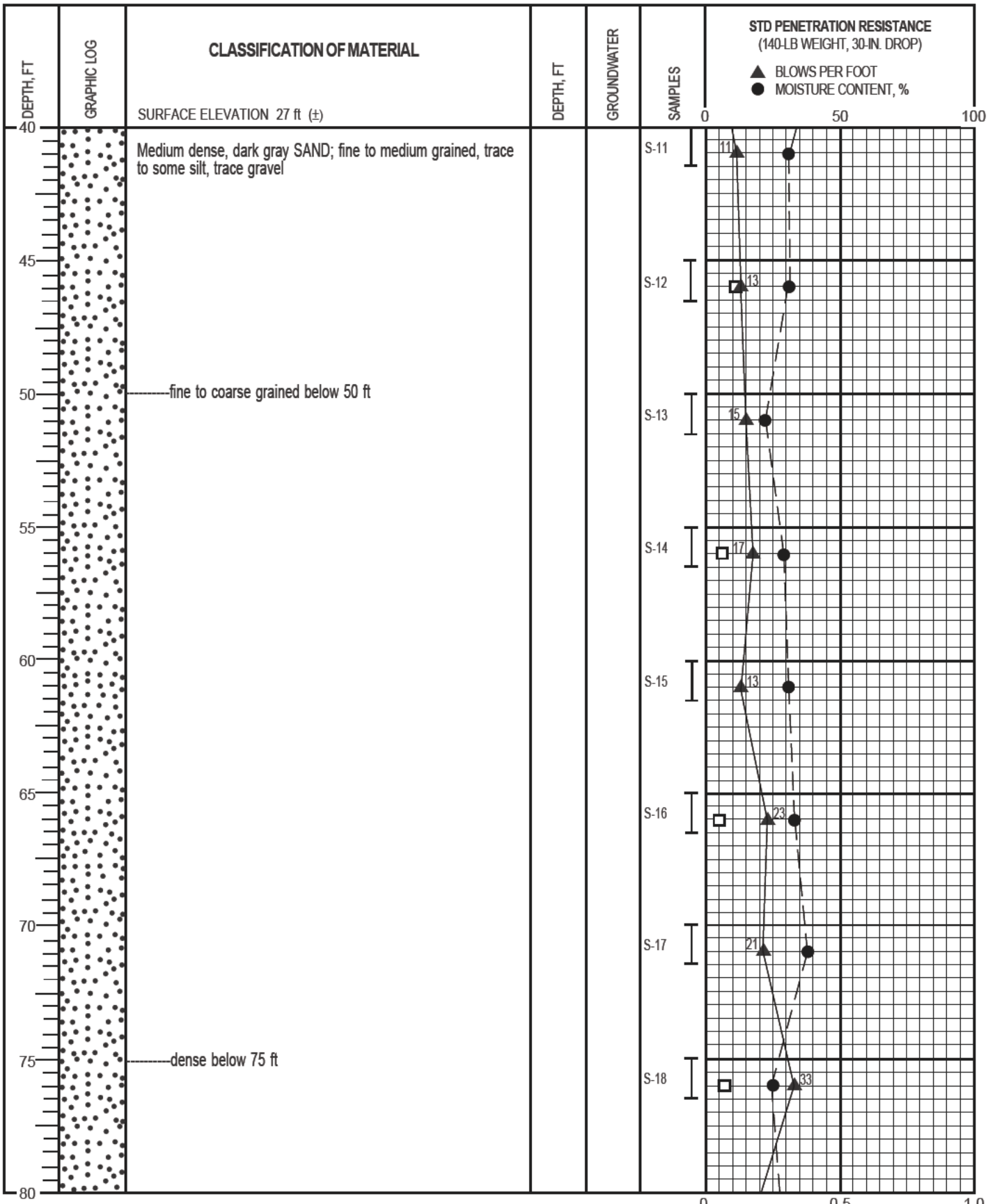
SEP. 2014 JOB NO. W1114 FIG. 2A



GRI

BORING B-25

SEP. 2014 JOB NO. W1114 FIG. 3A



2-IN.-OD SPLIT-SPOON SAMPLER

3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

NX CORE RUN

SLOTTED PVC PIPE

Water Level (date)

TORVANE SHEAR STRENGTH, TSF

PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

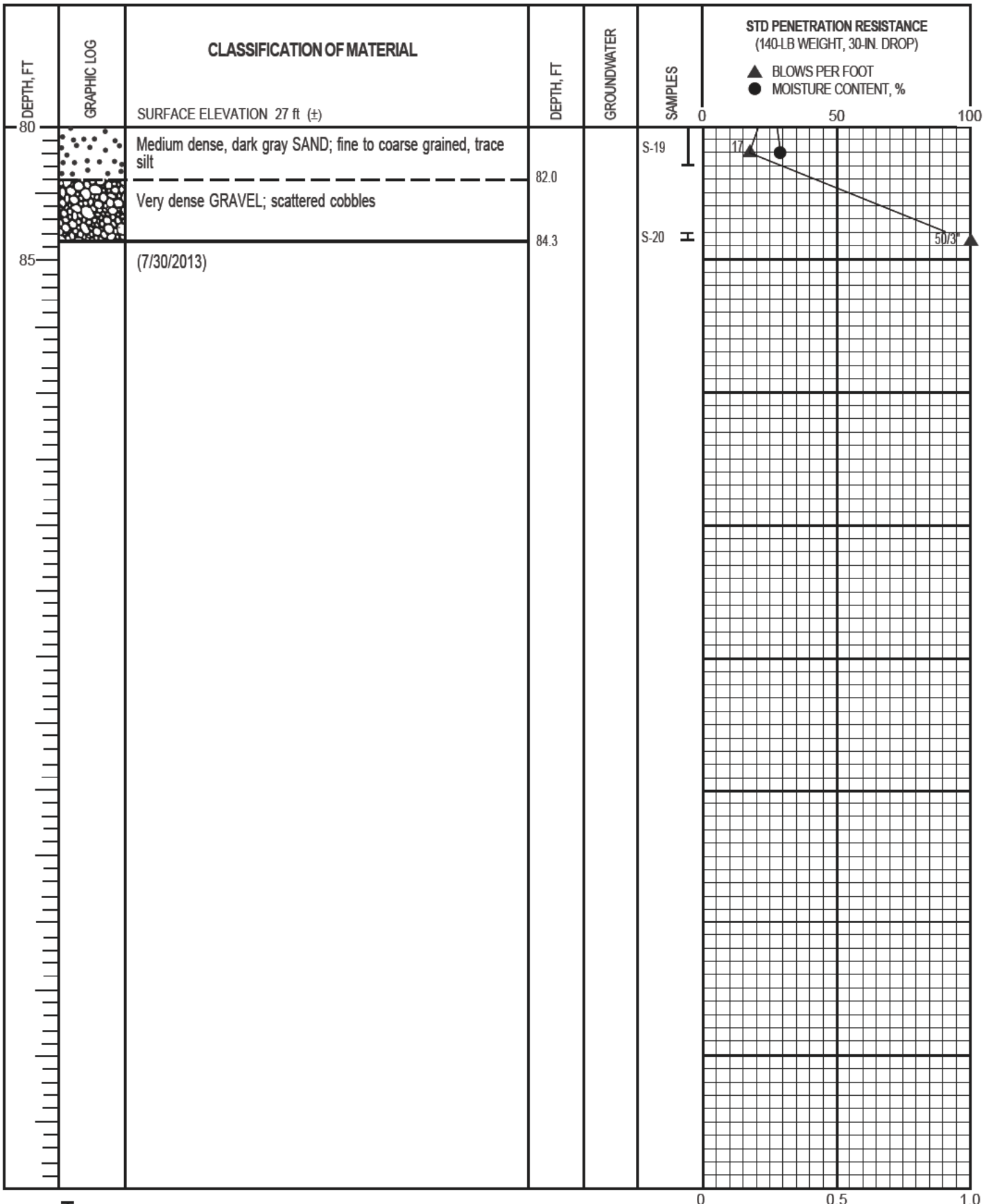
Moisture Content

Plastic Limit

GRI

BORING B-25 (cont.)

SEP. 2014 JOB NO. W1114 FIG. 3A



2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)

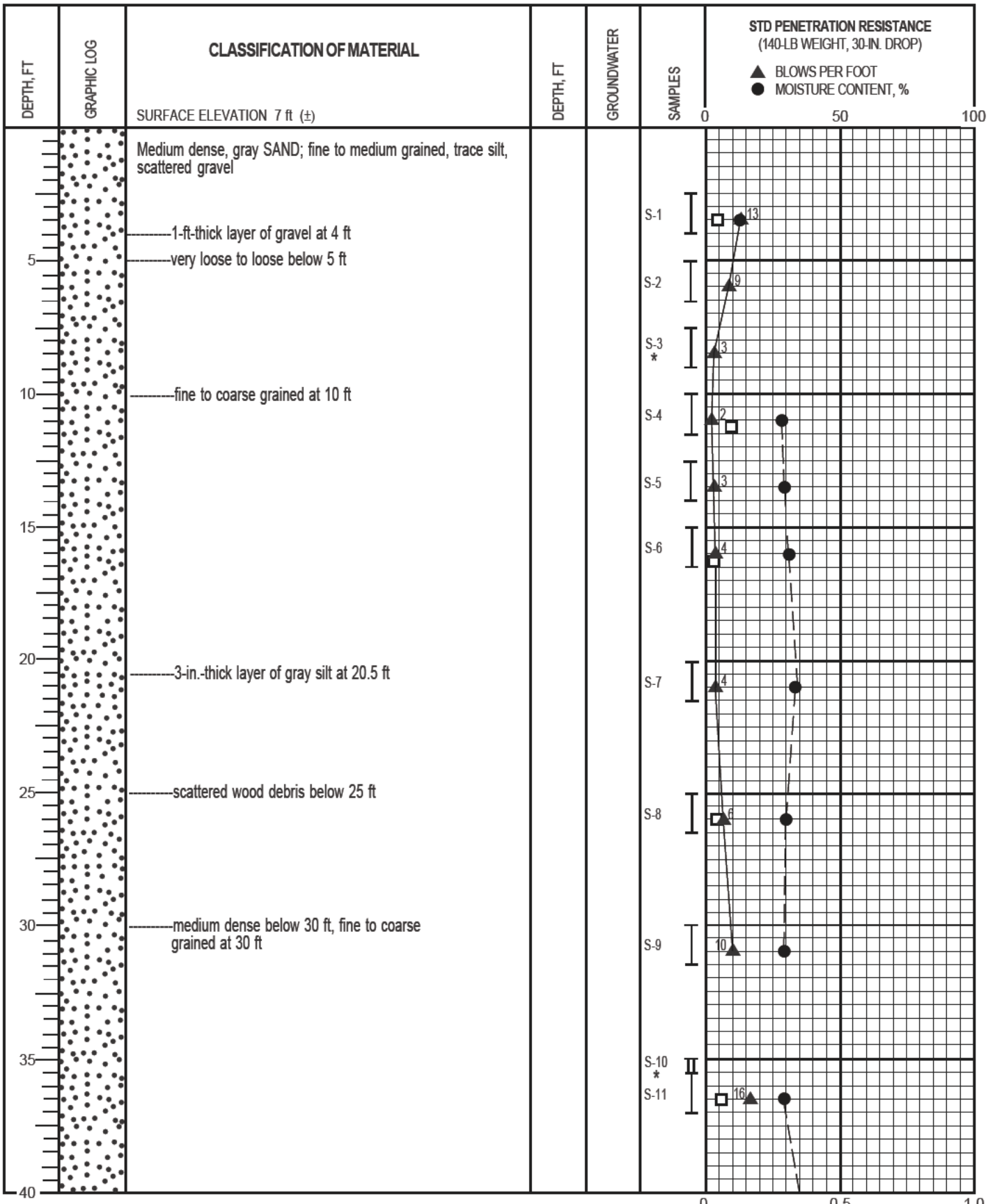
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY

Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-25 (cont.)

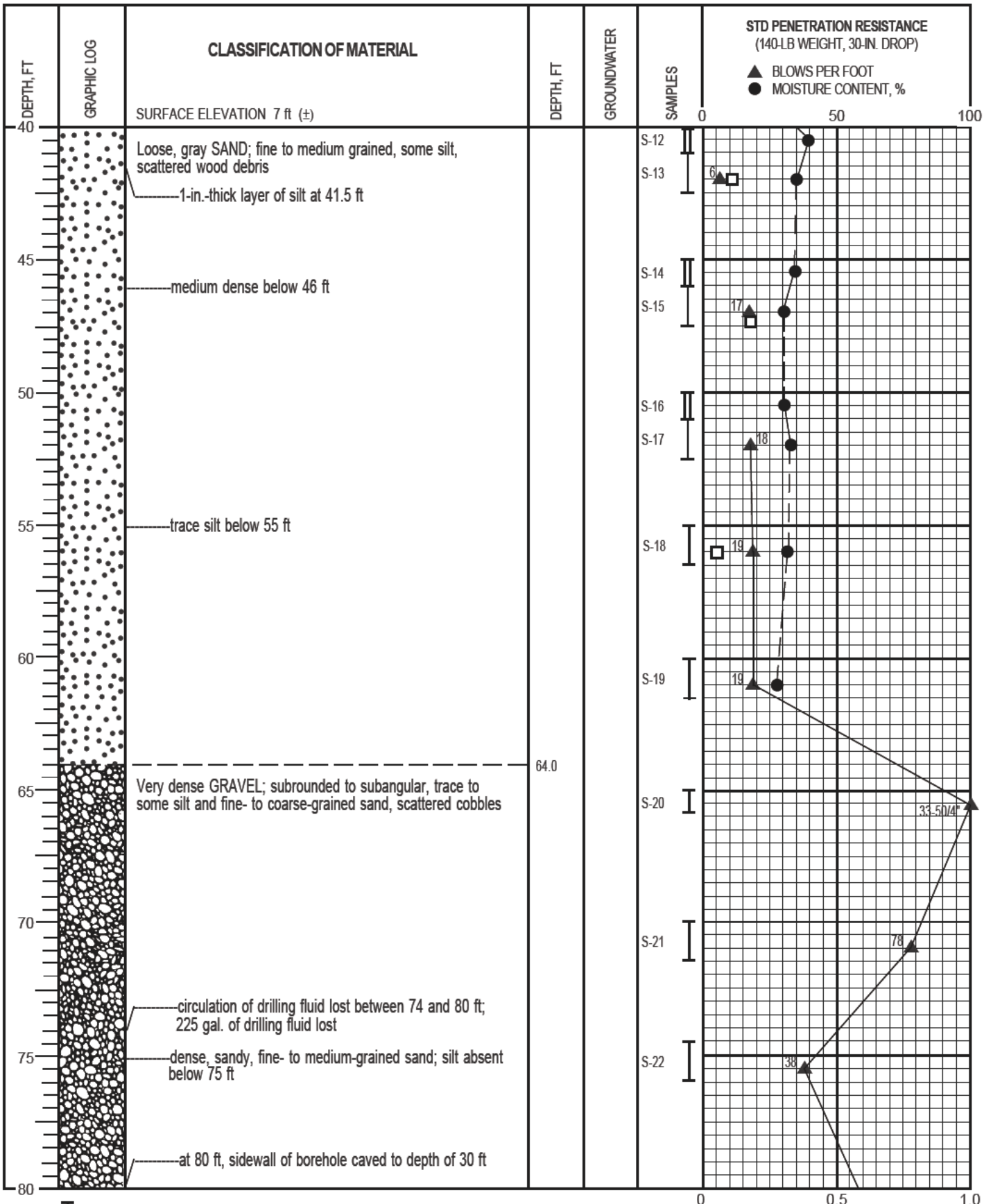
SEP. 2014 JOB NO. W1114 FIG. 3A



GRI

BORING B-26

SEP. 2014 JOB NO. W1114 FIG. 4A

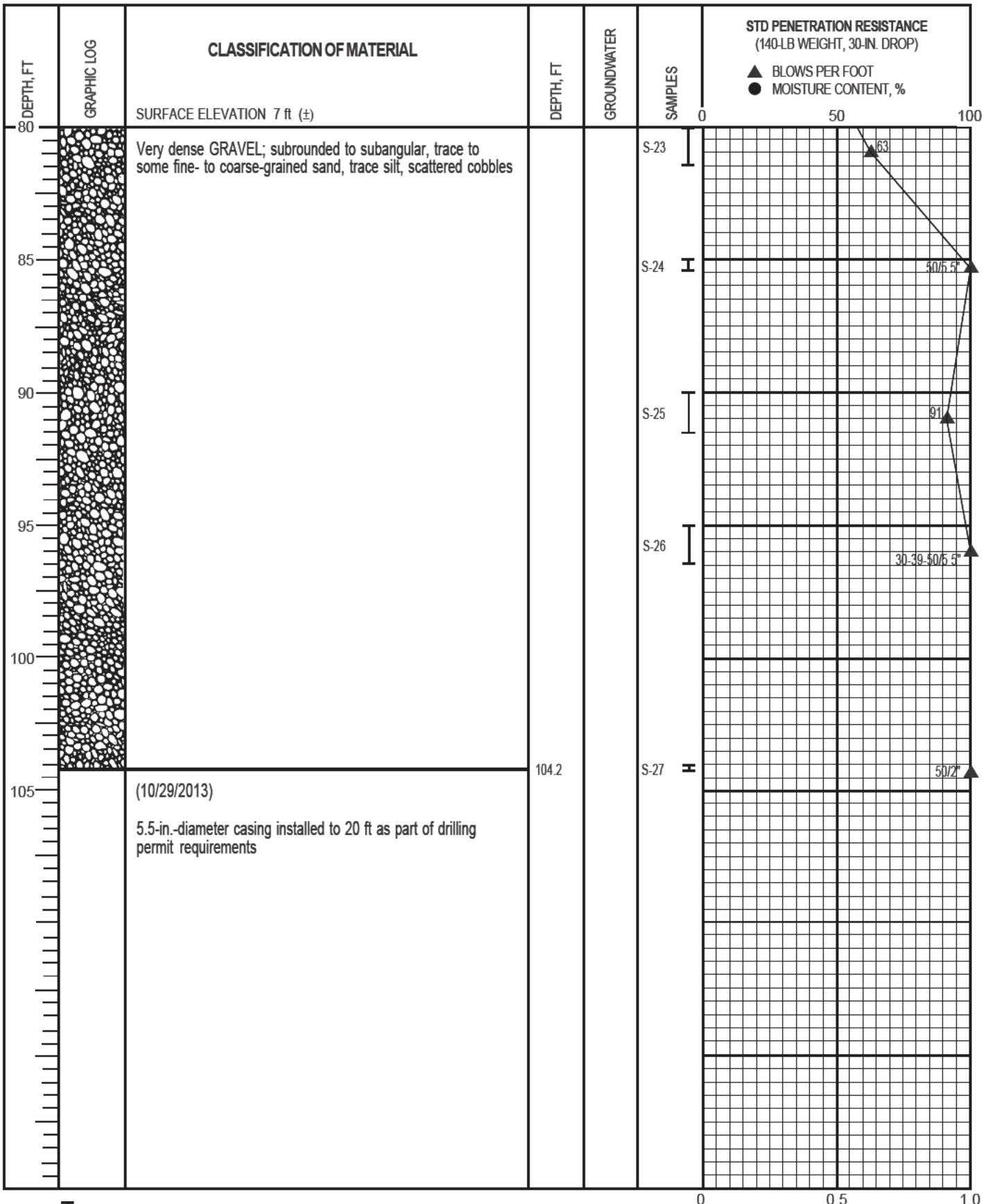


2-IN.-OD SPLIT-SPOON SAMPLER
3-IN.-OD THIN-WALLED SAMPLER
G GRAB SAMPLE OF DRILL CUTTINGS
NX CORE RUN
SLOTTED PVC PIPE
Water Level (date)
TORVANE SHEAR STRENGTH, TSF
PERCENT PASSING NO. 200 SIEVE (WASHED)
* NO RECOVERY
Liquid Limit
Moisture Content
Plastic Limit

GRI

BORING B-26 (cont.)

SEP. 2014 JOB NO. W1114 FIG. 4A



I 2-IN.-OD SPLIT-SPOON SAMPLER

II 3-IN.-OD THIN-WALLED SAMPLER

G GRAB SAMPLE OF DRILL CUTTINGS

NX CORE RUN

SLOTTED PVC PIPE

Water Level (date)

◆ TORVANE SHEAR STRENGTH, TSF

□ PERCENT PASSING NO. 200 SIEVE (WASHED)

* NO RECOVERY

Liquid Limit

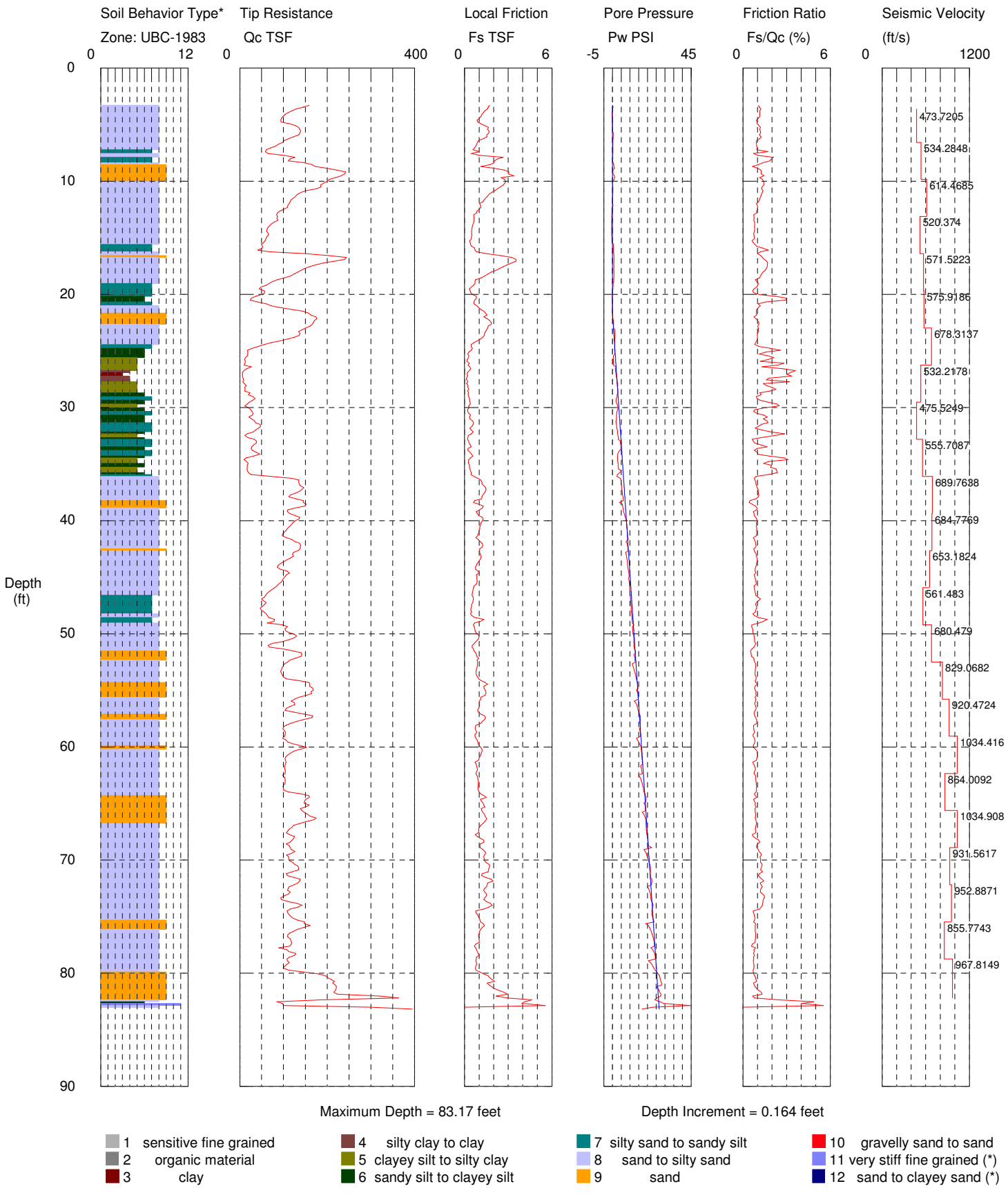
Moisture Content

Plastic Limit

GRI

BORING B-26 (cont.)

SEP. 2014 JOB NO. W1114 FIG. 4A



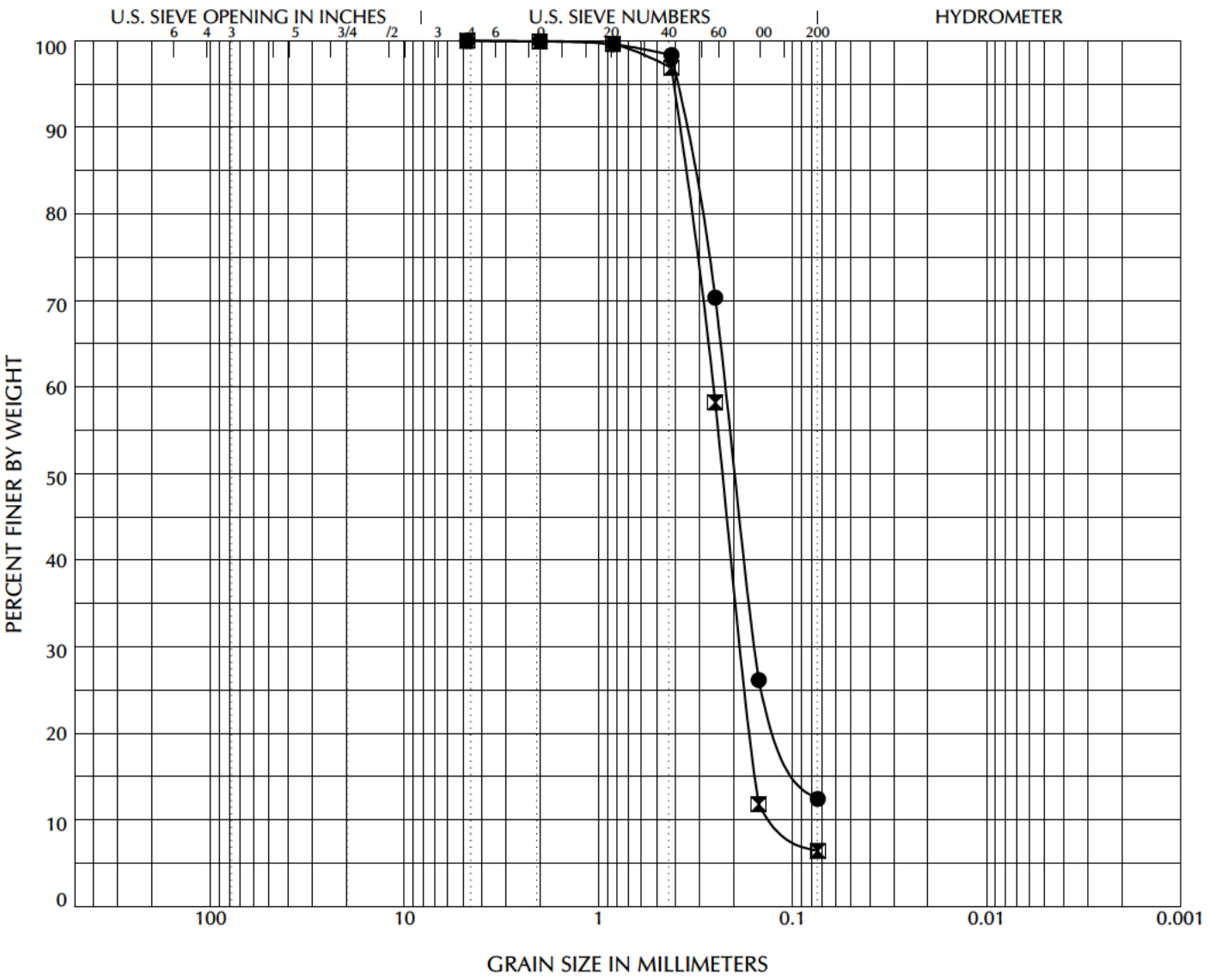
SURFACE ELEVATION = 27 FT

GRI

CONE PENETRATION TEST CPT-6

(WITH SEISMIC VELOCITY)

SEP. 2014 JOB NO. W1114 FIG. 5A



COBBLES	GRAVEL		SAND			SILT OR CLAY
	Coarse	Fine	Coarse	Medium	Fine	

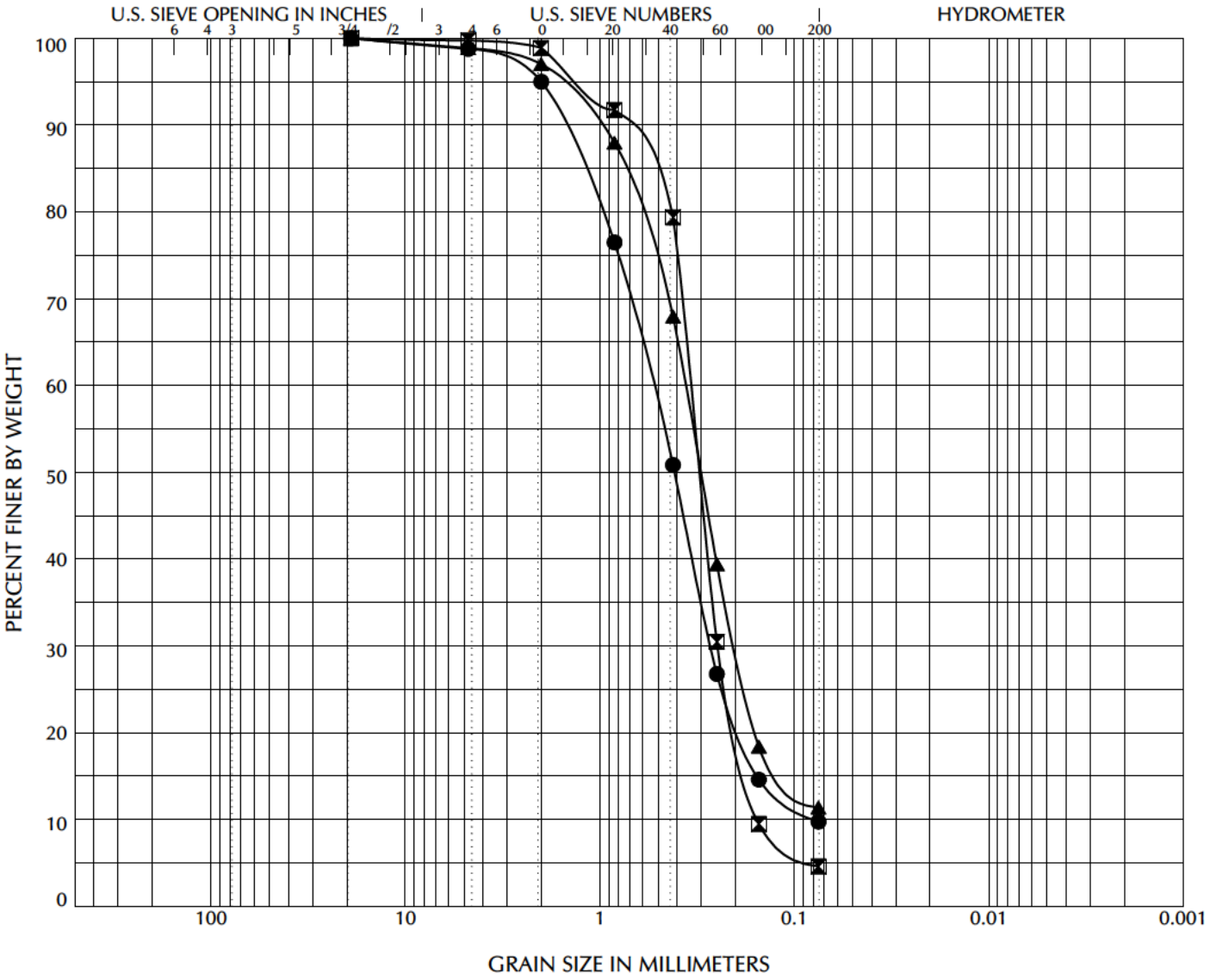
	Location	Sample	Depth, ft	Classification	Gravel, %	Sand, %	Fines, %
●	B-23	S-8	25.0	SAND; fine to medium grained, some silt	0.0	87.3	12.7
⧓	B-23	S-12	45.0	SAND; fine grained, trace silt	0.0	93.5	6.5

GRI

GRAIN SIZE DISTRIBUTION

SEP. 2014 JOB NO. W1114 FIG. 6A

GRA N S ZE GR - WO PER PAGE W1114-LAB GPJ GR DA A EMPLA E GD 2/3/14



COBBLES	GRAVEL		SAND			SILT OR CLAY
	Coarse	Fine	Coarse	Medium	Fine	

	Location	Sample	Depth, ft	Classification	Gravel, %	Sand, %	Fines, %
●	B-26	S-4	10.0	Gray SAND; fine to coarse grained, trace silt	1.2	89.0	9.8
⧓	B-26	S-8	25.0	Gray SAND; fine to medium grained, trace silt, scattered wood debris	0.3	95.2	4.6
▲	B-26	S-13	41.0	Gray SAND; fine to medium grained, some silt, scattered wood debris	1.1	87.5	11.4

GRI

GRAIN SIZE DISTRIBUTION

SEP. 2014 JOB NO. W1114 T3 FIG. 7A

GRA N SIZE GRI-THREE PER PAGE W1114-T3 LAB.GPJ GRI DATA TEMPLATE.GDT 6/4/14

APPENDIX B

Site-Specific Seismic Hazard Study

APPENDIX B

SITE-SPECIFIC SEISMIC HAZARD STUDY

General

GRI has completed a site-specific seismic hazard study for the docks at the proposed Tesoro Savage Vancouver Energy Distribution Terminal - Upland Facility (TSVEDT) in Vancouver, Washington. The purpose of the study was to evaluate the potential seismic hazards associated with regional and local seismicity. The site-specific hazard study is intended to meet the requirements of the upcoming American Society of Civil Engineers (ASCE) *Seismic Design of Pile-Supported Piers and Wharves* in compliance with the requirements of ASCE 7-05 Chapter 21. Our work was based on the potential for regional and local seismic activity, as described in the existing scientific literature, and on the subsurface conditions at the site, as disclosed by the geotechnical explorations completed for the project. Specifically, our work included the following tasks:

1) A detailed review of available literature, including published papers, maps, open-file reports, seismic histories and catalogs, and other sources of information regarding the tectonic setting, regional and local geology, and historical seismic activity that might have a significant effect on the site.

2) Compilation, examination, and evaluation of existing subsurface data gathered at and in the vicinity of the site, including classification and laboratory analyses of soil samples. This information was used to prepare a generalized subsurface profile for the docks on the TSVEDT property.

3) Identification of potential seismic sources appropriate for the site and characterization of those sources in terms of magnitude, distance, and acceleration response spectra.

4) Office studies, based on the generalized subsurface profile and the controlling seismic sources, resulting in conclusions and recommendations concerning:

    a) specific seismic events and characteristic earthquakes that might have a significant effect on the Docks;

    b) the potential for seismic energy amplification at the Docks; and

    c) site-specific acceleration response spectra for design of the Docks

This appendix describes the work accomplished and summarizes our conclusions and recommendations.

Geologic Setting

General. On a regional scale, the site lies within the Willamette-Puget Sound lowland trough of the Cascadia convergent tectonic system (Blakely et al., 2000). The lowland areas consist of broad north-south-trending basins in the underlying geologic structure between the Coast Range to the west and the Cascade Mountains to the east. The lowland trough is characterized by alluvial plains with areas of buttes and terraces. The site lies approximately 95 km inland from the down-dip edge of the seismogenic extent

of the Cascadia Subduction Zone (CSZ), an active convergent plate boundary along which remnants of the Farallon Plate (the Gorda, Juan de Fuca, and Explorer plates) are being subducted beneath the western edge of the North American continent. The subduction zone is a broad, eastward-dipping zone of contact between the upper portion of the subducting slabs and the over-riding North American Plate as shown on Figure 1B.

On a local scale, the site lies within the Portland Basin, a large, well-defined, northwest-trending structure characterized as a right-lateral pull-apart basin in the forearc of the CSZ. The Portland Basin is bounded by high-angle, northwest-trending, right-lateral strike-slip faults that are considered to be seismogenic; however, the relationship between specific earthquakes and individual faults in the area is not well understood since few of these faults are expressed clearly at the ground surface. A limited number of intrabasin faults have been mapped on the basis of stratigraphic offsets and geophysical evidence, and the site is located in close proximity to the inferred traces of the Portland Hills Fault and the East Bank Fault indicated on published geologic mapping (Personius et al., 2003). The distribution of these crustal faults relative to the site is shown on the Regional Geologic Map and Local Fault Map, Figures 2B and 3B, respectively. The locations of faults on the geologic map are inferred or approximate. Other faults may be present within the basin, but clear stratigraphic evidence regarding their location and extent is not presently available.

Because of the proximity of the site to the CSZ and its location within the Portland Basin, three seismic sources contribute to the potential for damaging earthquake motions at the site. Two of these sources are associated with tectonic activity related to the Cascadia Subduction Zone, the third is associated with movement on relatively shallow faults within and adjacent to the Portland Basin.

Site Soil and Geologic Conditions. The dock site is covered by alluvial sand and silt deposited by the Columbia River. The alluvium extends to variable depths, ranging from 16 ft at the T-section of the docks to 64 ft at pier 3 of the trestle. The sand and silt deposits are underlain by gravel associated with late Pleistocene catastrophic flood materials deposited by repeated Missoula Flood events that occurred between 13,500 and 15,000 years ago. Geologic investigations for the proposed Interstate 5 bridge replacement, about 3 miles upstream from the project site, indicate the gravel on the Washington side of the Columbia River can be up to 100 ft thick. The flood deposits are underlain by well-consolidated or cemented conglomerate and sandstone units of the Troutdale Formation (Pliocene), which are, in turn, underlain by the Sandy River Mudstone bedrock (Miocene to Pliocene; Beeson et al., 1991; Trimble, 1963).

Seismicity

General. The geologic and seismologic information available for identifying the potential seismicity at the site is incomplete, and large uncertainties are associated with estimates of the probable magnitude, location, and frequency of occurrence of earthquakes that might affect the site. The available information indicates the potential seismic sources that may affect the site can be grouped into three independent categories: *subduction zone events* related to sudden slip between the upper surface of the Juan de Fuca plate and the lower surface of the North American plate, *subcrustal (intraslab) events* related to deformation and volume changes within the deeper portion of the subducted Juan de Fuca plate, and *local crustal events* associated with movement on shallow, local faults within and adjacent to the Portland Basin. Based on our review of currently available information, we have developed parameters for each of these

potential seismic sources. The seismic sources are characterized by three important parameters: magnitude, distance to the subject site, and the peak horizontal bedrock accelerations produced by the controlling earthquake on the seismic source. The size of an earthquake is commonly defined by its moment magnitude M_W. Distance is measured using the closest horizontal distance to the surface projection of the rupture plane or the closest distance to the rupture plane, in kilometers. Peak horizontal bedrock accelerations are expressed in units of gravity (1 g = 32.2 ft/sec^2 = 981 cm/sec^2).

Subduction Zone Event. Written Japanese tsunami records provide evidence that a great CSZ earthquake occurred in January 1700. Geological studies show that great megathrust earthquakes have occurred repeatedly in the past 7,000 years (Atwater et al., 1995; Clague, 1997; Goldfinger, 2003; and Kelsey et al., 2005), and geodetic studies (Hyndman and Wang, 1995; Savage et al., 2000) indicate rate of strain accumulation consistent with the assumption that the CSZ is locked beneath offshore northern California, Oregon, Washington, and southern British Columbia (Fluck et al., 1997; Wang et al., 2001). Numerous geological and geophysical studies suggest the CSZ may be segmented (Hughes and Carr, 1980; Weaver and Michaelson, 1985; Guffanti and Weaver, 1988; Goldfinger, 1994; Kelsey and Bockheim, 1994; Mitchell et al., 1994; Personius, 1995; Nelson and Personius, 1996; Witter, 1999), but the most recent studies suggest that for the last great earthquake in 1700, most of the subduction zone ruptured in a single M_w 9 earthquake (Satake et al., 1996; Atwater and Hemphill-Haley, 1997; Clague et al., 2000). Published estimates of the probable maximum size of subduction zone events range from moment magnitude M_W 8.3 to >9.0. Numerous detailed studies of coastal subsidence, tsunamis, and turbidites yield a wide range of recurrence intervals, but the most complete records (>4,000 years) indicate average intervals of 350 to 600 years between great earthquakes on the CSZ (Adams, 1990; Atwater and Hemphill-Haley, 1997; Witter, 1999; Clague et al., 2000; Kelsey et al., 2002; Kelsey et al., 2005; Witter et al., 2003). Tsunami inundation in buried marshes along the Washington and Oregon coast and stratigraphic evidence from the Cascadia margin support these recurrence intervals (Kelsey et al., 2005; Goldfinger, 2003).

The USGS probabilistic analysis assumes four potential locations for the eastern edge of the earthquake rupture zone for the CSZ, as shown in Figure 4B. The 2008 USGS mapping effort indicates two rupture scenarios are assumed to represent these megathrust events: 1) M_W 9.0±0.2 events that rupture the entire CSZ every 500 years and 2) M_W 8.0 to 8.7 events with rupture zones that occur on segments of the CSZ and occur over the entire length of the CSZ during a period of about 500 years (Petersen et al., 2008). The assumed distribution of earthquake magnitudes is shown on Figure 5B. This distribution assumes the larger M_W 9.0 earthquakes likely occur more often than the smaller segmented ruptures. Therefore, for our deterministic analysis, we have chosen to represent the subduction zone event by a design earthquake of M_W 9.0 at a focal depth of 15 km and a rupture distance of 86 km. This corresponds to a sudden rupture of the entire length of the Juan de Fuca-North American plate interface with an assumed rupture zone along the coastline due west of Vancouver. Based on an average of the attenuation relationships published by Zhao (2006), Atkinson and Macias (2009), and Abrahamson, et al. (2012), a subduction zone earthquake with these parameters would result in an average peak bedrock acceleration of approximately 0.19 g at the project site.

Subcrustal Event. There is no historic earthquake record of subcrustal, intraslab earthquakes in Southwest Washington. Although both the Puget Sound and Northern California regions have experienced many of these earthquakes in historic times, Wong (2005) hypothesizes that due to subduction zone geometry, geophysical conditions and local geology, Southwest Washington/Oregon may not be subject to intraslab

earthquakes. In the Puget Sound area, these moderate to large earthquakes are deep (40 to 60 km) and over 200 km from the deformation front of the subduction zone. Offshore, along the Northern California coast, the earthquakes are shallower (up to 40 km) and located along the deformation front. Estimates of the probable magnitude, distance, and frequency of subcrustal events in Southwest Washington are generally based on comparisons of the CSZ with active convergent plate margins in other parts of the world and on the historical seismic record for the region surrounding Puget Sound, where significant events known to have occurred within the subducting Juan de Fuca plate have been recorded. Published estimates of the probable maximum size of these events range from moment magnitude M_W 7.0 to 7.5. The 1949, 1965, and 2001 documented subcrustal earthquakes in the Puget Sound area correspond to M_W 7.1, 6.5, and 6.8, respectively. Published information regarding the location and geometry of the subducting zone indicates that a focal depth of 50 km is probable (Weaver and Shedlock, 1989). We have chosen to represent the subcrustal event by a characteristic earthquake of moment magnitude M_W 7.0 at a focal depth of 50 km and a rupture distance of 50 km. Based on the attenuation relationships published by Zhao (2006), and Atkinson and Boore (2003), and Abrahamson, et al. (2012), a subcrustal earthquake of this magnitude and distance would result in a peak horizontal bedrock acceleration of approximately 0.14g at the site.

Local Crustal Event. Sudden crustal movements along relatively shallow, local faults in the southwest Washington area, although rare, have been responsible for local crustal earthquakes. The precise relationship between specific earthquakes and individual faults is not well understood, since few of the faults in the area are expressed at the ground surface, and the foci of the observed earthquakes have not been located with precision. The history of local seismic activity is commonly used as a basis for determining the size and frequency to be expected of local crustal events. Although the historical record of local earthquakes is relatively short (the earliest reported seismic event in the area occurred in 1920), it can serve as a guide for estimating the potential for seismic activity in the area.

Based on fault mapping conducted by the U.S. Geological Survey (USGS, 2008), the Portland Hills Fault is the closest mapped crustal fault to the site that is considered active in the probabilistic hazard maps. The Portland Hills Fault is located approximately 7 km from the site and has a characteristic earthquake magnitude of M_W 7.0. A crustal earthquake of this magnitude and distance would result in a peak horizontal bedrock acceleration of approximately 0.33g at the site based on an average of the NGA ground motion relations developed by the Pacific Earthquake Engineering Research (PEER) by Boore and Atkinson (2008), Campbell and Bozorgnia (2008), Idriss (2008) and Chiou and Youngs (2008).

Other Seismic Hazards. Based on the presence of loose sands and soft silts below the water table at the site, there is a high risk of liquefaction and lateral spreading during a design-level earthquake. More detailed discussions regarding liquefaction and lateral spreading are provided in the Seismic Considerations section of the report. Although detailed tsunami modeling of the Columbia River due to a Cascadia Subduction Zone earthquake has not been completed, we anticipate the risk of upland damage by tsunami at the site is low due to the distance from the coast. River fluctuations may result from a tsunami generated by a CSZ earthquake. Due to the proximity of the Columbia River, there is a risk of seiche. Unless occurring on a previously unmapped fault, it is our opinion the risk of ground rupture at the site is very low.

Deterministic Earthquake Parameters

As discussed above, three distinctly different seismic sources affect seismicity in the project area. Deterministic evaluation of the earthquake sources using published attenuation relations provides estimates of peak bedrock accelerations and response spectra for each seismic source. These deterministic estimates are not associated with a relative hazard level or probability of occurrence like probabilistic estimates, but simply provide an estimate of the ground motion parameters for each seismic source at a given distance from the site. The basic parameters of each earthquake source are as follows:

TABLE 1B: DETERMINISTIC EARTHQUAKE PARAMETERS

Earthquake Source	Attenuation Relationships	Magnitude, M_w	Rupture Distance, km	Focal Depth, km	Median Peak Bedrock Acceleration, g	Average Median Peak Bedrock Acceleration, g
Subduction Zone	Zhao (2006)	9.0	86	15	0.19	
	Atkinson and Macias (2009)	9.0	86	15	0.17	0.19
	Abrahamson (2012)	9.0	86	15	0.23	
Subcrustal	Zhao (2006)	7.0	50	50	0.15	
	Atkinson and Boore, (2003)	7.0	50	50	0.10	0.14
	Abrahamson (2012)	7.0	50	50	0.18	
Local Crustal	Campbell and Bozorgnia (2008)	7.0	7	NA	0.32	
	Chiou and Youngs (2008)	7.0	7	NA	0.36	0.33
	Boore and Atkinson (2008)	7.0	7	NA	0.27	
	Idriss (2008)	7.0	7	NA	0.38	

The values summarized in Table 1B represent the average of median peak bedrock accelerations for the characteristic earthquake on the controlling faults. The upcoming ASCE *Seismic Design of Pile-Supported Piers and Wharves* references ASCE 7-05 which requires an evaluation of 150 percent of the largest median spectral response acceleration taking into account the characteristic earthquakes on all known active faults within the region. Figure 6b compares 150% of these median deterministic spectral values with the deterministic lower limit on MCE response spectrum, in accordance with Figure 21.2-1 of ASCE 7-05 to develop the deterministic Maximum Considered Earthquake (MCE) bedrock spectra. Figure 6B shows that the individual fault deterministic response spectra are lower than the deterministic lower limit on MCE response spectrum. Per Section 21.2.2 of ASCE 7-05, the deterministic spectrum shall be the greater of the 150% deterministic spectrum and the deterministic lower limit spectrum of Figure 21.2-1. Therefore, the deterministic lower limit response spectrum is selected to represent the bedrock deterministic MCE response spectrum.

Probabilistic Considerations

The probability of an earthquake of a specific magnitude occurring at a given location is commonly expressed by its return period, i.e., the average length of time between successive occurrences of an earthquake of that size or larger at that location. The return period of a design earthquake is calculated once a project design life and some measure of the acceptable risk that the design earthquake might occur or be exceeded are specified. These expected earthquake recurrences are expressed as a probability of exceedance during a given time period or design life. The ASCE standard *Seismic Design of Pile-Supported Piers and Wharves* defines three seismic hazard levels: the Operating Level Earthquake (OLE),

the Contingency Level Earthquake (CLE), and the Design Earthquake (DE). The OLE is defined by 50% probability of exceedance in 50 years, which corresponds to an earthquake with an expected recurrence interval of 72 years, and represents a performance level with minimal structural damage. The CLE is defined by 10% probability of exceedance in 50 years, which corresponds to an earthquake with an expected recurrence interval of 475 years, and represents a performance level of controlled and repairable structural damage. The DE is defined per ASCE 7-05 which develops the response spectra based on ground motions associated with the MCE. The MCE is represented by a probabilistic earthquake with a 2% probability of exceedance in 50 years (return period of 2,475years), except where subject to deterministic limitations (Leyendecker et al., 2000). The Design Earthquake (DE) response spectrum is obtained by taking two-thirds of the MCE level ground motions.

For the Dock site, located at the approximate latitude and longitude coordinates of 45.65°N and 122.71°W, the spectral acceleration values corresponding to the 72, 475 and 2,475 years of return periods were obtained for Site Class B from the 2008 USGS hazard curves and uniform-hazard maps. These spectral accelerations for the three hazard levels are plotted on Figure 7B, and the values are presented on Table 2B.

TABLE 2B: RESPONSE SPECTRA FOR DIFFERENT PROBABILISTIC HAZARD LEVELS

	Spectral Acceleration, g		
Period, seconds	**72 Years**	**475 Years**	**2,475 Years**
0	0.05	0.20	0.41
0.1	0.09	0.39	0.86
0.2	0.11	0.45	0.96
0.3	0.10	0.38	0.83
0.5	0.07	0.29	0.64
1	0.03	0.16	0.37
2	0.01	0.07	0.19
3	0.01	0.04	0.10
4	0.00	0.02	0.07
5	0.00	0.02	0.04

Deaggregation of the 2008 USGS data suggests that the Cascadia Subduction Zone, subcrustal events, and local crustal faults all contribute to the seismic hazard at the site.

Development of Target Bedrock Spectra

The site-specific analysis requires developing a bedrock target spectrum prior to selecting and scaling input acceleration time histories. The bedrock target spectra are developed for all three seismic hazard levels, which are previously discussed in the probabilistic consideration section. The target spectra for the OLE and CLE conditions can be directly represented by the site–specific probabilistic uniform hazard curves which correspond to the ground motion with 50% probability of exceedance in 50 years and 10% probability of exceedance in 50 years, respectively. The target bedrock spectrum for the DE is developed as per the requirements of ASCE 7-05. According to Chapter 21 of ASCE 7-05, the controlling target spectrum is developed by comparing the deterministic and probabilistic MCE response spectra, and taking the lower of the two spectra to represent the site-specific MCE bedrock response spectrum. The

comparison of the MCE probabilistic and deterministic response spectra are shown in Figure 8B for the dock site. The probabilistic MCE spectrum is lower than the deterministic spectrum and, therefore, based on the above criterion, the probabilistic spectrum is defined to be the MCE bedrock spectrum.

Site Response Modeling

The effect of a specific seismic event on the site is related to the type and thickness of soil overlying the bedrock at the site and the type and quantity of seismic energy delivered to the bedrock beneath the site by the earthquake. Site response analysis was completed to estimate this site-specific behavior in accordance with ASCE standard for Pile-Supported Piers and Wharves. The site response analysis consisted of three components: 1) selection of target bedrock response spectrum, 2) numerical modeling to analyze the site-specific behavior of the soils using horizontal ground motion acceleration time histories scaled to the approximate level of the target bedrock response spectrum over the periods of interest, and 3) calculation of the ratio of the surface response spectra values to the bedrock response spectra values, at each spectral period, to develop a recommended ground surface response spectrum.

The site response modeling was completed using the D-MOD2000 program by GeoMotions, LLC. D-MOD2000 is a one-dimensional non-linear, time–domain site response modeling program capable of capturing the nonlinear- hysteretic soil behavior during cyclic seismic loading and unloading. The program computes the dynamic response of a layered soil profile to vertically propagating shear waves using total stress or effective stress analyses. The effective stress option provides a means to evaluate the influence of excess pore pressure development and cyclic degradation of soil strength/stiffness (i.e., pore water pressure generation, and pore water pressure dissipation and redistribution) on the dynamic response of the soil profile. D-MOD2000 uses the hyperbolic modified Kodner and Zelasko (MKZ) model to characterize the nonlinear stress-strain soil behavior. The MKZ parameters are generally obtained by fitting the hyperbolic model to published empirical curves.

Within the D-MOD2000 program, the user creates a discretized soil profile and inputs a variety of soil modeling parameters derived from field and laboratory testing and established correlations in the geotechnical literature. A suite of scaled earthquake records are input into the program and propagated up through the soil column to the ground surface. From the modeled ground surface response for a particular soil profile, a Spectral Acceleration Ratio (SAR) can be determined for each earthquake record as the ratio of ground surface to bedrock spectral acceleration ($SA_{surface}/SA_{bedrock}$) at selected periods.

Input Parameters

For the Dock, D-MOD2000 based total and effective stress analyses were performed for evaluating the seismic response and performance of the soil underlying the site. First, a generalized subsurface profile for the site was developed based on our subsurface explorations. Two shear wave velocity profiles at the T-section of the Dock and Pier 3 of the Trestle were estimated based on boring B-26 drilled at Pier 3 and CPT-6 measurements located in the upland area. The ratio of the effective overburden stresses to the one-fourth power, $(\sigma'_{v,\ Dock}/\ \sigma'_{v,\ CPT\text{-}6})^{0.25}$, was used as an adjustment factor to derive the shear wave velocity profiles from CPT-6 measurements. The assumed soil profiles at the T-section of the Dock and Pier 3 of the Trestle are tabulated below in Tables 3B and 4B, respectively.

TABLE 3B: SUBSURFACE PROFILE AT T-SECTION OF DOCK

Material	Thickness, ft	Total Unit Weight, pcf	Estimated Shear Wave Velocity, ft/sec
SAND	3	110	400
SAND	3	110	450
SAND	3	110	500
SAND	4	110	500
SAND	3	110	600
Very dense GRAVEL	5	125	850
Very dense GRAVEL	5	125	950
Very dense GRAVEL	5	125	1,100
Very dense GRAVEL	5	125	1,150
Very dense GRAVEL	10	125	1,200
Very dense GRAVEL	10	125	1,250
Very dense GRAVEL	10	125	1,300
Very dense GRAVEL	10	125	1,350
Very dense GRAVEL	10	125	1,400
Very dense GRAVEL	10	125	1,450
Very dense GRAVEL	10	125	1,500
Very dense GRAVEL	10	125	1,550
Very dense GRAVEL	10	125	1,600
Very dense GRAVEL	10	125	1,650
Very dense GRAVEL	10	125	1,700
Very dense GRAVEL	10	125	1,750
Very dense GRAVEL	10	125	1,800
Very dense GRAVEL	10	125	1,900
Very dense GRAVEL	10	125	2,100
Very dense GRAVEL	10	125	2,200
Troutdale	10	130	2,500

TABLE 4B SUBSURFACE PROFILE AT PIER 3 OF TRESTLE

Material	Thickness, ft	Total Unit Weight, pcf	Estimated Shear Wave Velocity, ft/sec
Loose SAND	3	110	300
Loose SAND	3	110	400
Loose SAND	4	110	350
Loose SAND	3	110	350
Loose SAND	3	110	400
Medium dense SAND	4	110	500
Medium dense SAND	3	110	550
Medium dense SAND	3	110	500
Medium dense SAND	3	110	450
Medium dense SAND	4	110	550
Medium dense SAND	3	110	700

Material	Thickness, ft	Total Unit Weight, pcf	Estimated Shear Wave Velocity, ft/sec
Medium dense SAND	3	110	750
Medium dense SAND	3	110	850
Medium dense SAND	4	110	750
Medium dense SAND	3	110	900
Medium dense SAND	3	110	800
Medium dense SAND	3	110	850
Medium dense SAND	4	110	750
Medium dense SAND	3	110	900
Very dense GRAVEL	5	125	1,100
Very dense GRAVEL	5	125	1,200
Very dense GRAVEL	5	125	1,300
Very dense GRAVEL	5	125	1,350
Very dense GRAVEL	10	125	1,400
Very dense GRAVEL	10	125	1,450
Very dense GRAVEL	10	125	1,500
Very dense GRAVEL	10	125	1,550
Very dense GRAVEL	10	125	1,600
Very dense GRAVEL	10	125	1,650
Very dense GRAVEL	10	125	1,700
Very dense GRAVEL	10	125	1,750
Very dense GRAVEL	10	125	1,800
Very dense GRAVEL	10	125	1,850
Very dense GRAVEL	10	125	1,900
Very dense GRAVEL	10	125	2,000
Very dense GRAVEL	10	125	2,100
Very dense GRAVEL	10	125	2,200
Very dense GRAVEL	10	125	2,300
Very dense GRAVEL	10	125	2,400
Troutdale	10	130	2,500

The material properties and boundary conditions were specified in D-MOD2000 for the Dock site. The unit weights for each of the soil profile were estimated based on the laboratory unit weight test results. The sand and gravel layers encountered throughout the soil profile were assigned the depth- dependent EPRI (1993) sand and rock modulus reduction and damping curves, which accounts for the effects of confining pressure. The representative pore-pressure generation parameters for the sand layers were selected based on grain size distribution curve matching procedures with D-MOD2000. The grain size distribution curve for the sand layer was compared to the liquefiable sands and silts curves within D-MOD2000 database, and the Santa Monica Beach (SMB) sand was selected to approximate the pore-pressure generation parameters. The half-space boundary condition at the base of the model was represented by a visco-elastic boundary with a unit weight of 130 pounds per cubic foot (pcf) and a shear wave velocity of 2,500 feet per second.

Ground Motion Selection and Scaling

The target bedrock response spectrum for the site was developed for Site Class B, or rock site, conditions in accordance with the method outlined in the Target Bedrock Spectrum section of this report for OLE, CLE and MCE hazard levels. A series of earthquake acceleration-time histories have been selected and scaled to the target bedrock spectrum. From the available records, corrected free-field and basement/ground floor accelerograms were selected for input as bedrock time histories. Wherever possible, earthquakes of similar magnitude and duration to the characteristic earthquakes were selected. These records were checked for obvious errors, missing data points, and other anomalies and were transformed into a uniform data format. The selected strong-motion records are tabulated below in Table 5B.

TABLE 5B SELECTED STRONG-MOTION RECORDS

Earthquake	Recording Station	Magnitude	Rupture Distance, km	Peak Bedrock Acceleration, g
Loma Prieta (1989)	San Jose - Santa Teresa Hills	6.9	14.7	0.28
Nisqually (2001)	Olympia, WSDOT Test Lab	6.8	18.3	0.22
Chile (2010)	Curico	8.8	65.1	0.47
Chile (2010)	Hualane	8.8	50	0.46
Japan (2011)	Kuroiso (TCG001)	9	102	0.42
Japan (2011)	Yamatsuri (FKS 014)	9	76	0.23
Japan (2011)	Hachinohe (AOM 012)	9	99	0.19

The selected acceleration time histories were then scaled to reasonably match the bedrock target spectrum at periods of interest including the site fundamental period for the OLE, CLE and MCE hazard levels. The scaling process involves selecting a single factor and multiplying the acceleration time history by this factor so that its pseudo acceleration response spectrum more closely matches the target spectrum at the period of interest.

Site Response Results

Using the generalized subsurface profiles (i.e., at the T-section of the Dock and Pier 3 of the Trestle), the target spectra developed at the bedrock, and the strong ground motion records listed in the preceding tables, pseudo acceleration response spectra were computed for the Dock site with the D-MOD2000 nonlinear model. The ground surface response spectra were developed at 5% of critical damping. The ground surface spectra were compared to the input rock spectra to quantify amplification and/or attenuation through the soil column at the site. The ratio of ground surface to bedrock spectral accelerations, defined as the spectral amplification ratio (SAR), is shown on Figure 9B and Figure 10B for the CLE and MCE conditions, respectively. To estimate ground surface site response throughout the range of spectral periods, the target response spectra is multiplied by the SAR to determine the ground surface response spectrum. The results of the site-specific response modeling are shown on Figures 11B and 12B for the CLE and MCE hazard levels, respectively. Figures 11B and Figure 12B also include the code-based spectrum (i.e., for example Site Class D and Site Class E), developed using site amplification factors based on the appropriate Site Class type. The code-based spectrum is typically derived based on the 0.2 and 1 second spectral accelerations values at the bedrock and site coefficients (i.e., F_a and F_v) provided in Table 11.4-1 and Table 11.4-2 of ASCE 7-05. The code-based site coefficients and the spectral values corresponding to 0.2 and 1 second periods are provided on Table 6B for the OLE, CLE and MCE hazard

levels. The two spectral values are obtained from the map of spectral acceleration parameters provided in Chapter 22 of ACSE 7-05 for the MCE condition while the spectral values corresponding to 72- and 475-year return periods are obtained from USGS data for the OLE and CLE conditions, respectively.

TABLE 6B: SITE COEFFICIENTS AND SPECTRAL VALUES

Hazard Level, Ss and S1 Values	Site Class	F_a	F_v
OLE $S_s = 0.11$ g, $S_1 = 0.03$ g	D	1.6	2.4
	E	2.5	3.5
CLE $S_s = 0.45$ g, $S_1 = 0.16$ g	D	1.44	2.17
	E	1.87	3.33
MCE $S_s = 0.94$ g, $S_1 = 0.41$ g	D	1.12	1.59
	E	0.97	2.40

The site is generally designated as Site Class D based on the average shear wave velocity (Vs_{100}) in the upper 100 ft per Section 20.4 of ASCE 7-05. For the OLE hazard level the degree of ground shaking is insufficient to cause liquefaction of the soil. Therefore, the code-based Site Class D depicted on Figure 13B is recommended for the OLE condition to estimate the ground response spectral acceleration.

For the CLE and MCE hazard levels, our analyses indicate the soil may liquefy and the site is designated as Site Class F in accordance with section 20.3.1 of ASCE 7-05. A site response analyses is required for Site Class F designations. Structures with a fundamental period less than 0.5 second are exempted from this requirement, and the response spectrum may be developed based on the appropriate Site Class for non-liquefied site conditions. Research by Youd and Carter (2005) indicates that code–based response spectra for non-liquefied conditions may be conservatively extended to represent the response spectra for structures with fundamental periods less than 1.0 sec for liquefied conditions. Per Section 21.3 of ASCE 7-05, the ground surface response spectra developed from site response analysis for Site Class F may not be less than 80% of the Site Class response spectrum values assuming no liquefaction.

The calculated and recommended site specific ground surface response spectra at the T-section of the dock and at Pier 3 of the trestle are shown on Figures 11B and 12B for the CLE and MCE, respectively. The calculated values presented on the figures are based on total stress analysis. However, effective stress analyses were also completed for comparison. As anticipated, the effective stress analyses resulted in a "softening" of the soil response and generally lower response values than the total stress analyses. The trends associated with the effective stress analyses were considered in selecting the recommended spectra. The recommended response spectra are also intended to conservatively envelope the estimated response for both the T-section of the dock and the Pier 3 location of the trestle. It should be noted that Figures 11B and 12B also include a spectra based on 80% of Site Class E in addition to site class D spectral values due to liquefaction and code considerations for liquefiable profiles.

CLE Hazard Level. The estimated CLE ground surface response spectra at periods greater than 0.5 second are less than or equal to 80% of the Site Class E response spectrum which is the minimum allowed by the code for periods in this range of interest. At periods less than 0.5 second, the code allows the use of the non-liquefied site class D spectrum. We have recommended a slight increase from the site class D spectrum at short periods to match 80% of the site class E spectrum to account for the shorter period

amplification observed in the total stress analyses of the T-section of the dock. Considering the range of analyses and uncertainties, we have recommended a single CLE hazard level response spectrum at all periods for both the dock and trestle structure. This spectrum based on 80% of the Site Class E response spectrum is shown on Figure 11B.

DE Hazard Level. The estimated MCE ground surface response spectra from the total stress analysis typically exceed either the Site Class D or 80% of Site Class E spectra at periods less than 1.8 seconds. However, total stress parameters do not account for reductions in the response due to softening of the liquefied soils observed in our effective stress analyses, particularly at short periods. At the MCE hazard level, the site class D spectrum is more conservative than the site class E spectrum and we have recommended the site class D spectrum in accordance with the recommendations in ASCE7-05. At periods between 0.89 and 1.8 seconds we conservatively recommend the design spectrum include an increase above Site Class D and E to transition to longer periods and envelop the estimated site specific ground surface response. At periods greater than approximately 1.8 seconds, the site-specific response spectrum is less than 80% of Site Class E, which is the minimum spectral amplification allowed by ASCE 7-05 for liquefied conditions. Plots of our recommended response spectra are shown on the Figure 12B for the MCE. The design earthquake (DE) response spectrum is determined by taking two-thirds of the MCE response spectrum and is shown on Figure 14B.

Conclusions

The site-specific response modeling for the Dock site was completed using total and effective stress parameters based on the generalized subsurface profiles developed at the T-section of the Dock and Pier 3 of the Trestle. The site response modeling was performed for three seismic hazard levels (i.e., OLE, CLE and DE) to meet the requirements of ASCE standard *Seismic Design of Pile-Supported Piers and Wharves*.

For the OLE hazard level, we recommend the code-based Site Class D response spectrum as shown on Figure 13B. For the CLE hazard level, the recommended spectrum is based on 80% of the code based Site Class E response spectrum. For the DE hazard level, the code-based Site Class D response spectrum is recommended for periods less than 0.89 second. At longer periods the recommended response spectrum envelopes the site-specific spectral response values and 80% of the Site Class E response spectrum. The recommended spectra for CLE and DE are shown on Figures 11B and 14B, respectively.

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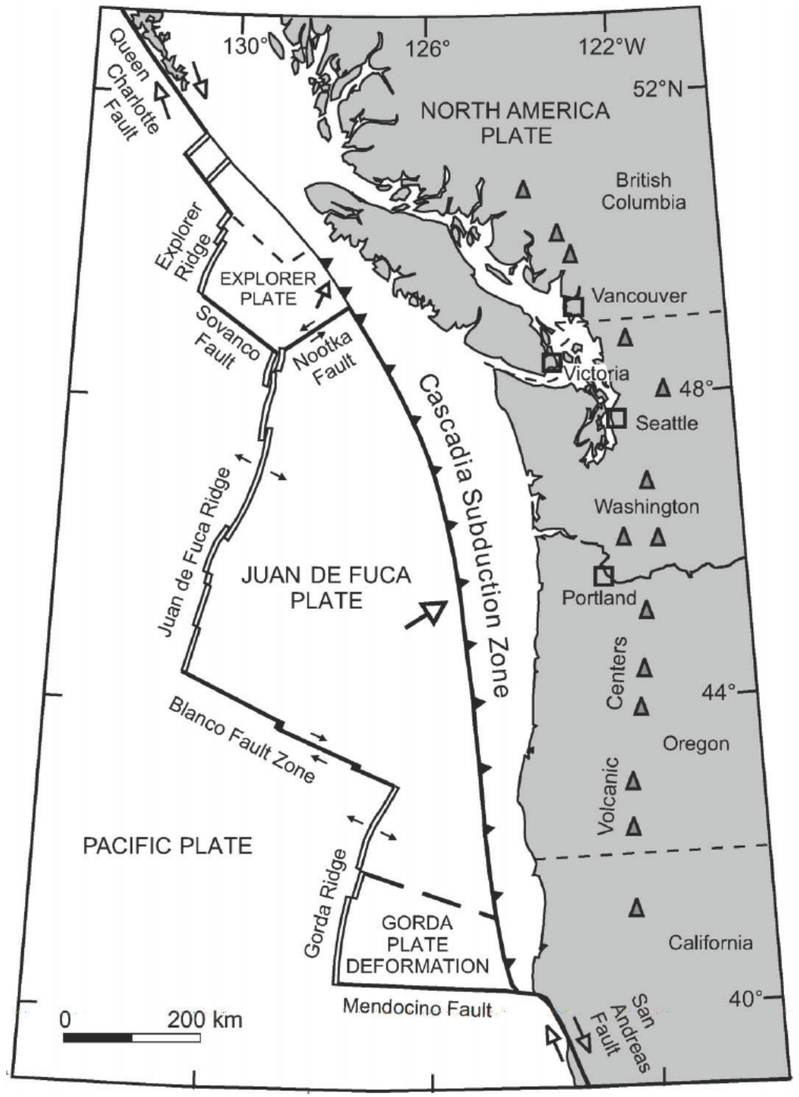
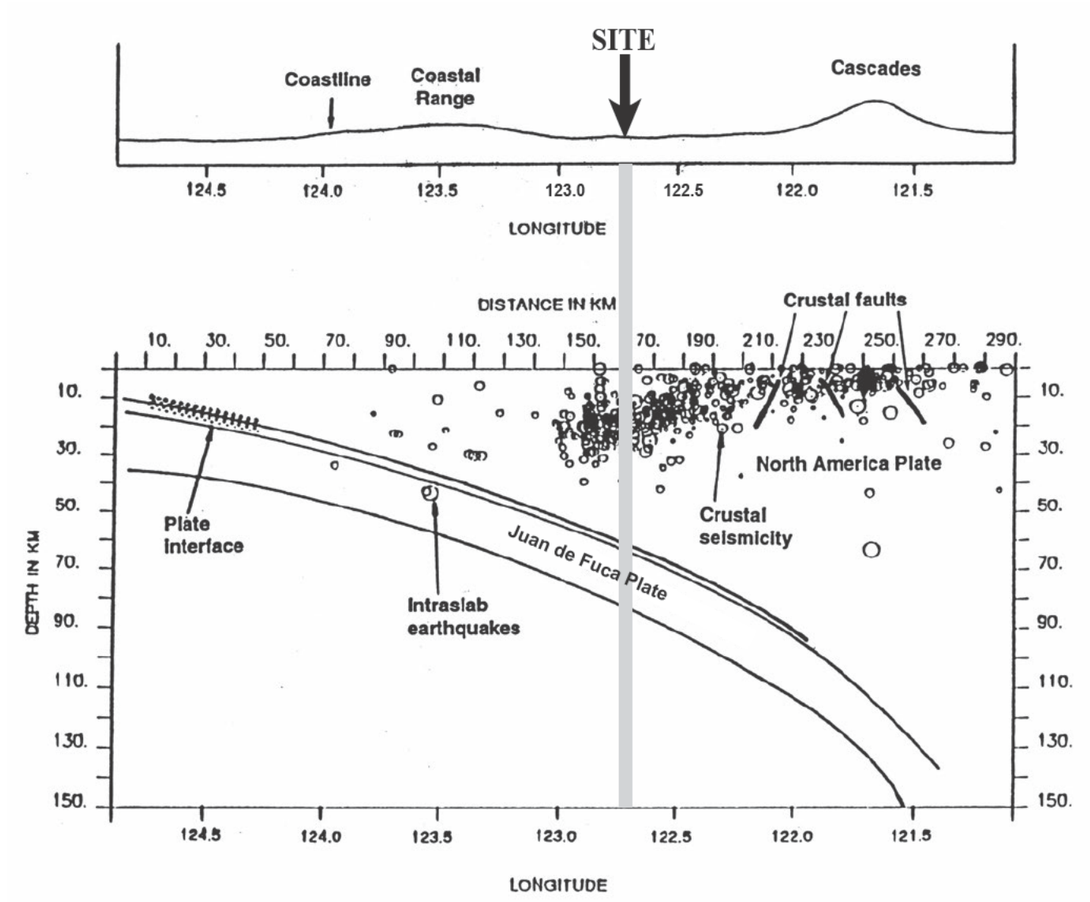


A) TECTONIC MAP OF PACIFIC NORTHWEST, SHOWING ORIENTATION AND EXTENT OF CASCADIA SUBDUCTION ZONE (MODIFIED FROM DRAGERT AND OTHERS, 1994)

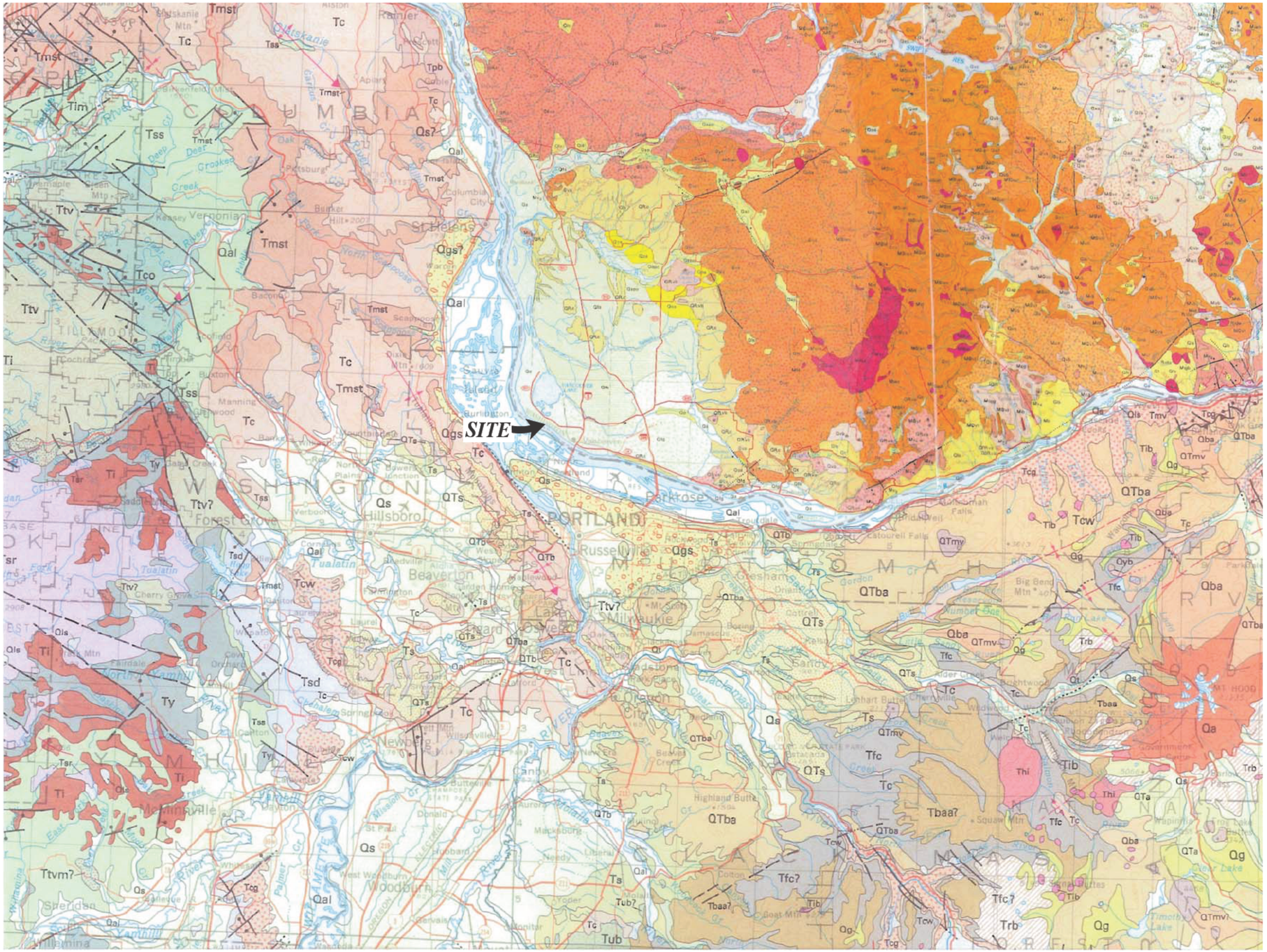


B) EAST-WEST CROSS-SECTION THROUGH WESTERN OREGON AT THE LATITUDE OF PORTLAND, SHOWING THE SEISMIC SOURCES CONSIDERED IN THE SITE-SPECIFIC SEISMIC HAZARD STUDY (MODIFIED FROM GEOMATRIX, 1995)

GRI

TECTONIC SETTING SUMMARY

SEP. 2014 JOB NO. W1114-T3 FIG. 1B



Contact — Approximately located

Fault — Dashed where inferred; dotted where concealed; queried where doubtful; ball and bar on downthrown side

Thrust fault — Dashed where inferred; dotted where concealed; queried where doubtful; sawteeth on upper plate

Strike and dip of bed

FROM:

WALSH, T.J., KOROSEC, M.A., PHILLIPS, W.M., LOGAN, R.L., AND SCHASSE, H.W., 1987, GEOLOGIC MAP OF WASHINGTON-SOUTHWEST QUADRANT; 1:250,000: WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES, 6M-34

WALKER, G.W., AND MACLEOD, N.S., 1991, GEOLOGIC MAP OF OREGON: U.S. GEOLOGICAL SURVEY

North

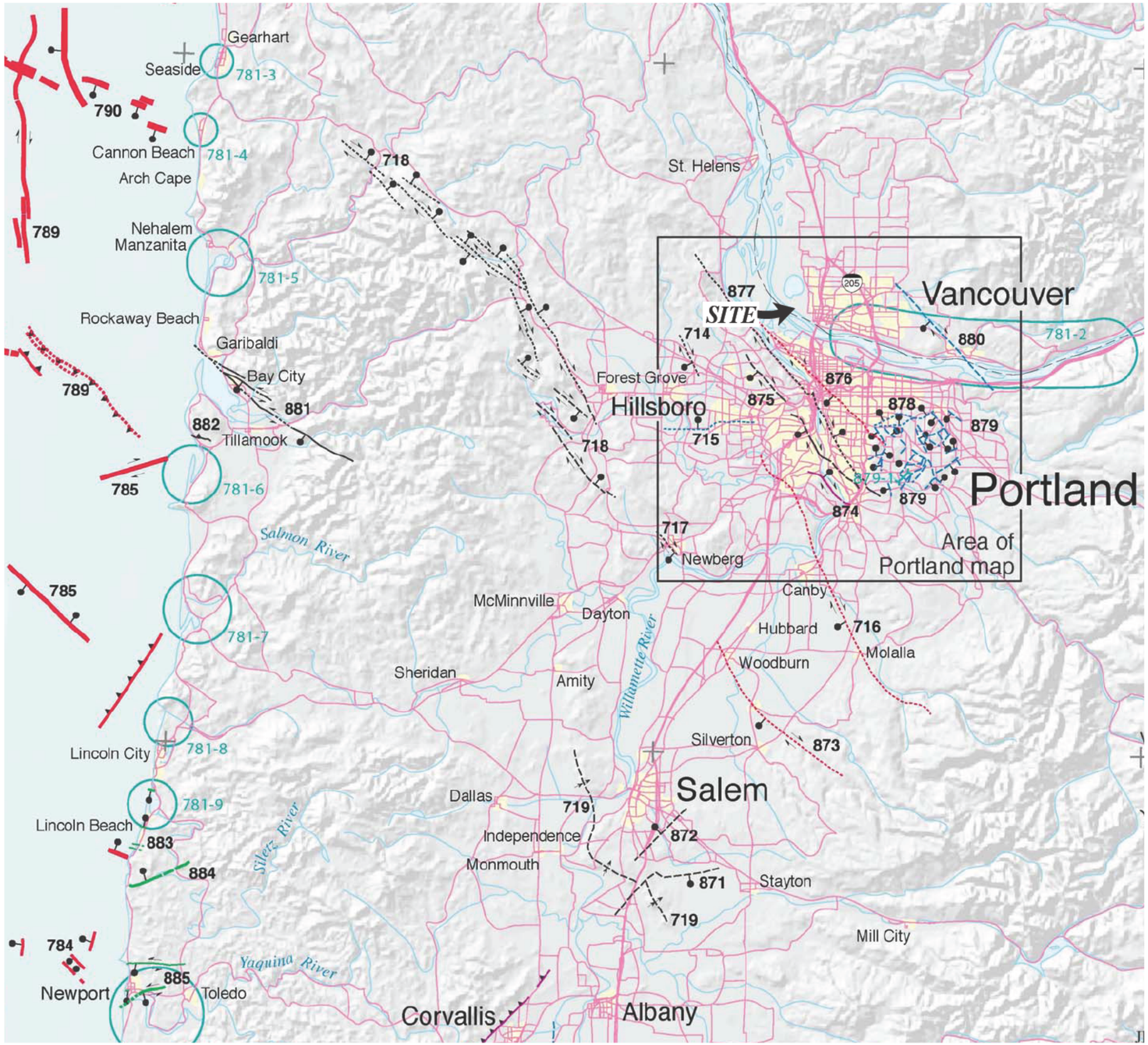
0 10 20 MILES

0 10 20 KILOMETERS

GRI

REGIONAL GEOLOGIC MAP

SEP. 2014 JOB NO. W1114-T3 FIG. 2B



MAP EXPLANATION

TIME OF MOST RECENT SURFACE RUPTURE

- Holocene (<10,000 years) or post last glaciation (<15,000 years; 15 ka); no historic ruptures in Oregon to date
- Late Quaternary (<130,000; post penultimate glaciation)
- Late and middle Quaternary (<750,000 years; 750 ka)
- Quaternary, undifferentiated (<1,600,000 years; <1.6 Ma)
- Class B structure (age or origin uncertain)

SLIP RATE

- >5 mm/year
- 1.0-5.0 mm/year
- 0.2-1.0 mm/year
- <0.2 mm/year

TRACE

- Mostly continuous at map scale
- Mostly discontinuous at map scale
- Inferred or concealed

STRUCTURE TYPE AND RELATED FEATURES

- Normal or high-angle reverse fault
- Strike-slip fault
- Thrust fault
- Anticlinal fold
- Synclinal fold
- Monoclinal fold
- Plunge direction of fold
- Fault section marker

DETAILED STUDY SITES

- 731-2 Trench site
- 781-2 Subduction zone study site

CULTURAL AND GEOGRAPHIC FEATURES

- Divided highway
- Primary or secondary road
- Permanent river or stream
- Intermittent river or stream
- Permanent or intermittent lake

FAULT NUMBER	NAME OF STRUCTURE
876	EAST BANK FAULT
877	PORTLAND HILLS FAULT
880	LACAMAS LAKE FAULT
878	GRAND BUTTE FAULT

FROM: PERSONIUS, S.F., AND OTHERS, 2003, MAP OF QUATERNARY FAULTS AND FOLDS IN OREGON, USGS OPEN FILE REPORT OFR-03-095.

North

0 5 10 MILES

0 5 10 KILOMETERS

GRI

LOCAL FAULT MAP

SEP. 2014 JOB NO. W1114-T3 FIG. 3B

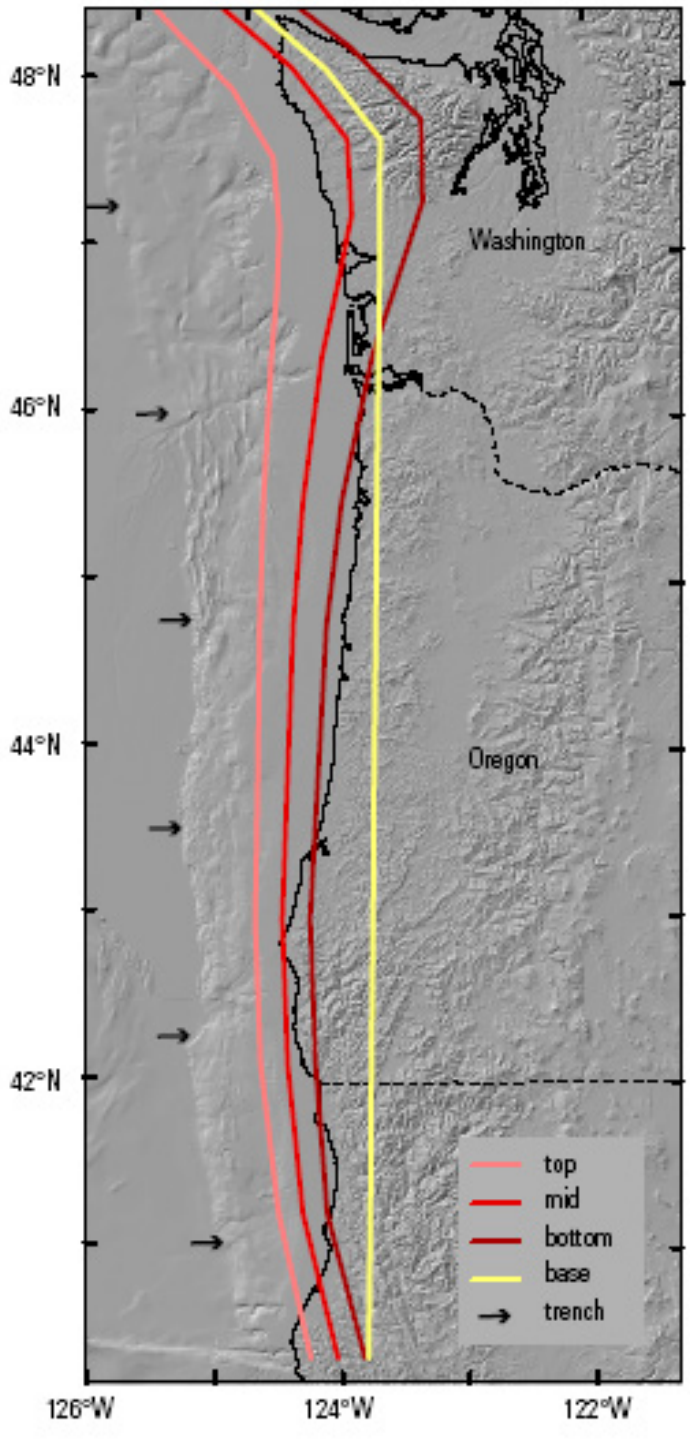


Figure 21. Location of the eastern edge of earthquake-rupture zones on the Cascadia subduction zone for the various models used in this study relative to the surficial expression of the trench: top, base of the elastic zone; mid, midpoint of the transition zone; bottom, base of the transition zones; base, base of the model that assumes ruptures extend to about 30-kilometers depth. Figure provided by Ray Weldon.

FROM: PETERSEN, MD, FRANKEL, AD, HARMSEN, SC, AND OTHERS, 2008, DOCUMENTATION FOR THE 2008 UPDATE OF THE UNITED STATES NATIONAL SEISMIC HAZARD MAPS: US GEOLOGICAL SURVEY, OPEN FILE REPORT 2008-1128

GRI

ASSUMED RUPTURE LOCATIONS
(CASCADIA SUBDUCTION ZONE)

SEP. 2014 JOB NO. W1114-T3 FIG. 4B

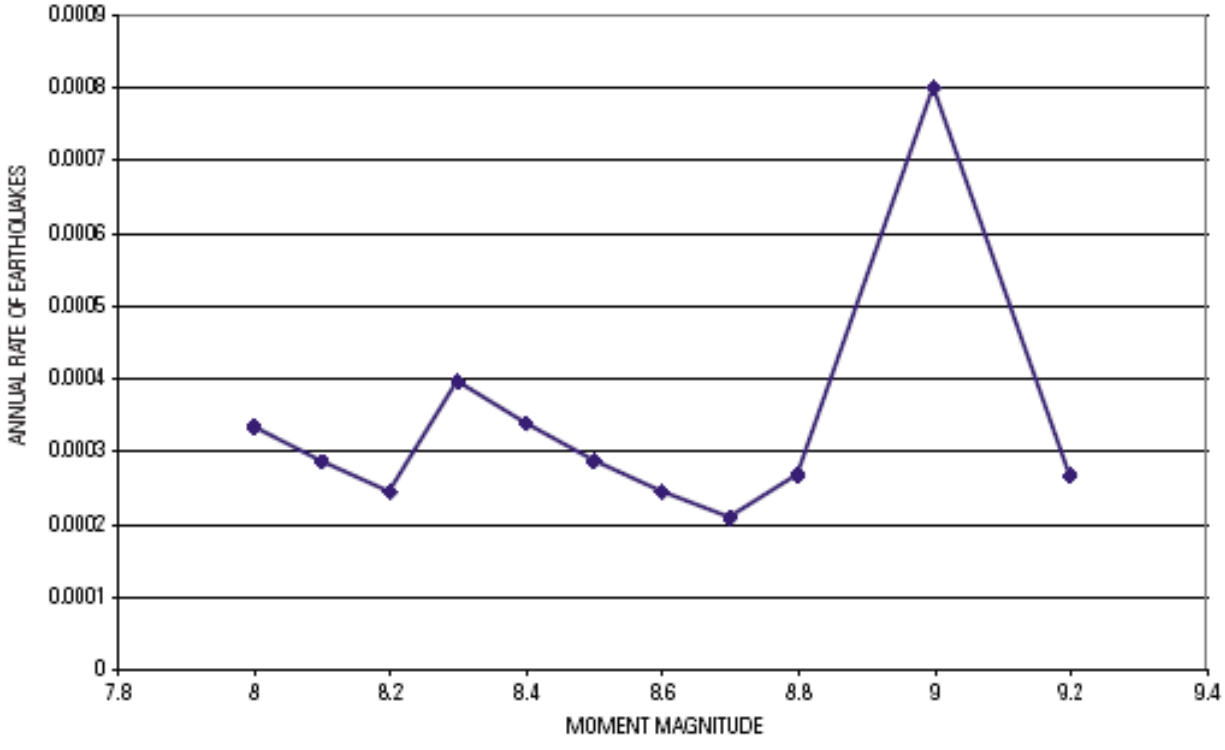


Figure 22. Magnitude-frequency distribution of the Cascadia subduction zone.

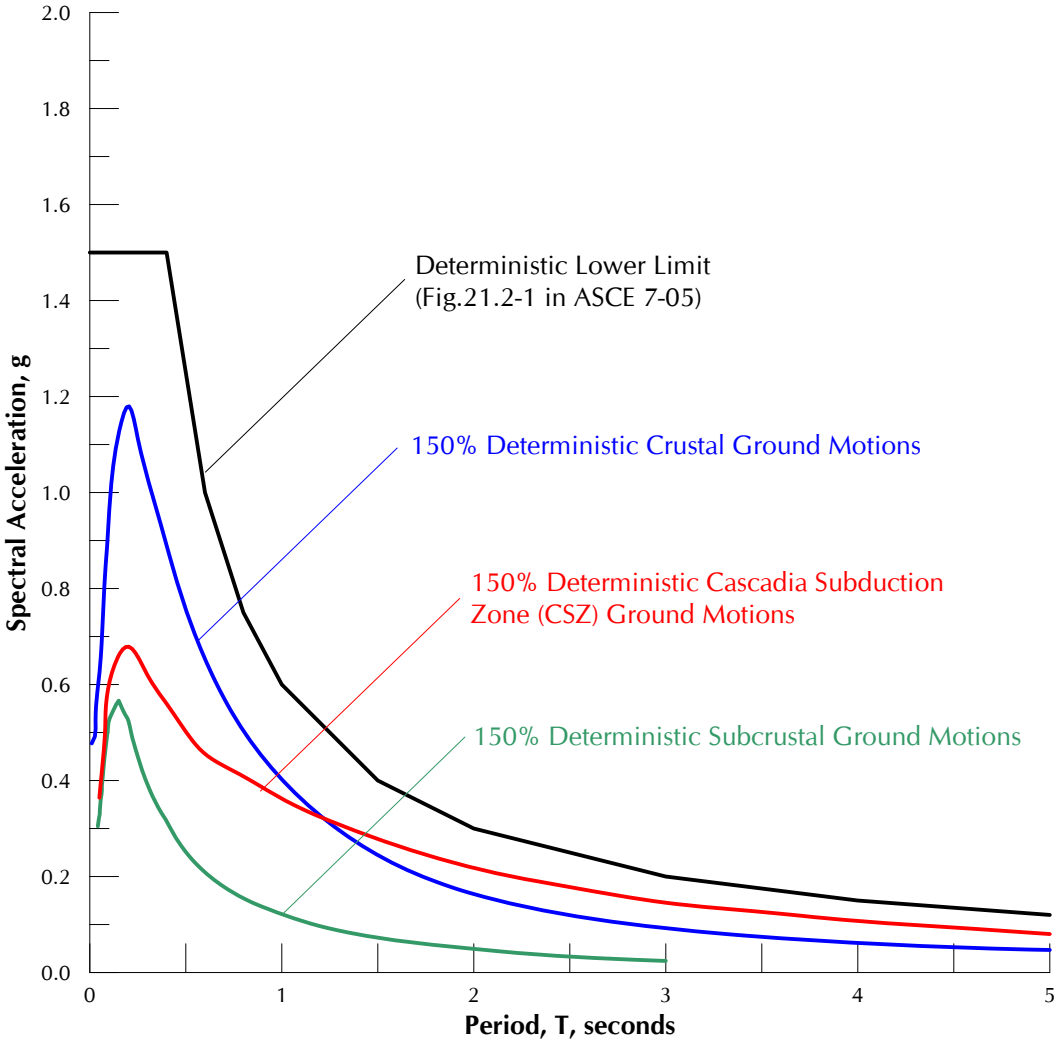
FROM: PETERSEN, M, FRANKEL, A, HARMSEN, S, AND OTHERS, 2008, DOCUMENTATION FOR THE 2008 UPDATE OF THE UNITED STATES NATIONAL SEISMIC HAZARD MAPS: US GEOLOGICAL SURVEY, OPEN FILE REPORT 2008-1128

GRI

ASSUMED MAGNITUDE-FREQUENCY DISTRIBUTION

(CASCADIA SUBDUCTION ZONE)

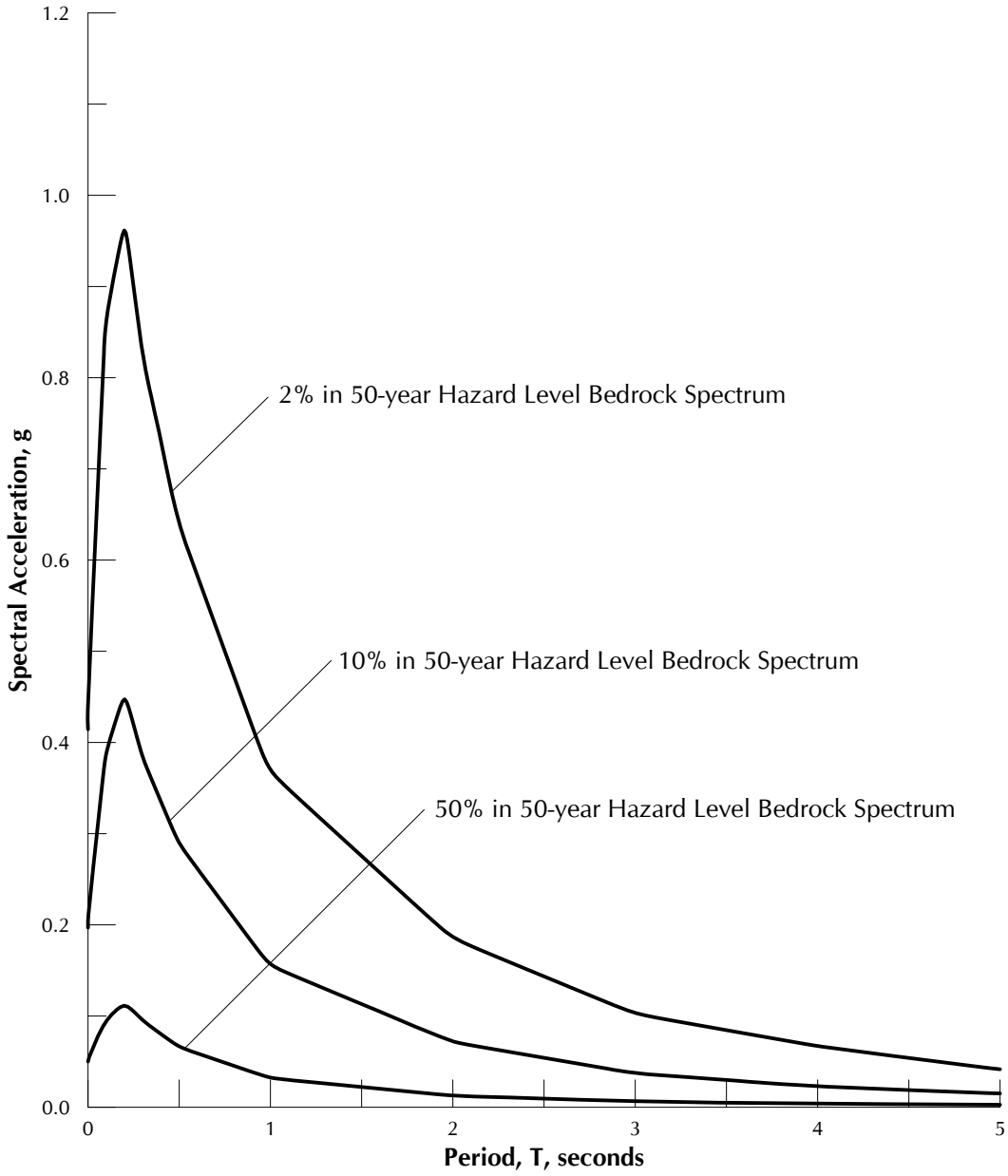
SEP. 2014 JOB NO. W1114-T3 FIG. 5B



GRI

DETERMINISTIC MCE
BEDROCK RESPONSE SPECTRA COMPARISON
(5% DAMPING)

SEP. 2014 JOB NO. W1114-T3 FIG. 6B

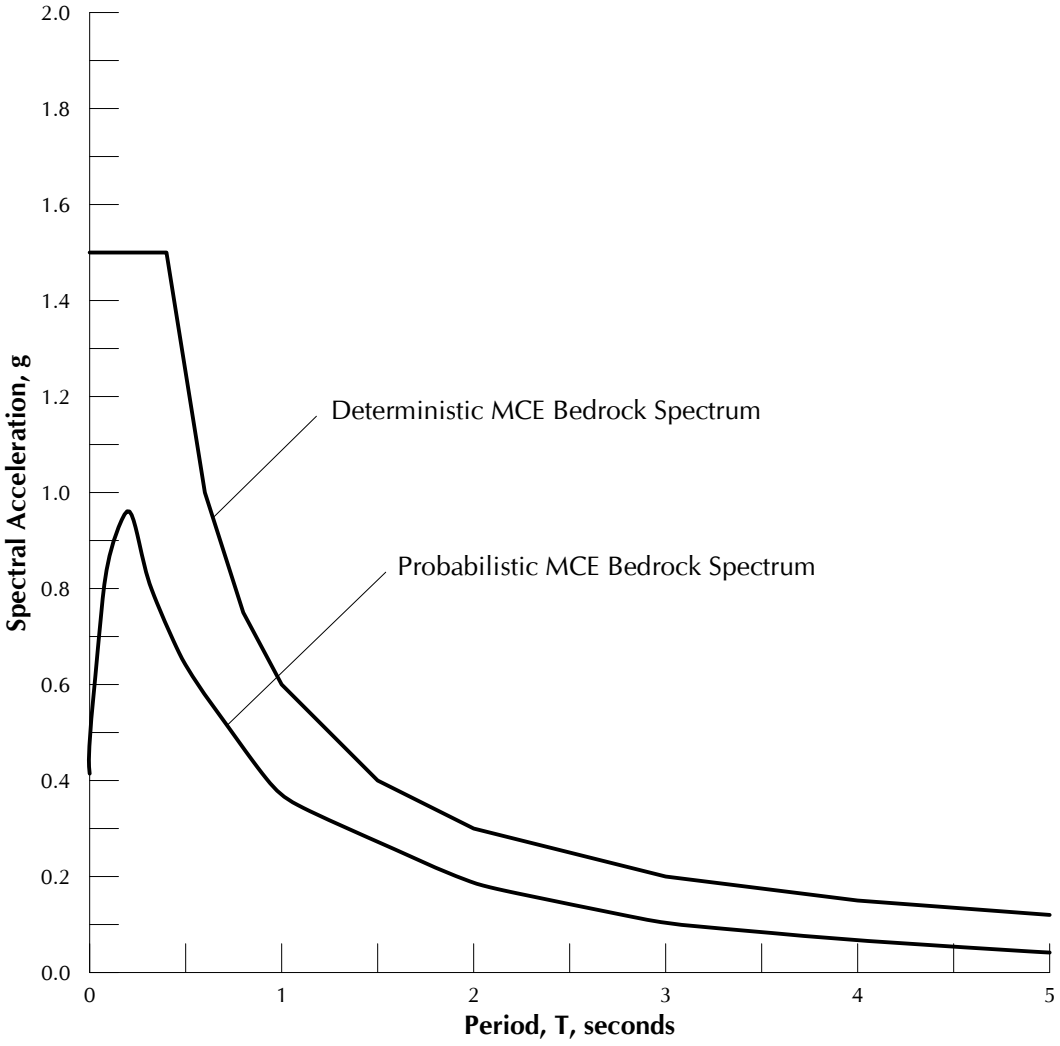


GRI

BEDROCK RESPONSE SPECTRA FOR DIFFERENT PROBABILISTIC HAZARD LEVELS

(5% DAMPING)

SEP. 2014 JOB NO. W1114-T3 FIG. 7B

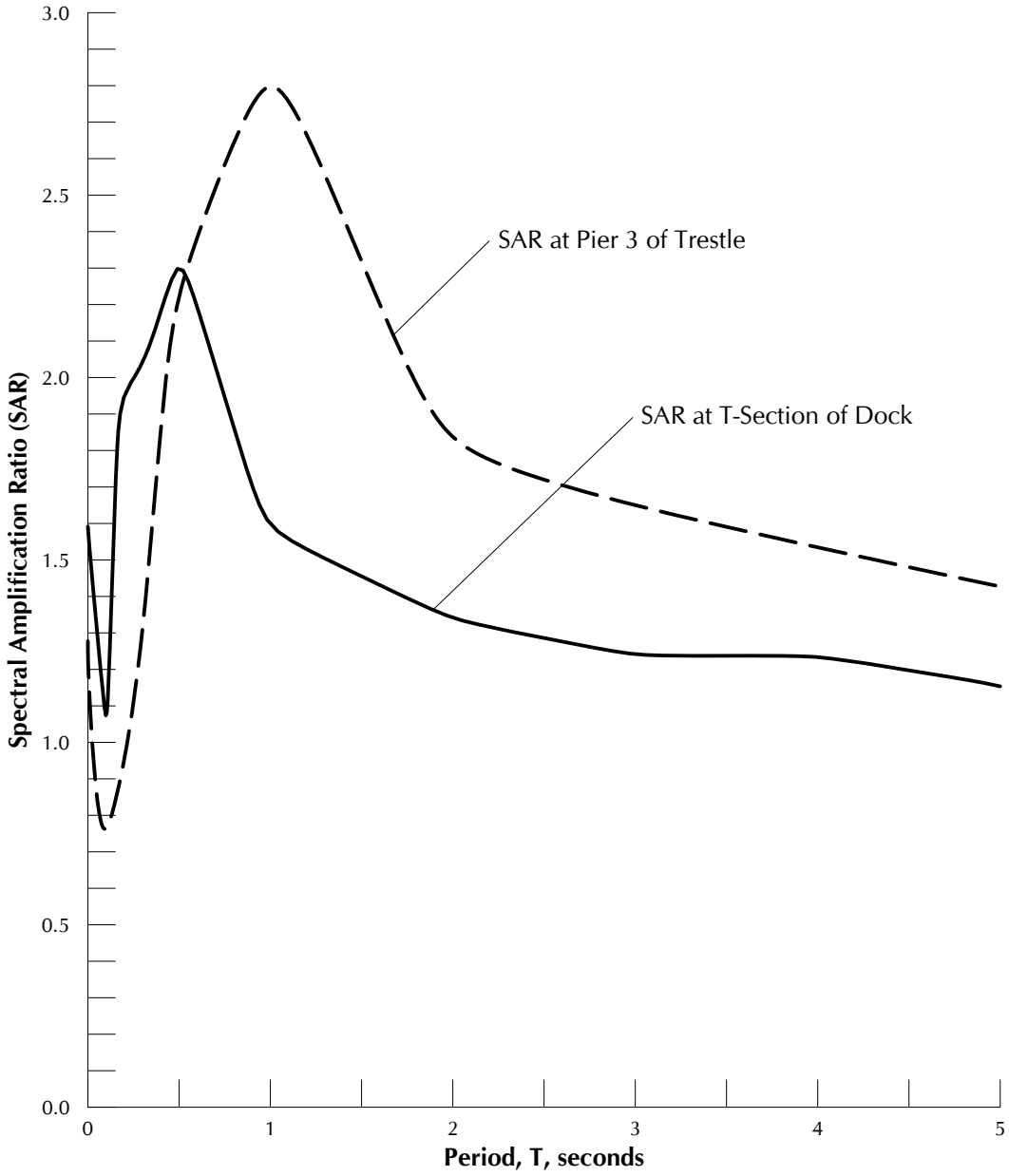


GRI

DETERMINISTIC AND PROBABILISTIC MCE BEDROCK RESPONSE SPECTRA COMPARISON

(5% DAMPING)

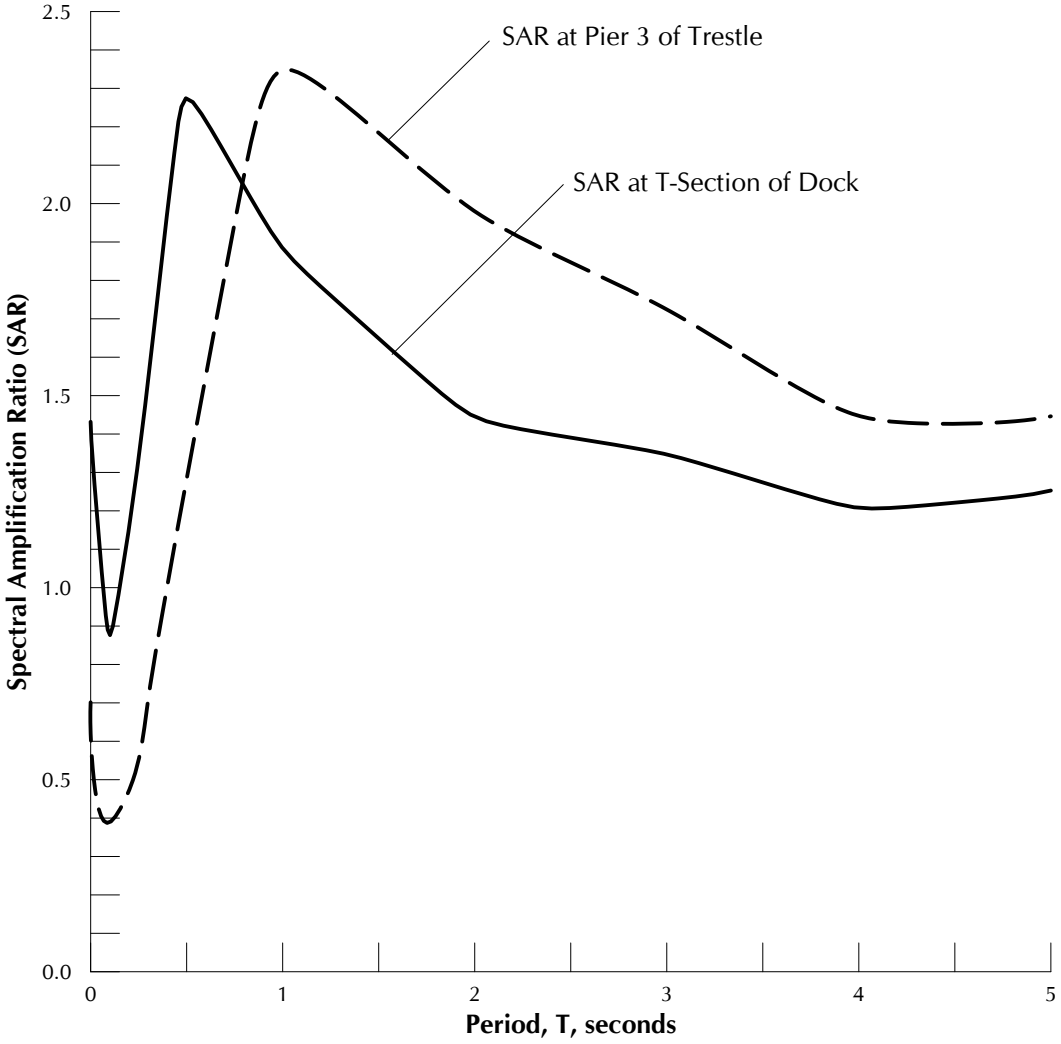
SEP. 2014 JOB NO. W1114-T3 FIG. 8B



GRI

SPECTRAL AMPLIFICATION RATIO (SAR) FOR CLE (475-YEAR) HAZARD LEVEL

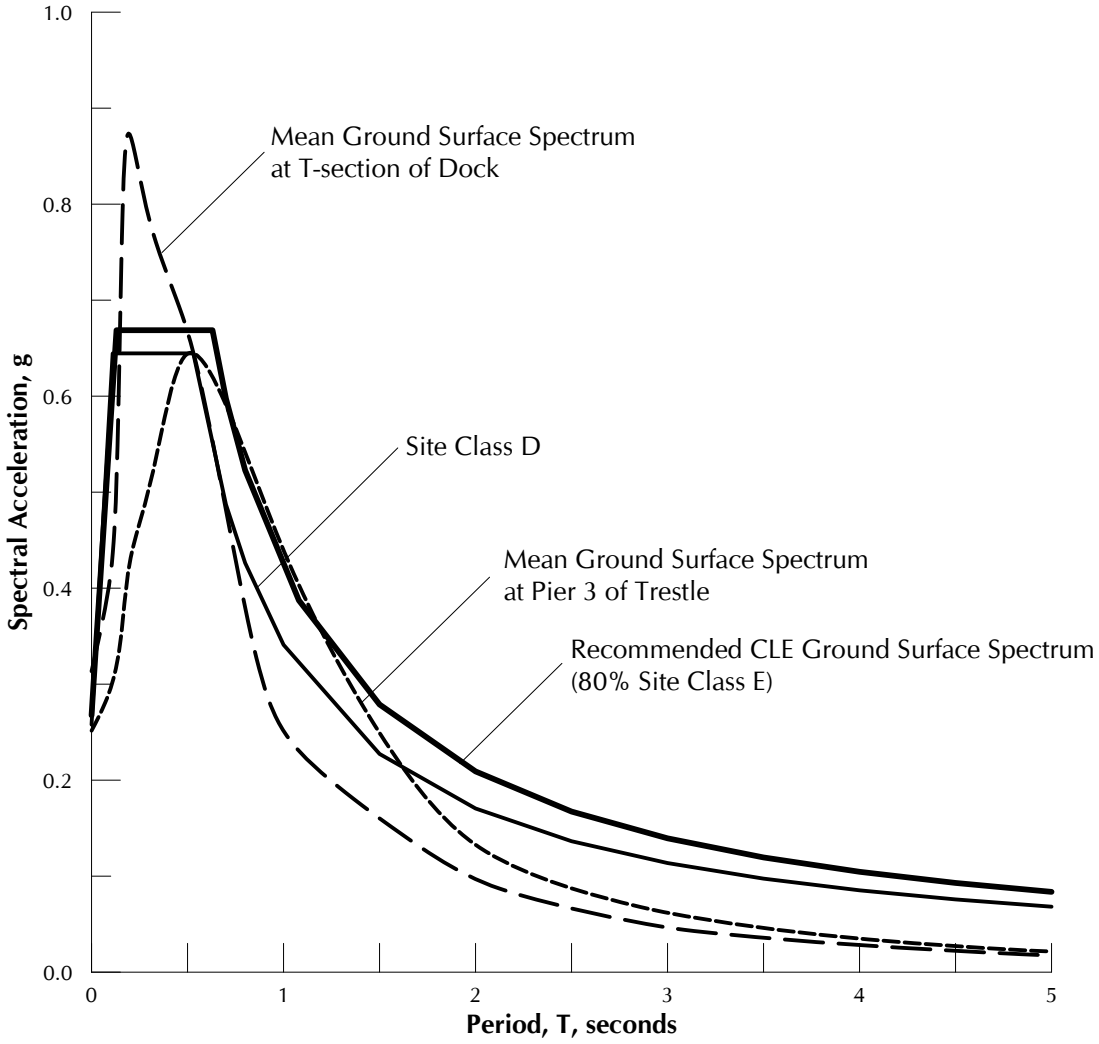
SEP. 2014 JOB NO. W1114-T3 FIG. 9B



GRI

SPECTRAL AMPLIFICATION RATIO (SAR) FOR MCE (2,475-YEAR) HAZARD LEVEL

SEP. 2014 JOB NO. W1114-T3 FIG. 10B

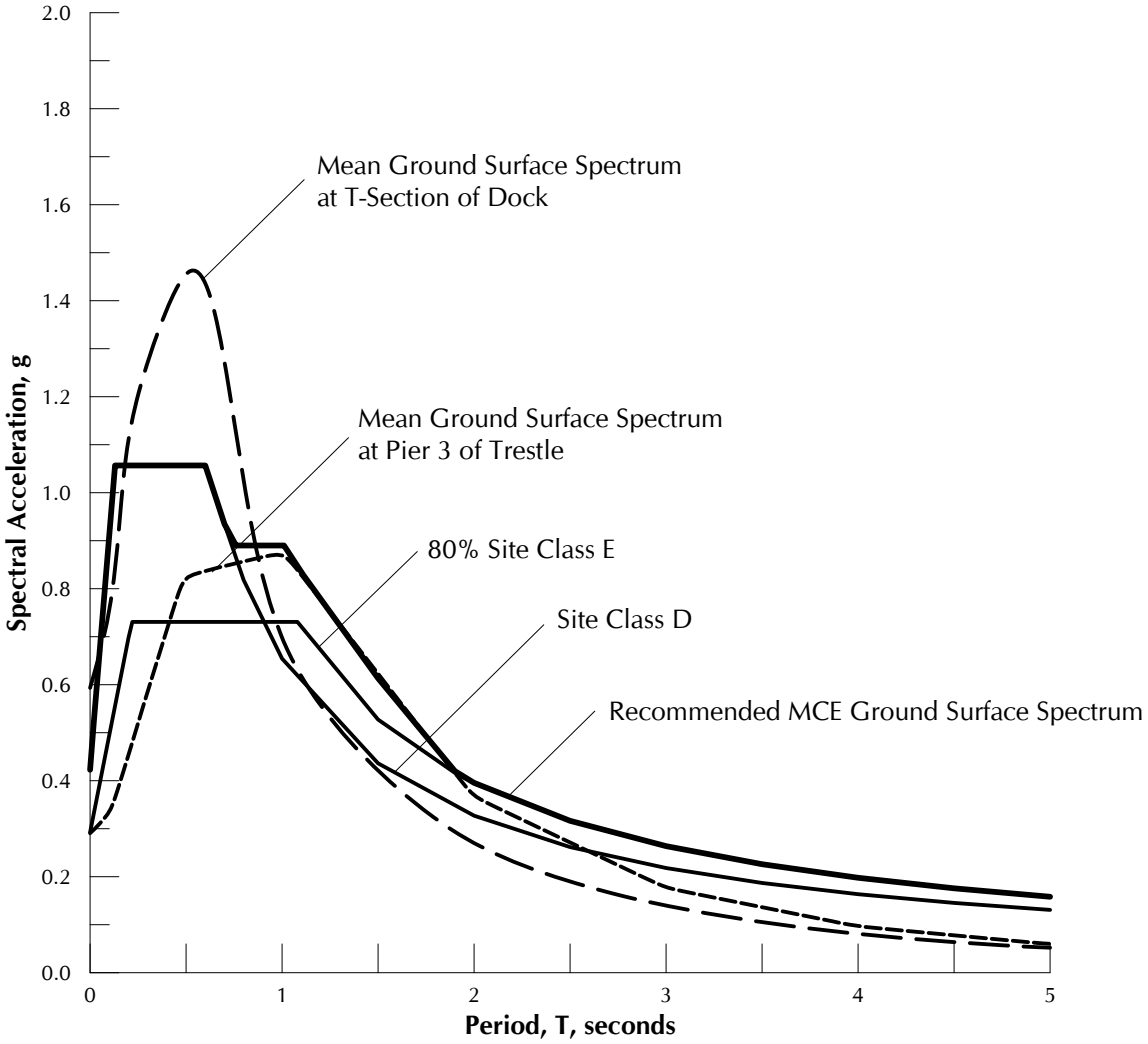


GRI

CLE GROUND SURFACE RESPONSE SPECTRA

(5% DAMPING)

SEP. 2014 JOB NO. W1114-T3 FIG. 11B

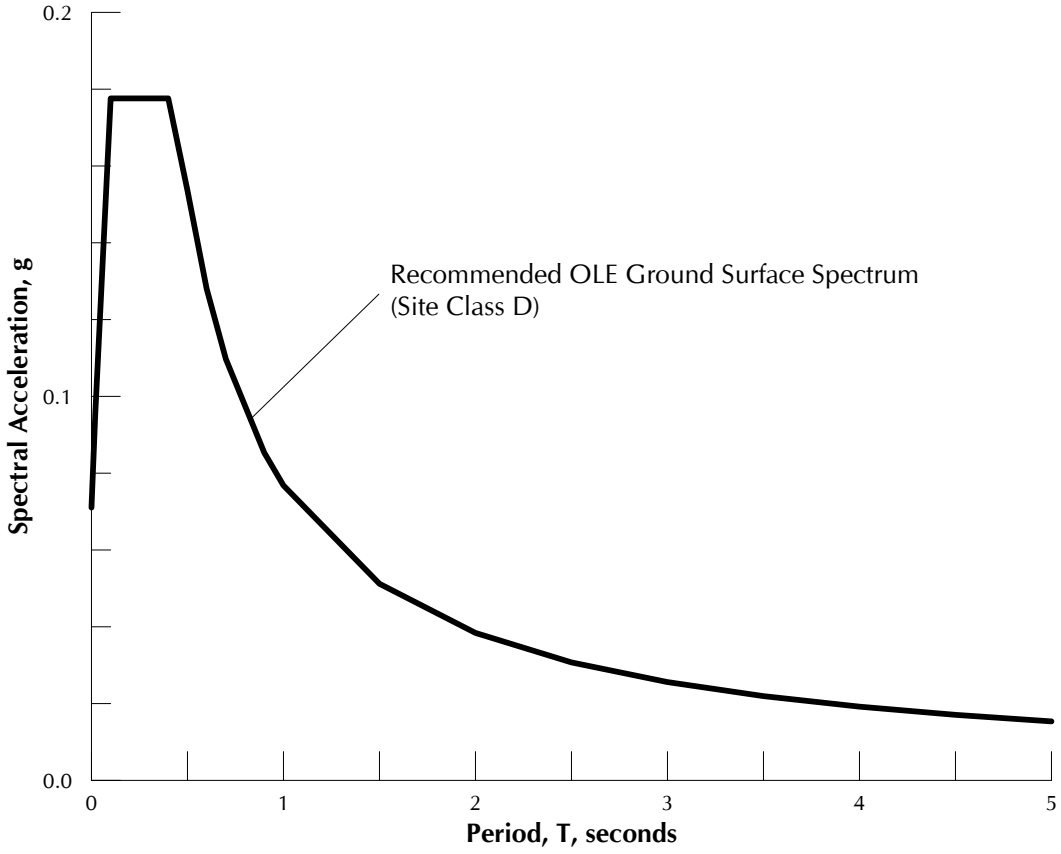


GRI

MCE GROUND SURFACE RESPONSE SPECTRA

(5% DAMPING)

SEP. 2014 JOB NO. W1114-T3 FIG. 12B

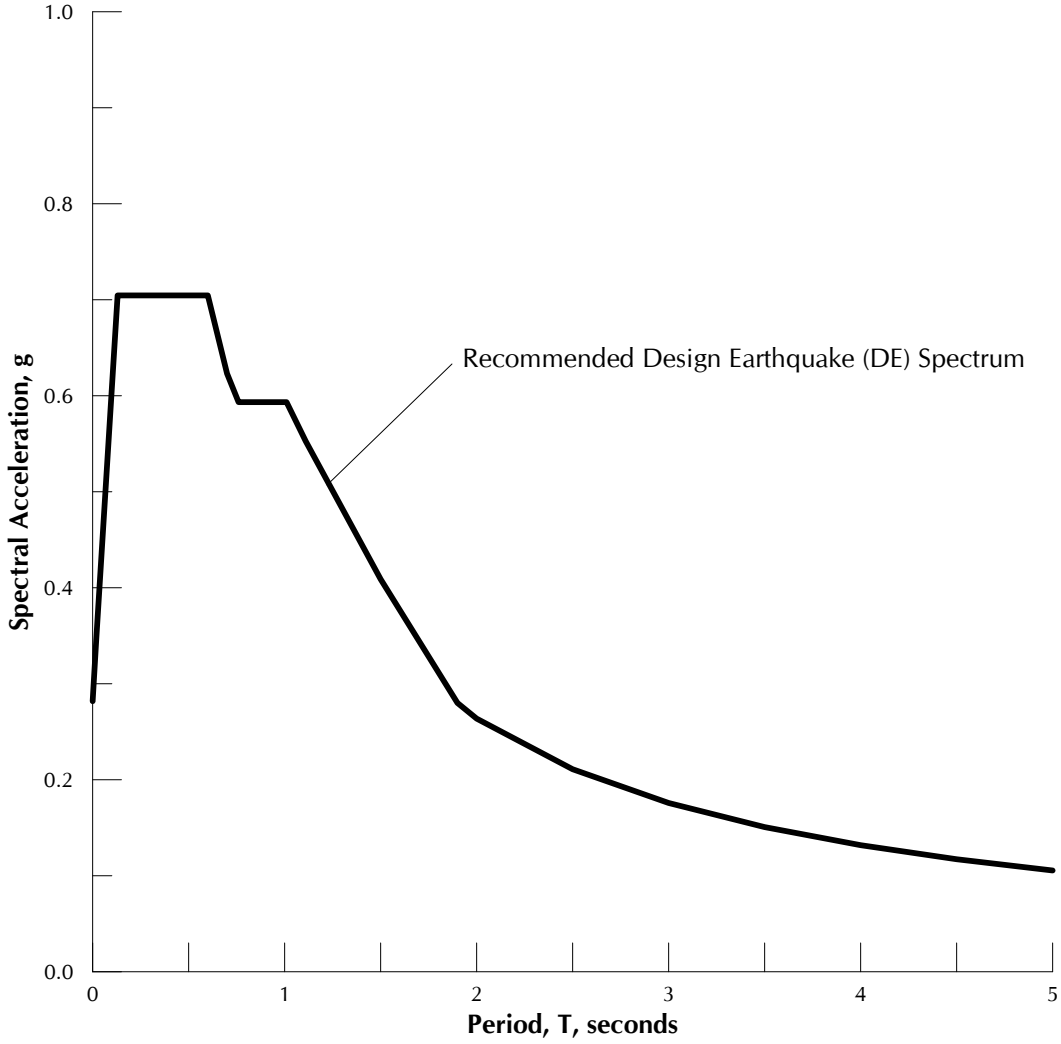


GRI

OLE GROUND SURFACE RESPONSE SPECTRUM

(5% DAMPING)

SEP. 2014 JOB NO. W1114-T3 FIG. 13B



GRI

DE (2/3 MCE) GROUND SURFACE RESPONSE SPECTRUM

(5% DAMPING)

SEP. 2014 JOB NO. W1114-T3 FIG. 14B

Appendix E
Isopluvial Mapping

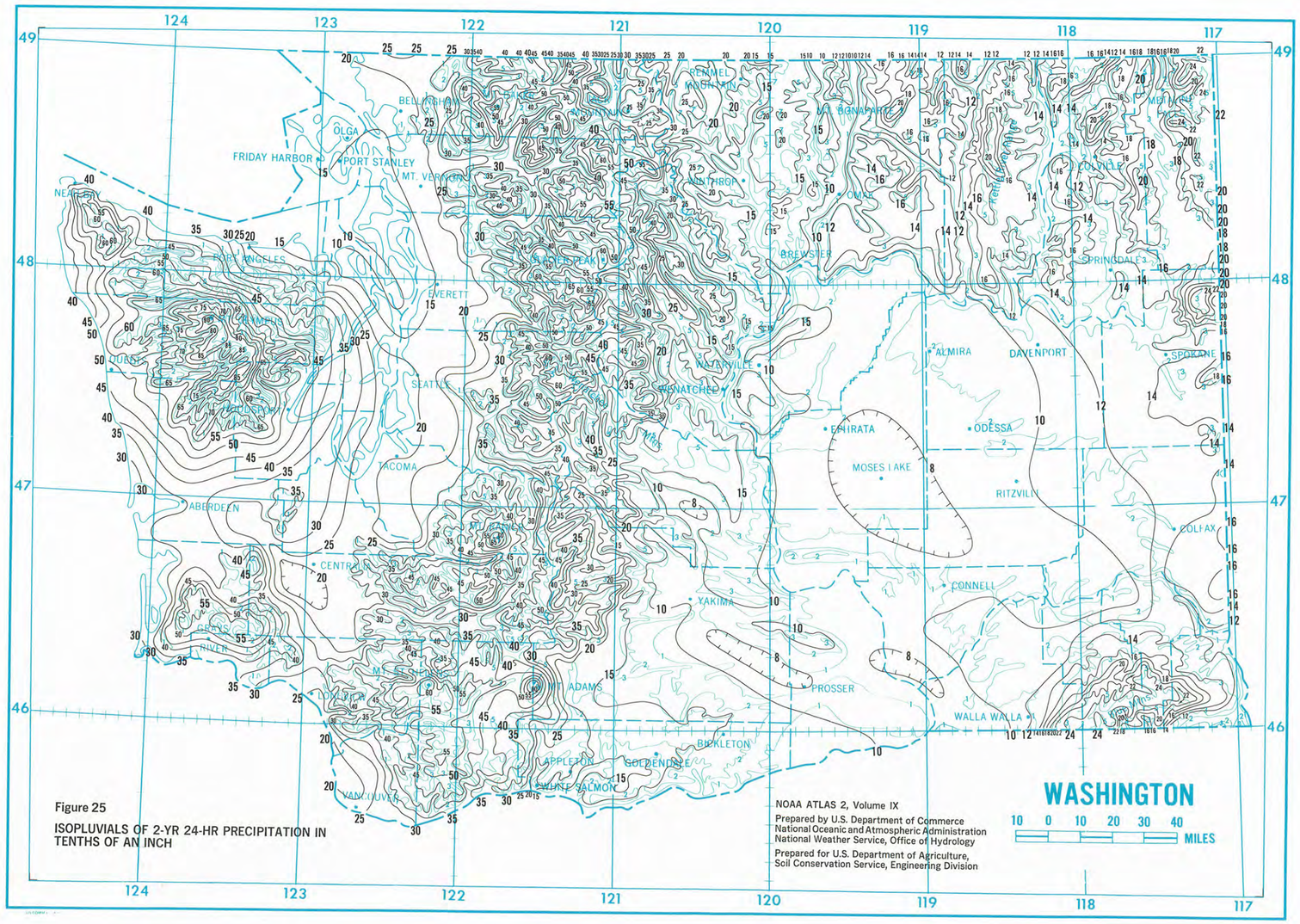


Figure 25

ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

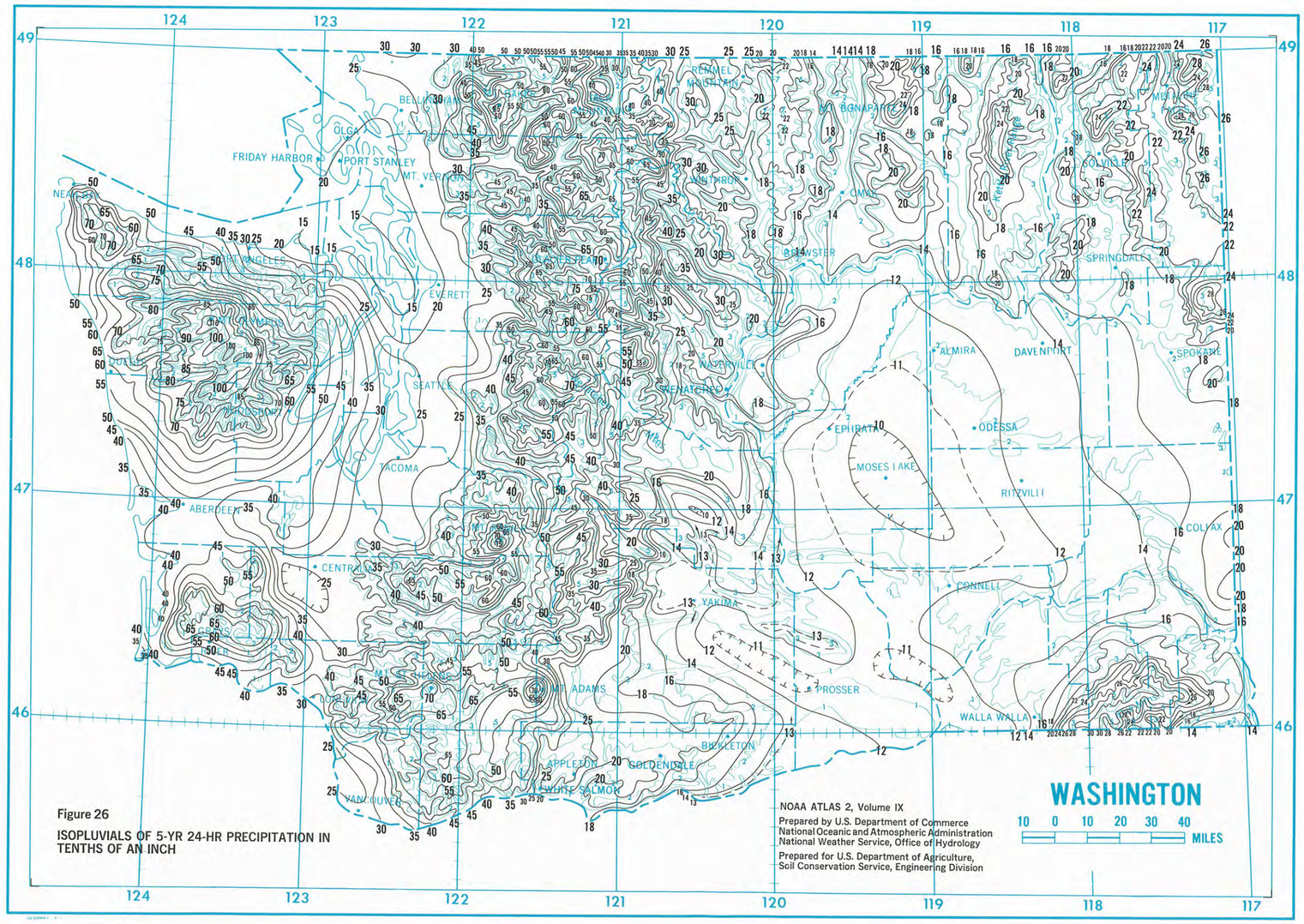


Figure 26

ISOPLUVIALS OF 5-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

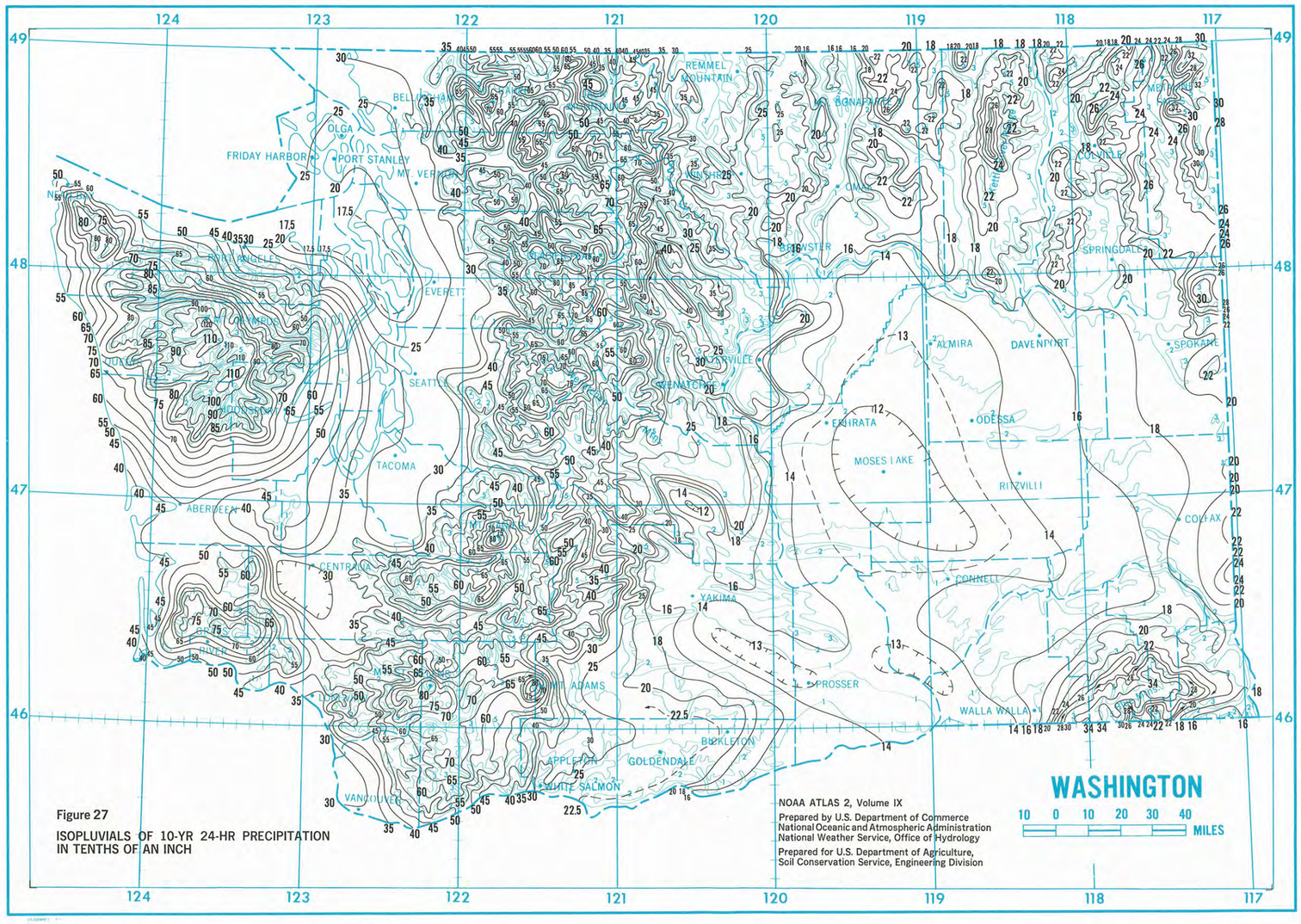


Figure 27

ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

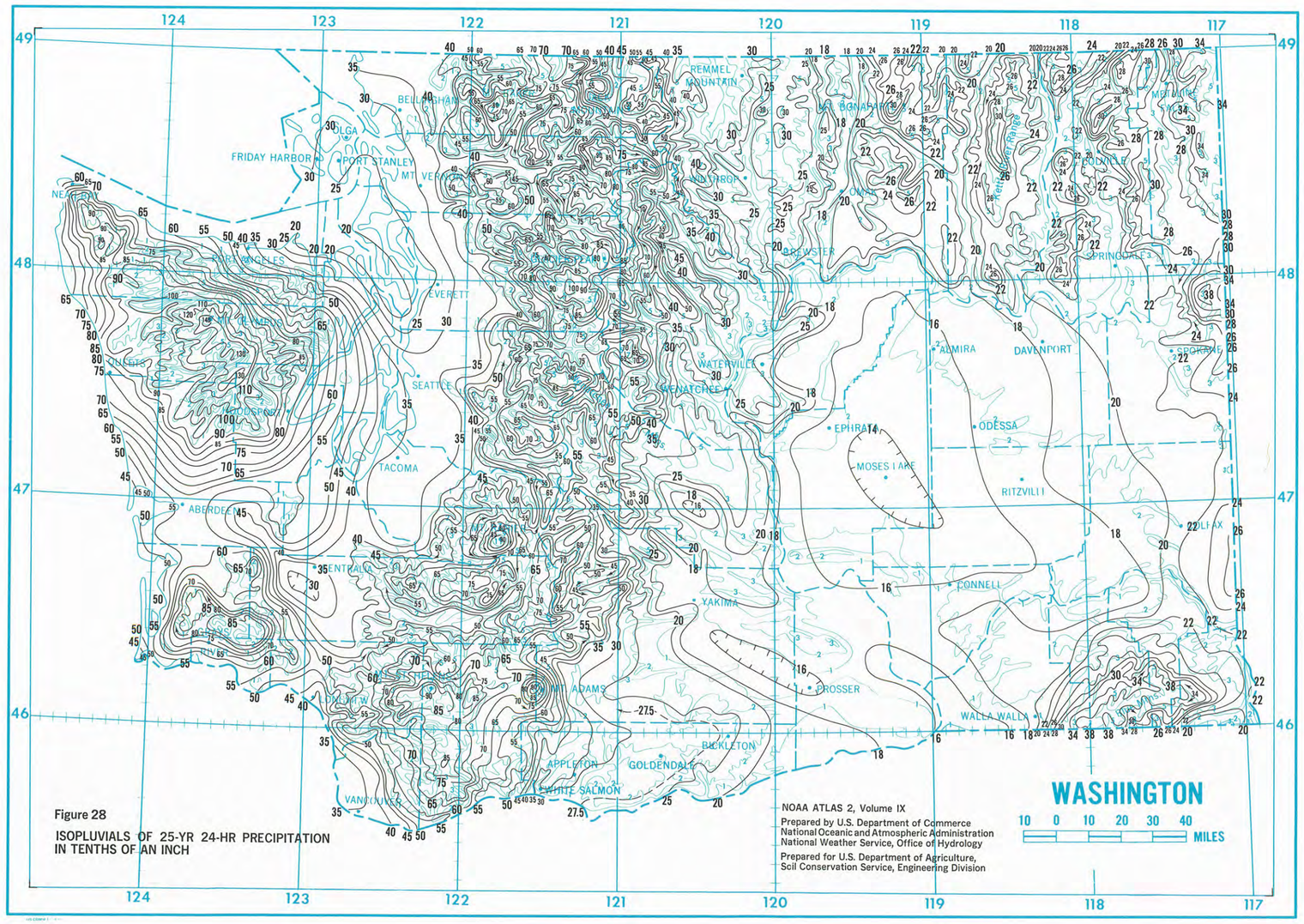


Figure 28

ISOPLUVIALS OF 25-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

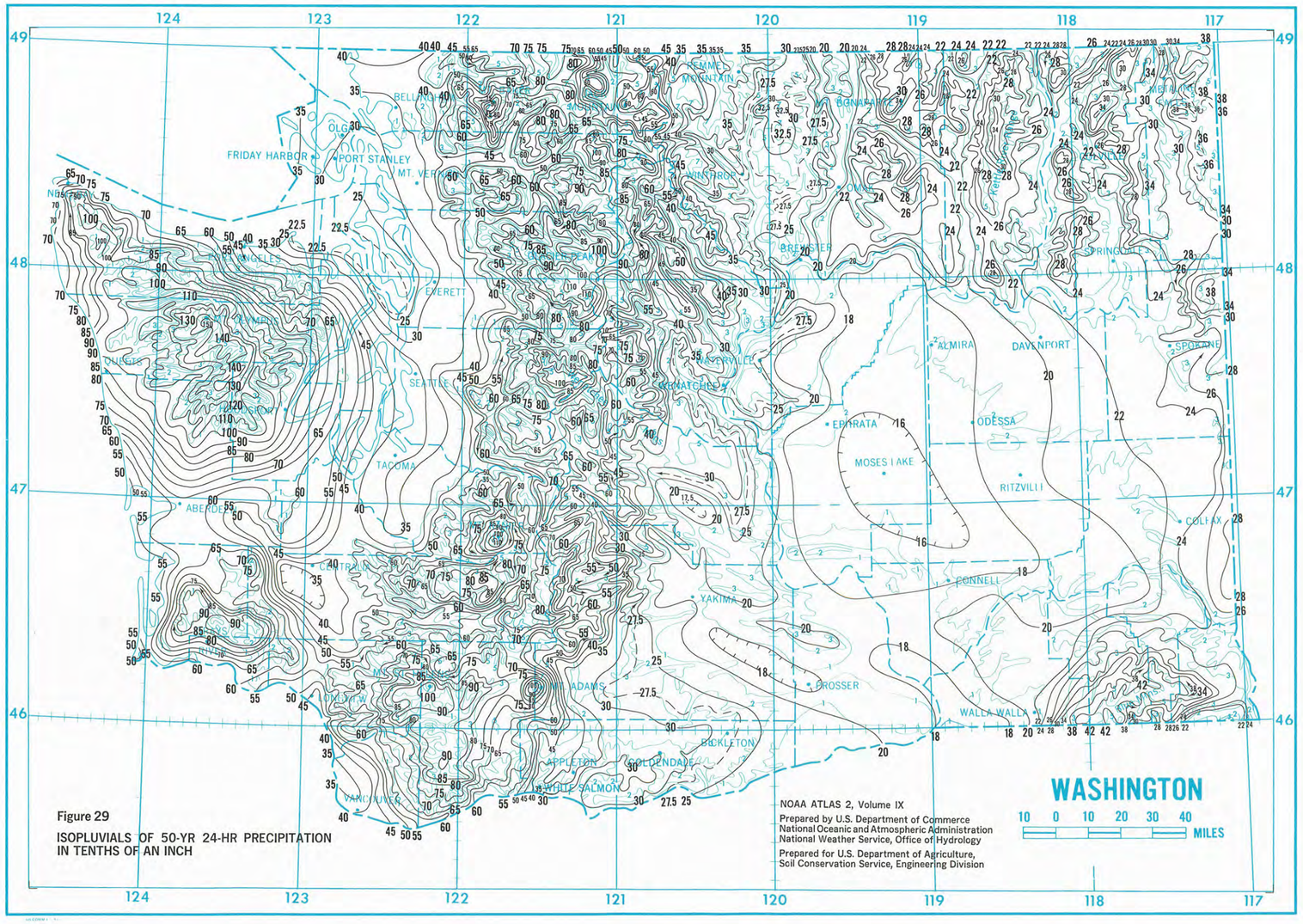


Figure 29

ISOPLUVIALS OF 50-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

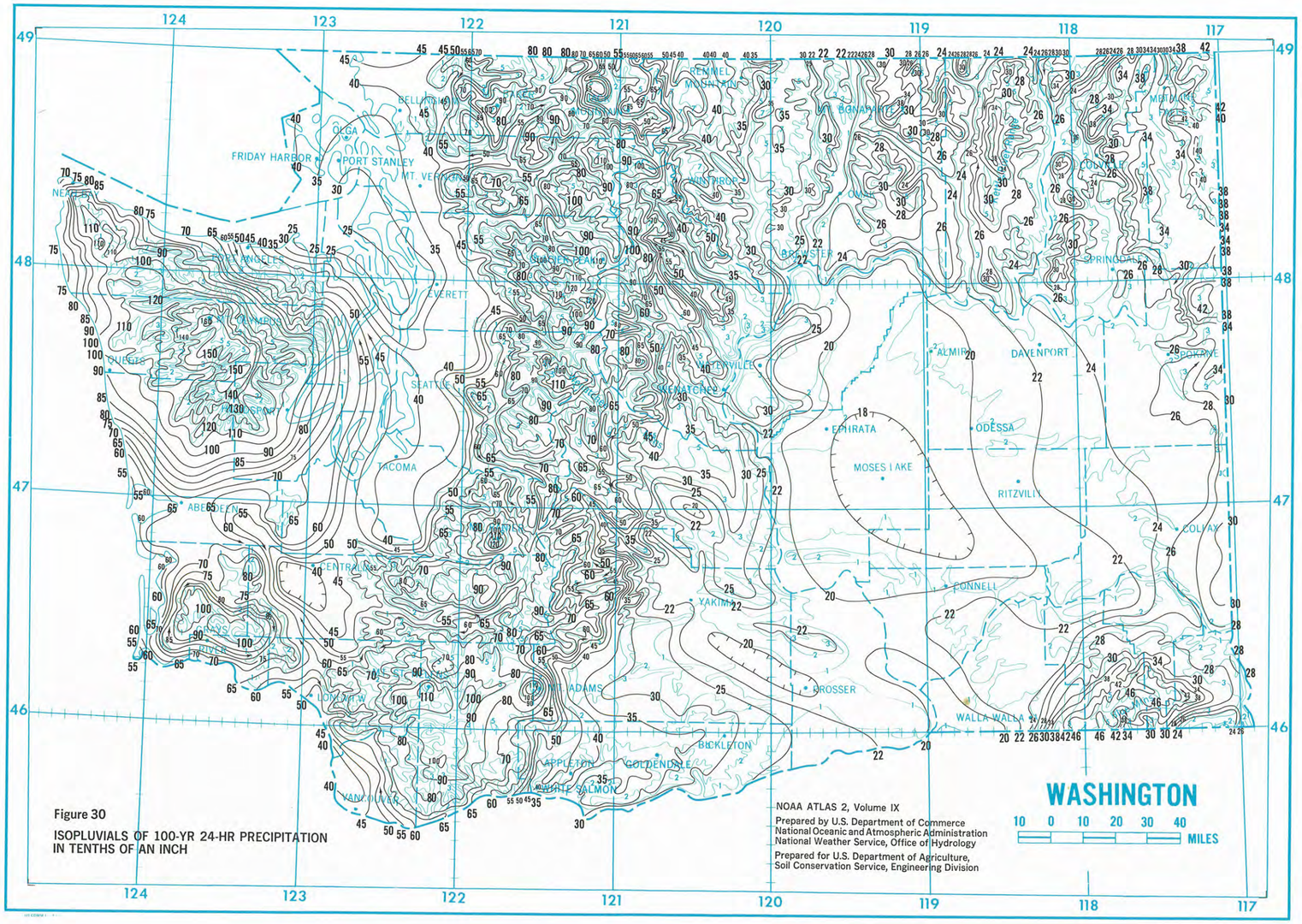


Figure 30

ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

☆ U.S. GOVERNMENT PRINTING OFFICE : 1974 O—507-860

Construction Stormwater Pollution Prevention Plan

Vancouver Energy
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix F
Construction Stormwater Calculations

Existing Surface Condition

Facility Area *WWHM3 Input*	Industrial Yard *Driveways (Flat)*	Roadways *Road (Flat)*	Misc. Impervious *Driveways (Flat)*	Pervious Surface *A/B Pasture (Flat)*	Open Water/Bank *Not Input in Model*	Total
200 - Unloading and Office	7.0	0.0	0.8	0.0	0.0	7.8
300 - Storage	20.8	0.0	0.0	0.0	0.0	20.8
400 - Marine Terminal	1.1	0.7	0.4	0.5	5.0	7.7
500 - Transfer Pipelines	2.4	0.6	0.3	1.6	0.0	4.9
600 - West Boiler	0.7	0.1	0.0	0.0	0.0	0.8
Rail Improvements	5.4	0.0	0.0	0.0	0.0	5.4
Total	37.4	1.4	1.6	2.0	5.0	47.4

Construction Surface Condition

Facility Area *WWHM3 Input*	Industrial Yard *Driveways (Flat)*	Roadways *Road (Flat)*	Misc. Impervious *Driveways (Flat)*	Pervious Surface *A/B Pasture (Flat)*	Open Water/Bank *Not Input in Model*	Total
200 - Unloading and Office	45.8	0.6	0.8	0.1	0.0	47.3
300 - Storage	24.6	0.3	0.0	0.0	0.0	24.9
400 - Marine Terminal	1.1	1.0	0.4	2.6	6.8	12.0
500 - Transfer Pipelines	6.4	2.1	1.1	3.3	0.0	12.9
600 - West Boiler	1.1	0.3	0.0	0.0	0.0	1.3
Rail Improvements	5.4	0.0	0.0	0.0	0.0	5.4
Total	84.4	4.2	2.4	6.0	6.8	103.9

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	VE_Construction2015_02-23
Site Name:	Vancouver Energy - Construction
Site Address:	
City:	Vancouver
Report Date:	2/24/2015
Gage:	I-5 Bridge
Data Start:	1948/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	1.02
Version:	2014/04/24

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year
Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year
Low Flow Threshold for POC3:	50 Percent of the 2 Year
High Flow Threshold for POC3:	50 Year
Low Flow Threshold for POC4:	50 Percent of the 2 Year
High Flow Threshold for POC4:	50 Year
Low Flow Threshold for POC5:	50 Percent of the 2 Year
High Flow Threshold for POC5:	50 Year
Low Flow Threshold for POC6:	50 Percent of the 2 Year
High Flow Threshold for POC6:	50 Year

Landuse Basin Data

Predeveloped Land Use

Area 200 - Existing

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
DRIVEWAYS FLAT	7.8
Impervious Total	7.8
Basin Total	7.8

Element Flows To:

Surface	Interflow	Groundwater

Area 300 - Existing

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
DRIVEWAYS FLAT	20.8
Impervious Total	20.8
Basin Total	20.8

Element Flows To:

Surface	Interflow	Groundwater

Area 400 - Existing

Bypass: No

GroundWater: No

Pervious Land Use	Acres
A B, Pasture, Flat	0.5
Pervious Total	0.5

Impervious Land Use	Acres
ROADS FLAT	0.7
DRIVEWAYS FLAT	1.1
Impervious Total	1.8
Basin Total	2.3

Element Flows To:

Surface	Interflow	Groundwater

Area 500 - Existing

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
A B, Pasture, Flat	1.5
Pervious Total	1.5

Impervious Land Use	Acres
ROADS FLAT	1
DRIVEWAYS FLAT	2.4
Impervious Total	3.4
Basin Total	4.9

Element Flows To:

Surface	Interflow	Groundwater

Area 600 - Existing

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
ROADS FLAT	0.1
DRIVEWAYS FLAT	0.7
Impervious Total	0.8
Basin Total	0.8

Element Flows To:

Surface	Interflow	Groundwater

RailImp - Existing

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
DRIVEWAYS FLAT	3.5
Impervious Total	3.5
Basin Total	3.5

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Area 200 - Construction

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
A B, Pasture, Flat	0.1
Pervious Total	0.1

Impervious Land Use	Acres
ROADS FLAT	0.6
DRIVEWAYS FLAT	46.6
Impervious Total	47.2
Basin Total	47.3

Element Flows To:

Surface	Interflow	Groundwater

Area 300 - Construction

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
ROADS FLAT	0.3
DRIVEWAYS FLAT	24.6
Impervious Total	24.9
Basin Total	24.9

Element Flows To:

Surface	Interflow	Groundwater

Area 400 - Construction

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
DRIVEWAYS FLAT	2.2
Impervious Total	2.2
Basin Total	2.2

Element Flows To:

Surface	Interflow	Groundwater

Area 500 - Construction

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
A B, Pasture, Flat	0.5
Pervious Total	0.5

Impervious Land Use	Acres
ROADS FLAT	3.2
DRIVEWAYS FLAT	9.2
Impervious Total	12.4
Basin Total	12.9

Element Flows To:

Surface	Interflow	Groundwater

Area 600 - Construction

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
ROADS FLAT	0.3
DRIVEWAYS FLAT	1.1
Impervious Total	1.4
Basin Total	1.4

Element Flows To:

Surface	Interflow	Groundwater

RailImp - Construction

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
Pervious Total	0
Impervious Land Use	Acres
DRIVEWAYS FLAT	3.5
Impervious Total	3.5
Basin Total	3.5

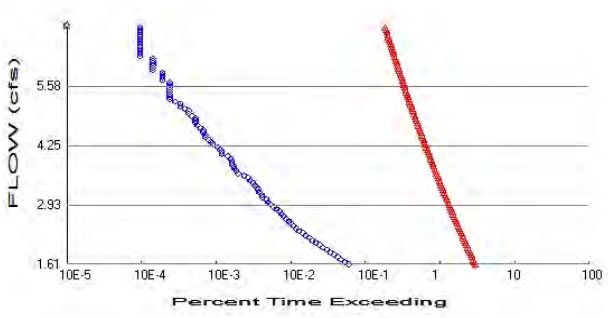
Element Flows To:

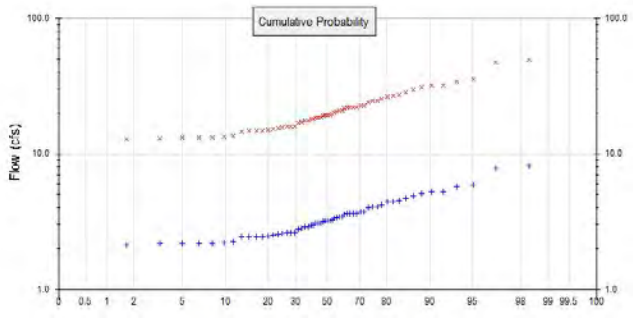
Surface	Interflow	Groundwater

Mitigated Routing

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 7.8

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.1
Total Impervious Area: 47.2

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	3.214386
5 year	4.271893
10 year	5.034589
25 year	6.071998
50 year	6.90004
100 year	7.776863

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	19.451303
5 year	25.850744
10 year	30.466169
25 year	36.744021
50 year	41.754912
100 year	47.061008

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	5.911	35.767
1950	2.758	16.688
1951	3.379	20.453
1952	3.450	20.878
1953	2.471	14.955
1954	4.409	26.682
1955	2.436	14.741
1956	4.055	24.538
1957	2.427	14.689
1958	3.587	21.705

1959	2.912	17.621
1960	3.051	18.465
1961	3.254	19.689
1962	2.183	13.209
1963	2.255	13.643
1964	2.424	14.665
1965	3.141	19.008
1966	2.557	15.476
1967	2.990	18.096
1968	5.248	31.756
1969	5.232	31.659
1970	7.762	46.976
1971	4.043	24.465
1972	3.068	18.567
1973	3.209	19.418
1974	3.621	21.909
1975	2.581	15.619
1976	2.826	17.103
1977	1.960	11.861
1978	3.192	19.317
1979	5.082	30.755
1980	2.508	15.177
1981	3.633	21.986
1982	3.641	22.031
1983	4.164	25.203
1984	2.437	14.745
1985	2.968	17.959
1986	4.515	27.323
1987	2.632	15.926
1988	2.636	15.952
1989	3.441	20.823
1990	2.108	12.753
1991	3.345	20.241
1992	2.223	13.454
1993	3.067	18.557
1994	2.635	15.948
1995	3.979	24.080
1996	5.679	34.367
1997	4.891	29.600
1998	4.713	28.520
1999	2.189	13.249
2000	2.165	13.102
2001	2.174	13.155
2002	3.758	22.743
2003	2.895	17.517
2004	3.631	21.969
2005	4.397	26.605
2006	3.725	22.539
2007	3.212	19.436
2008	8.170	49.439

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	8.1700	49.4392
2	7.7624	46.9760
3	5.9106	35.7669
4	5.6793	34.3668

5	5.2479	31.7563
6	5.2319	31.6594
7	5.0824	30.7551
8	4.8915	29.5996
9	4.7131	28.5204
10	4.5152	27.3225
11	4.4094	26.6823
12	4.3965	26.6045
13	4.1644	25.2030
14	4.0550	24.5380
15	4.0429	24.4648
16	3.9793	24.0800
17	3.7583	22.7425
18	3.7246	22.5386
19	3.6407	22.0311
20	3.6332	21.9858
21	3.6305	21.9692
22	3.6206	21.9093
23	3.5869	21.7054
24	3.4502	20.8783
25	3.4410	20.8226
26	3.3792	20.4533
27	3.3449	20.2407
28	3.2537	19.6889
29	3.2118	19.4355
30	3.2089	19.4182
31	3.1922	19.3167
32	3.1412	19.0082
33	3.0683	18.5673
34	3.0666	18.5569
35	3.0515	18.4654
36	2.9904	18.0959
37	2.9678	17.9590
38	2.9120	17.6214
39	2.8948	17.5172
40	2.8263	17.1030
41	2.7577	16.6875
42	2.6361	15.9521
43	2.6354	15.9475
44	2.6319	15.9262
45	2.5812	15.6193
46	2.5574	15.4756
47	2.5081	15.1774
48	2.4714	14.9549
49	2.4366	14.7445
50	2.4360	14.7407
51	2.4274	14.6888
52	2.4235	14.6653
53	2.2545	13.6427
54	2.2233	13.4535
55	2.1894	13.2489
56	2.1828	13.2088
57	2.1740	13.1553
58	2.1651	13.1017
59	2.1075	12.7533
60	1.9601	11.8610

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
1.6072	1258	63031	5010	Fail
1.6607	1118	60864	5444	Fail
1.7141	991	58844	5937	Fail
1.7676	896	56951	6356	Fail
1.8210	797	55057	6908	Fail
1.8745	712	53227	7475	Fail
1.9280	644	51418	7984	Fail
1.9814	572	49756	8698	Fail
2.0349	514	48178	9373	Fail
2.0884	455	46642	10250	Fail
2.1418	412	45106	10948	Fail
2.1953	372	43655	11735	Fail
2.2488	332	42308	12743	Fail
2.3022	305	40941	13423	Fail
2.3557	270	39615	14672	Fail
2.4091	251	38353	15280	Fail
2.4626	230	37154	16153	Fail
2.5161	209	35934	17193	Fail
2.5695	199	34819	17496	Fail
2.6230	181	33725	18632	Fail
2.6765	169	32631	19308	Fail
2.7299	158	31600	20000	Fail
2.7834	148	30632	20697	Fail
2.8368	136	29748	21873	Fail
2.8903	124	28865	23278	Fail
2.9438	112	28044	25039	Fail
2.9972	104	27140	26096	Fail
3.0507	99	26277	26542	Fail
3.1042	89	25499	28650	Fail
3.1576	87	24762	28462	Fail
3.2111	79	23984	30359	Fail
3.2645	77	23268	30218	Fail
3.3180	74	22553	30477	Fail
3.3715	70	21901	31287	Fail
3.4249	66	21291	32259	Fail
3.4784	61	20679	33900	Fail
3.5319	56	20077	35851	Fail
3.5853	50	19522	39044	Fail
3.6388	41	18975	46280	Fail
3.6923	39	18436	47271	Fail
3.7457	37	17889	48348	Fail
3.7992	36	17361	48225	Fail
3.8526	34	16898	49700	Fail
3.9061	34	16414	48276	Fail
3.9596	33	15983	48433	Fail
4.0130	30	15514	51713	Fail
4.0665	25	15063	60252	Fail
4.1200	25	14700	58800	Fail
4.1734	24	14254	59391	Fail
4.2269	22	13860	63000	Fail
4.2803	19	13475	70921	Fail
4.3338	18	13132	72955	Fail
4.3873	17	12785	75205	Fail
4.4407	15	12444	82960	Fail

4.4942	15	12116	80773	Fail
4.5477	14	11782	84157	Fail
4.6011	14	11436	81685	Fail
4.6546	13	11125	85576	Fail
4.7081	12	10807	90058	Fail
4.7615	11	10517	95609	Fail
4.8150	11	10250	93181	Fail
4.8684	11	9983	90754	Fail
4.9219	10	9705	97050	Fail
4.9754	9	9446	104955	Fail
5.0288	9	9194	102155	Fail
5.0823	8	8967	112087	Fail
5.1358	7	8750	125000	Fail
5.1892	7	8539	121985	Fail
5.2427	6	8298	138300	Fail
5.2961	5	8062	161240	Fail
5.3496	5	7862	157240	Fail
5.4031	5	7656	153120	Fail
5.4565	5	7469	149380	Fail
5.5100	5	7290	145800	Fail
5.5635	5	7113	142260	Fail
5.6169	5	6962	139240	Fail
5.6704	5	6789	135780	Fail
5.7239	4	6644	166100	Fail
5.7773	4	6474	161850	Fail
5.8308	4	6318	157950	Fail
5.8842	4	6156	153900	Fail
5.9377	3	6015	200500	Fail
5.9912	3	5874	195800	Fail
6.0446	3	5737	191233	Fail
6.0981	3	5605	186833	Fail
6.1516	3	5468	182266	Fail
6.2050	3	5321	177366	Fail
6.2585	2	5182	259100	Fail
6.3119	2	5066	253300	Fail
6.3654	2	4959	247950	Fail
6.4189	2	4839	241950	Fail
6.4723	2	4740	237000	Fail
6.5258	2	4601	230050	Fail
6.5793	2	4500	225000	Fail
6.6327	2	4399	219950	Fail
6.6862	2	4300	215000	Fail
6.7397	2	4206	210300	Fail
6.7931	2	4090	204500	Fail
6.8466	2	3991	199550	Fail
6.9000	2	3894	194700	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

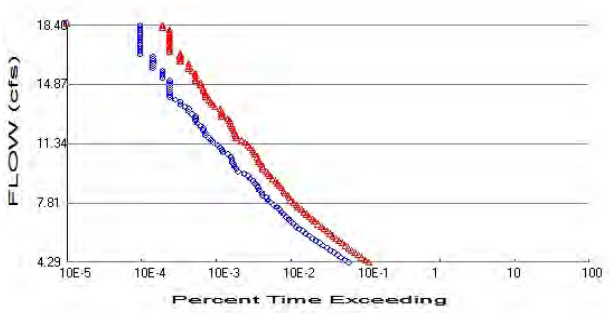
Water Quality BMP Flow and Volume for POC #1

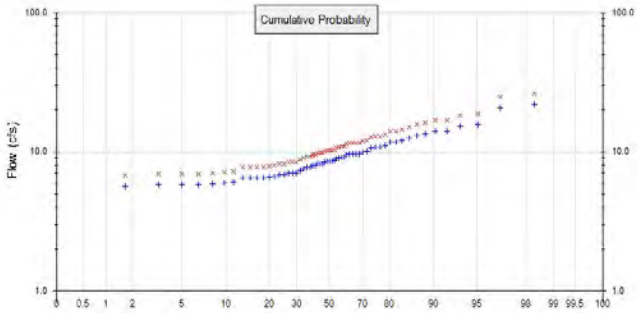
On-line facility volume:	5.3145 acre-feet
On-line facility target flow:	6.7254 cfs.
Adjusted for 15 min:	7.5997 cfs.
Off-line facility target flow:	3.8357 cfs.
Adjusted for 15 min:	4.3343 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment

POC 2





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #2
Total Pervious Area: 0
Total Impervious Area: 20.8

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0
Total Impervious Area: 24.9

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	**Flow(cfs)**
2 year	8.571694
5 year	11.391712
10 year	13.425566
25 year	16.191986
50 year	18.400096
100 year	20.738287

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	10.261309
5 year	13.637194
10 year	16.071952
25 year	19.383674
50 year	22.027036
100 year	24.82612

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #2

Year	**Predeveloped**	**Mitigated**
1949	15.762	18.869
1950	7.354	8.803
1951	9.011	10.788
1952	9.201	11.014
1953	6.590	7.889
1954	11.758	14.076
1955	6.496	7.776
1956	10.813	12.945
1957	6.473	7.749
1958	9.565	11.451
1959	7.765	9.296

1960	8.137	9.741
1961	8.676	10.387
1962	5.821	6.968
1963	6.012	7.197
1964	6.463	7.737
1965	8.376	10.028
1966	6.820	8.164
1967	7.974	9.546
1968	13.994	16.753
1969	13.952	16.702
1970	20.700	24.780
1971	10.781	12.906
1972	8.182	9.795
1973	8.557	10.244
1974	9.655	11.558
1975	6.883	8.240
1976	7.537	9.023
1977	5.227	6.257
1978	8.512	10.190
1979	13.553	16.225
1980	6.688	8.007
1981	9.689	11.598
1982	9.709	11.622
1983	11.105	13.294
1984	6.498	7.778
1985	7.914	9.474
1986	12.040	14.414
1987	7.018	8.402
1988	7.030	8.415
1989	9.176	10.985
1990	5.620	6.728
1991	8.920	10.678
1992	5.929	7.097
1993	8.178	9.790
1994	7.028	8.413
1995	10.612	12.703
1996	15.145	18.130
1997	13.044	15.615
1998	12.568	15.046
1999	5.838	6.989
2000	5.774	6.912
2001	5.797	6.940
2002	10.022	11.998
2003	7.719	9.241
2004	9.681	11.590
2005	11.724	14.035
2006	9.932	11.890
2007	8.565	10.253
2008	21.787	26.081

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	21.7867	26.0812
2	20.6996	24.7798
3	15.7617	18.8685
4	15.1447	18.1300
5	13.9943	16.7527

6	13.9516	16.7017
7	13.5531	16.2246
8	13.0439	15.6151
9	12.5683	15.0457
10	12.0404	14.4138
11	11.7583	14.0760
12	11.7240	14.0350
13	11.1051	13.2941
14	10.8132	12.9447
15	10.7811	12.9062
16	10.6115	12.7032
17	10.0221	11.9976
18	9.9323	11.8901
19	9.7086	11.6223
20	9.6886	11.5984
21	9.6813	11.5897
22	9.6550	11.5581
23	9.5651	11.4505
24	9.2006	11.0142
25	9.1761	10.9848
26	9.0113	10.7876
27	8.9196	10.6778
28	8.6765	10.3867
29	8.5648	10.2531
30	8.5572	10.2439
31	8.5124	10.1904
32	8.3765	10.0276
33	8.1822	9.7951
34	8.1776	9.7896
35	8.1373	9.7413
36	7.9745	9.5464
37	7.9141	9.4741
38	7.7653	9.2960
39	7.7194	9.2411
40	7.5369	9.0225
41	7.3538	8.8034
42	7.0297	8.4154
43	7.0277	8.4130
44	7.0183	8.4018
45	6.8831	8.2398
46	6.8197	8.1640
47	6.6883	8.0067
48	6.5903	7.8893
49	6.4976	7.7784
50	6.4959	7.7763
51	6.4730	7.7489
52	6.4627	7.7366
53	6.0120	7.1971
54	5.9287	7.0973
55	5.8385	6.9893
56	5.8208	6.9682
57	5.7972	6.9399
58	5.7736	6.9117
59	5.6201	6.7279
60	5.2269	6.2572

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
4.2858	1258	2339	185	Fail
4.4284	1117	2100	188	Fail
4.5710	992	1885	190	Fail
4.7136	894	1699	190	Fail
4.8561	797	1526	191	Fail
4.9987	712	1372	192	Fail
5.1413	642	1249	194	Fail
5.2838	572	1132	197	Fail
5.4264	514	1026	199	Fail
5.5690	455	930	204	Fail
5.7115	412	847	205	Fail
5.8541	372	774	208	Fail
5.9967	332	709	213	Fail
6.1392	305	652	213	Fail
6.2818	270	584	216	Fail
6.4244	251	540	215	Fail
6.5669	230	486	211	Fail
6.7095	209	441	211	Fail
6.8521	199	409	205	Fail
6.9946	181	373	206	Fail
7.1372	169	340	201	Fail
7.2798	158	316	200	Fail
7.4223	148	290	195	Fail
7.5649	136	263	193	Fail
7.7075	124	250	201	Fail
7.8501	112	230	205	Fail
7.9926	104	213	204	Fail
8.1352	99	202	204	Fail
8.2778	89	193	216	Fail
8.4203	87	175	201	Fail
8.5629	79	169	213	Fail
8.7055	77	158	205	Fail
8.8480	74	149	201	Fail
8.9906	70	139	198	Fail
9.1332	66	132	200	Fail
9.2757	61	120	196	Fail
9.4183	56	111	198	Fail
9.5609	50	104	208	Fail
9.7034	41	99	241	Fail
9.8460	39	89	228	Fail
9.9886	37	89	240	Fail
10.1311	36	83	230	Fail
10.2737	34	78	229	Fail
10.4163	34	77	226	Fail
10.5588	33	75	227	Fail
10.7014	30	70	233	Fail
10.8440	26	67	257	Fail
10.9866	25	65	260	Fail
11.1291	24	60	250	Fail
11.2717	22	56	254	Fail
11.4143	19	51	268	Fail
11.5568	18	46	255	Fail
11.6994	17	39	229	Fail
11.8420	15	39	260	Fail

11.9845	15	37	246	Fail
12.1271	14	36	257	Fail
12.2697	14	35	250	Fail
12.4122	13	34	261	Fail
12.5548	12	33	275	Fail
12.6974	11	32	290	Fail
12.8399	11	30	272	Fail
12.9825	11	25	227	Fail
13.1251	10	25	250	Fail
13.2676	9	25	277	Fail
13.4102	9	24	266	Fail
13.5528	8	20	250	Fail
13.6953	7	19	271	Fail
13.8379	7	18	257	Fail
13.9805	6	17	283	Fail
14.1231	5	15	300	Fail
14.2656	5	15	300	Fail
14.4082	5	15	300	Fail
14.5508	5	14	280	Fail
14.6933	5	14	280	Fail
14.8359	5	13	260	Fail
14.9785	5	13	260	Fail
15.1210	5	11	220	Fail
15.2636	4	11	275	Fail
15.4062	4	11	275	Fail
15.5487	4	11	275	Fail
15.6913	4	10	250	Fail
15.8339	3	9	300	Fail
15.9764	3	9	300	Fail
16.1190	3	9	300	Fail
16.2616	3	7	233	Fail
16.4041	3	7	233	Fail
16.5467	3	7	233	Fail
16.6893	2	7	350	Fail
16.8318	2	5	250	Fail
16.9744	2	5	250	Fail
17.1170	2	5	250	Fail
17.2596	2	5	250	Fail
17.4021	2	5	250	Fail
17.5447	2	5	250	Fail
17.6873	2	5	250	Fail
17.8298	2	5	250	Fail
17.9724	2	5	250	Fail
18.1150	2	5	250	Fail
18.2575	2	4	200	Fail
18.4001	2	4	200	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

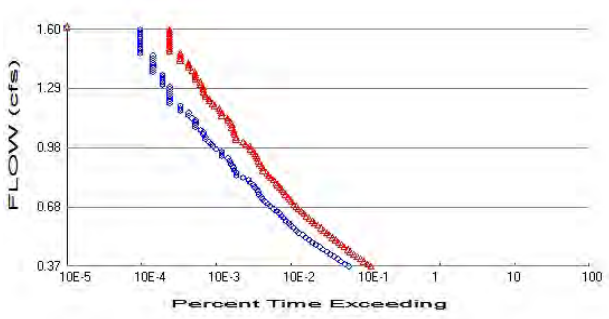
Water Quality BMP Flow and Volume for POC #2

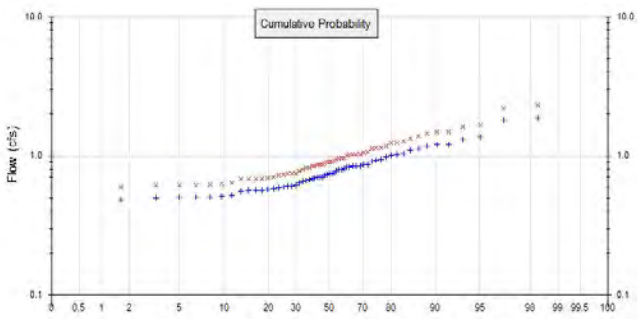
On-line facility volume:	2.8048 acre-feet
On-line facility target flow:	3.5479 cfs.
Adjusted for 15 min:	4.0091 cfs.
Off-line facility target flow:	2.0232 cfs.
Adjusted for 15 min:	2.2862 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment

POC 3





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #3
Total Pervious Area: 0.5
Total Impervious Area: 1.8

Mitigated Landuse Totals for POC #3
Total Pervious Area: 0
Total Impervious Area: 2.2

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #3

Return Period	**Flow(cfs)**
2 year	0.742504
5 year	0.987397
10 year	1.164103
25 year	1.40455
50 year	1.596536
100 year	1.799887

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	0.906622
5 year	1.204892
10 year	1.420012
25 year	1.712613
50 year	1.946163
100 year	2.193472

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #3

Year	**Predeveloped**	**Mitigated**
1949	1.364	1.667
1950	0.636	0.778
1951	0.802	0.953
1952	0.796	0.973
1953	0.571	0.697
1954	1.018	1.244
1955	0.562	0.687
1956	0.937	1.144
1957	0.560	0.685
1958	0.828	1.012
1959	0.672	0.821

1960	0.704	0.861
1961	0.751	0.918
1962	0.504	0.616
1963	0.520	0.636
1964	0.559	0.684
1965	0.725	0.886
1966	0.590	0.721
1967	0.690	0.843
1968	1.211	1.480
1969	1.207	1.476
1970	1.810	2.189
1971	0.933	1.140
1972	0.708	0.865
1973	0.741	0.905
1974	0.836	1.021
1975	0.596	0.728
1976	0.652	0.797
1977	0.452	0.553
1978	0.737	0.900
1979	1.173	1.434
1980	0.579	0.707
1981	0.838	1.025
1982	0.840	1.027
1983	0.976	1.175
1984	0.562	0.687
1985	0.685	0.837
1986	1.042	1.274
1987	0.607	0.742
1988	0.609	0.744
1989	0.794	0.971
1990	0.486	0.594
1991	0.772	0.943
1992	0.513	0.627
1993	0.708	0.865
1994	0.608	0.743
1995	0.918	1.122
1996	1.311	1.602
1997	1.129	1.380
1998	1.088	1.329
1999	0.505	0.618
2000	0.500	0.611
2001	0.502	0.613
2002	0.867	1.060
2003	0.668	0.816
2004	0.838	1.024
2005	1.015	1.240
2006	0.860	1.051
2007	0.741	0.906
2008	1.886	2.304

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #3

Rank	Predeveloped	Mitigated
1	1.8855	2.3044
2	1.8102	2.1894
3	1.3640	1.6671
4	1.3106	1.6018
5	1.2113	1.4802

6	1.2074	1.4757
7	1.1729	1.4335
8	1.1288	1.3796
9	1.0877	1.3293
10	1.0421	1.2735
11	1.0179	1.2437
12	1.0147	1.2400
13	0.9756	1.1746
14	0.9370	1.1437
15	0.9331	1.1403
16	0.9185	1.1224
17	0.8673	1.0600
18	0.8596	1.0505
19	0.8403	1.0269
20	0.8384	1.0248
21	0.8380	1.0240
22	0.8355	1.0212
23	0.8278	1.0117
24	0.8024	0.9731
25	0.7962	0.9705
26	0.7941	0.9531
27	0.7719	0.9434
28	0.7509	0.9177
29	0.7412	0.9059
30	0.7406	0.9051
31	0.7367	0.9004
32	0.7249	0.8860
33	0.7081	0.8654
34	0.7077	0.8649
35	0.7042	0.8607
36	0.6901	0.8435
37	0.6851	0.8371
38	0.6724	0.8213
39	0.6681	0.8165
40	0.6523	0.7972
41	0.6364	0.7778
42	0.6086	0.7435
43	0.6084	0.7433
44	0.6074	0.7423
45	0.5957	0.7280
46	0.5905	0.7213
47	0.5788	0.7074
48	0.5707	0.6970
49	0.5623	0.6872
50	0.5622	0.6871
51	0.5602	0.6846
52	0.5593	0.6836
53	0.5204	0.6359
54	0.5131	0.6271
55	0.5053	0.6175
56	0.5037	0.6157
57	0.5020	0.6132
58	0.4996	0.6107
59	0.4864	0.5944
60	0.4524	0.5528

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3713	1259	2508	199	Fail
0.3836	1120	2247	200	Fail
0.3960	989	2013	203	Fail
0.4084	894	1813	202	Fail
0.4208	800	1634	204	Fail
0.4331	711	1477	207	Fail
0.4455	643	1335	207	Fail
0.4579	573	1222	213	Fail
0.4703	513	1096	213	Fail
0.4826	454	1005	221	Fail
0.4950	410	914	222	Fail
0.5074	371	834	224	Fail
0.5198	332	763	229	Fail
0.5321	304	699	229	Fail
0.5445	269	639	237	Fail
0.5569	251	581	231	Fail
0.5693	230	536	233	Fail
0.5817	211	484	229	Fail
0.5940	198	436	220	Fail
0.6064	180	408	226	Fail
0.6188	169	373	220	Fail
0.6312	158	337	213	Fail
0.6435	147	316	214	Fail
0.6559	136	293	215	Fail
0.6683	124	264	212	Fail
0.6807	111	250	225	Fail
0.6930	104	230	221	Fail
0.7054	95	215	226	Fail
0.7178	89	205	230	Fail
0.7302	86	195	226	Fail
0.7426	78	178	228	Fail
0.7549	77	169	219	Fail
0.7673	74	160	216	Fail
0.7797	70	150	214	Fail
0.7921	67	140	208	Fail
0.8044	60	133	221	Fail
0.8168	57	124	217	Fail
0.8292	48	113	235	Fail
0.8416	39	105	269	Fail
0.8539	39	101	258	Fail
0.8663	37	90	243	Fail
0.8787	36	89	247	Fail
0.8911	35	86	245	Fail
0.9034	33	81	245	Fail
0.9158	32	78	243	Fail
0.9282	30	75	250	Fail
0.9406	25	73	292	Fail
0.9530	25	70	280	Fail
0.9653	25	66	264	Fail
0.9777	21	61	290	Fail
0.9901	19	59	310	Fail
1.0025	18	52	288	Fail
1.0148	17	48	282	Fail
1.0272	15	39	260	Fail

1.0396	15	39	260	Fail
1.0520	14	37	264	Fail
1.0643	14	36	257	Fail
1.0767	13	36	276	Fail
1.0891	11	34	309	Fail
1.1015	11	34	309	Fail
1.1138	11	33	300	Fail
1.1262	11	30	272	Fail
1.1386	10	30	300	Fail
1.1510	9	25	277	Fail
1.1634	9	25	277	Fail
1.1757	7	24	342	Fail
1.1881	7	23	328	Fail
1.2005	7	20	285	Fail
1.2129	5	19	380	Fail
1.2252	5	17	340	Fail
1.2376	5	17	340	Fail
1.2500	5	15	300	Fail
1.2624	5	15	300	Fail
1.2747	5	14	280	Fail
1.2871	5	14	280	Fail
1.2995	5	14	280	Fail
1.3119	4	13	325	Fail
1.3243	4	13	325	Fail
1.3366	4	11	275	Fail
1.3490	4	11	275	Fail
1.3614	4	11	275	Fail
1.3738	3	11	366	Fail
1.3861	3	10	333	Fail
1.3985	3	9	300	Fail
1.4109	3	9	300	Fail
1.4233	3	9	300	Fail
1.4356	3	7	233	Fail
1.4480	3	7	233	Fail
1.4604	3	7	233	Fail
1.4728	2	7	350	Fail
1.4851	2	5	250	Fail
1.4975	2	5	250	Fail
1.5099	2	5	250	Fail
1.5223	2	5	250	Fail
1.5347	2	5	250	Fail
1.5470	2	5	250	Fail
1.5594	2	5	250	Fail
1.5718	2	5	250	Fail
1.5842	2	5	250	Fail
1.5965	2	5	250	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

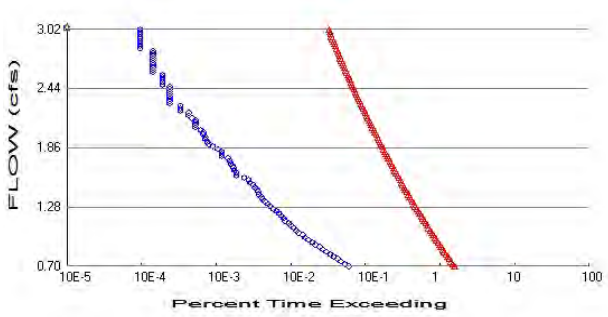
Water Quality BMP Flow and Volume for POC #3

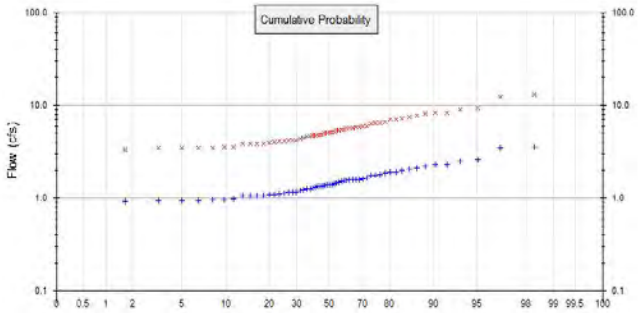
On-line facility volume:	0.169 acre-feet
On-line facility target flow:	0.2137 cfs.
Adjusted for 15 min:	0.2415 cfs.
Off-line facility target flow:	0.1218 cfs.
Adjusted for 15 min:	0.1377 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment

POC 4





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #4
Total Pervious Area: 1.5
Total Impervious Area: 3.4

Mitigated Landuse Totals for POC #4
Total Pervious Area: 0.5
Total Impervious Area: 12.4

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #4

Return Period	**Flow(cfs)**
2 year	1.403297
5 year	1.866852
10 year	2.201438
25 year	2.656822
50 year	3.020503
100 year	3.405777

Flow Frequency Return Periods for Mitigated. POC #4

Return Period	**Flow(cfs)**
2 year	5.11078
5 year	6.792783
10 year	8.005961
25 year	9.656198
50 year	10.973454
100 year	12.368363

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #4

Year	**Predeveloped**	**Mitigated**
1949	2.577	9.396
1950	1.202	4.384
1951	1.541	5.395
1952	1.504	5.485
1953	1.078	3.929
1954	1.923	7.010
1955	1.062	3.873
1956	1.771	6.448
1957	1.058	3.859
1958	1.564	5.702
1959	1.270	4.630

1960	1.330	4.851
1961	1.418	5.173
1962	0.951	3.470
1963	0.983	3.584
1964	1.057	3.853
1965	1.369	4.994
1966	1.116	4.066
1967	1.304	4.754
1968	2.288	8.343
1969	2.281	8.317
1970	3.440	12.359
1971	1.763	6.427
1972	1.338	4.878
1973	1.399	5.101
1974	1.578	5.756
1975	1.125	4.103
1976	1.232	4.493
1977	0.855	3.116
1978	1.392	5.075
1979	2.215	8.080
1980	1.093	3.987
1981	1.584	5.776
1982	1.587	5.788
1983	1.859	6.635
1984	1.062	3.874
1985	1.294	4.718
1986	1.969	7.178
1987	1.147	4.184
1988	1.150	4.191
1989	1.500	5.470
1990	0.919	3.350
1991	1.458	5.317
1992	0.969	3.534
1993	1.337	4.875
1994	1.150	4.190
1995	1.735	6.326
1996	2.476	9.029
1997	2.132	7.776
1998	2.054	7.493
1999	0.955	3.481
2000	0.944	3.442
2001	0.949	3.456
2002	1.638	5.975
2003	1.262	4.602
2004	1.583	5.772
2005	1.917	6.989
2006	1.624	5.921
2007	1.400	5.106
2008	3.562	12.988

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #4

Rank	**Predeveloped**	**Mitigated**
1	3.5616	12.9884
2	3.4404	12.3591
3	2.5765	9.3964
4	2.4756	9.0286
5	2.2884	8.3430

6	2.2806	8.3173
7	2.2155	8.0798
8	2.1323	7.7762
9	2.0545	7.4927
10	1.9686	7.1781
11	1.9231	7.0101
12	1.9168	6.9894
13	1.8590	6.6349
14	1.7712	6.4476
15	1.7625	6.4273
16	1.7351	6.3263
17	1.6383	5.9748
18	1.6237	5.9212
19	1.5874	5.7880
20	1.5838	5.7759
21	1.5830	5.7717
22	1.5783	5.7559
23	1.5636	5.7023
24	1.5408	5.4850
25	1.5040	5.4704
26	1.5000	5.3947
27	1.4581	5.3175
28	1.4183	5.1725
29	1.4000	5.1059
30	1.3989	5.1015
31	1.3915	5.0747
32	1.3693	4.9937
33	1.3376	4.8779
34	1.3367	4.8751
35	1.3301	4.8511
36	1.3035	4.7540
37	1.2943	4.7182
38	1.2704	4.6297
39	1.2619	4.6020
40	1.2321	4.4932
41	1.2021	4.3840
42	1.1498	4.1910
43	1.1495	4.1898
44	1.1472	4.1840
45	1.1251	4.1034
46	1.1157	4.0659
47	1.0933	3.9873
48	1.0784	3.9292
49	1.0621	3.8736
50	1.0619	3.8726
51	1.0581	3.8589
52	1.0566	3.8528
53	0.9832	3.5843
54	0.9691	3.5344
55	0.9545	3.4807
56	0.9515	3.4701
57	0.9486	3.4564
58	0.9438	3.4420
59	0.9188	3.3505
60	0.8547	3.1161

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.7016	1257	32799	2609	Fail
0.7251	1112	31032	2790	Fail
0.7485	990	29580	2987	Fail
0.7719	894	28170	3151	Fail
0.7953	793	26656	3361	Fail
0.8188	711	25351	3565	Fail
0.8422	639	24068	3766	Fail
0.8656	570	22890	4015	Fail
0.8890	509	21775	4277	Fail
0.9125	451	20771	4605	Fail
0.9359	411	19793	4815	Fail
0.9593	367	18836	5132	Fail
0.9827	331	17967	5428	Fail
1.0061	303	17115	5648	Fail
1.0296	269	16341	6074	Fail
1.0530	251	15579	6206	Fail
1.0764	230	14870	6465	Fail
1.0998	211	14184	6722	Fail
1.1233	198	13526	6831	Fail
1.1467	178	12932	7265	Fail
1.1701	169	12375	7322	Fail
1.1935	158	11819	7480	Fail
1.2169	145	11268	7771	Fail
1.2404	136	10732	7891	Fail
1.2638	122	10284	8429	Fail
1.2872	111	9825	8851	Fail
1.3106	104	9402	9040	Fail
1.3341	94	8983	9556	Fail
1.3575	89	8638	9705	Fail
1.3809	86	8249	9591	Fail
1.4043	78	7883	10106	Fail
1.4278	77	7563	9822	Fail
1.4512	74	7241	9785	Fail
1.4746	69	6970	10101	Fail
1.4980	66	6697	10146	Fail
1.5214	61	6438	10554	Fail
1.5449	57	6179	10840	Fail
1.5683	50	5939	11878	Fail
1.5917	39	5710	14641	Fail
1.6151	39	5483	14058	Fail
1.6386	37	5243	14170	Fail
1.6620	36	5045	14013	Fail
1.6854	35	4847	13848	Fail
1.7088	33	4664	14133	Fail
1.7323	32	4475	13984	Fail
1.7557	30	4311	14370	Fail
1.7791	25	4134	16536	Fail
1.8025	25	3968	15872	Fail
1.8259	25	3814	15256	Fail
1.8494	22	3686	16754	Fail
1.8728	19	3551	18689	Fail
1.8962	17	3415	20088	Fail
1.9196	16	3309	20681	Fail
1.9431	15	3181	21206	Fail

1.9665	15	3076	20506	Fail
1.9899	14	2958	21128	Fail
2.0133	14	2851	20364	Fail
2.0367	13	2735	21038	Fail
2.0602	11	2617	23790	Fail
2.0836	11	2535	23045	Fail
2.1070	11	2445	22227	Fail
2.1304	11	2354	21400	Fail
2.1539	10	2264	22640	Fail
2.1773	9	2175	24166	Fail
2.2007	9	2114	23488	Fail
2.2241	7	2045	29214	Fail
2.2476	7	1969	28128	Fail
2.2710	7	1893	27042	Fail
2.2944	5	1827	36540	Fail
2.3178	5	1771	35420	Fail
2.3412	5	1707	34140	Fail
2.3647	5	1643	32860	Fail
2.3881	5	1588	31760	Fail
2.4115	5	1544	30879	Fail
2.4349	5	1487	29740	Fail
2.4584	5	1436	28720	Fail
2.4818	4	1385	34625	Fail
2.5052	4	1343	33575	Fail
2.5286	4	1299	32475	Fail
2.5520	4	1261	31525	Fail
2.5755	4	1223	30575	Fail
2.5989	3	1188	39600	Fail
2.6223	3	1143	38100	Fail
2.6457	3	1107	36900	Fail
2.6692	3	1069	35633	Fail
2.6926	3	1044	34800	Fail
2.7160	3	1006	33533	Fail
2.7394	3	973	32433	Fail
2.7629	3	947	31566	Fail
2.7863	3	917	30566	Fail
2.8097	3	896	29866	Fail
2.8331	2	864	43200	Fail
2.8565	2	835	41750	Fail
2.8800	2	808	40400	Fail
2.9034	2	791	39550	Fail
2.9268	2	762	38100	Fail
2.9502	2	737	36850	Fail
2.9737	2	718	35900	Fail
2.9971	2	701	35050	Fail
3.0205	2	682	34100	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

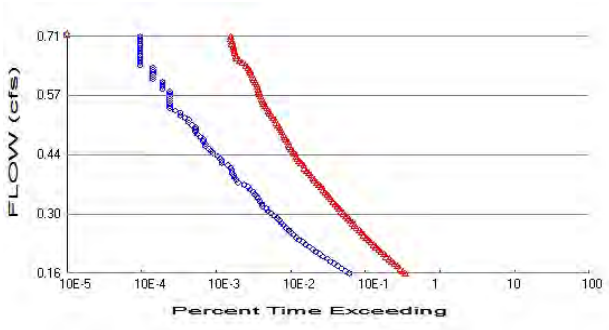
Water Quality BMP Flow and Volume for POC #4

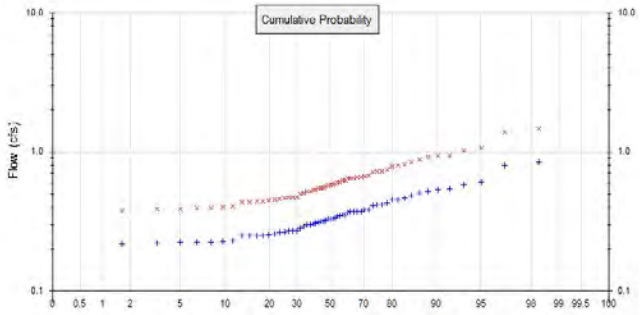
On-line facility volume:	1.3964 acre-feet
On-line facility target flow:	1.7668 cfs.
Adjusted for 15 min:	1.9964 cfs.
Off-line facility target flow:	1.0074 cfs.
Adjusted for 15 min:	1.1383 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment

POC 5





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #5
Total Pervious Area: 0
Total Impervious Area: 0.8

Mitigated Landuse Totals for POC #5
Total Pervious Area: 0
Total Impervious Area: 1.4

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #5

Return Period	**Flow(cfs)**
2 year	0.329681
5 year	0.438143
10 year	0.516368
25 year	0.622769
50 year	0.707696
100 year	0.797627

Flow Frequency Return Periods for Mitigated. POC #5

Return Period	**Flow(cfs)**
2 year	0.576941
5 year	0.76675
10 year	0.903644
25 year	1.089846
50 year	1.238469
100 year	1.395847

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #5

Year	**Predeveloped**	**Mitigated**
1949	0.606	1.061
1950	0.283	0.495
1951	0.347	0.607
1952	0.354	0.619
1953	0.253	0.444
1954	0.452	0.791
1955	0.250	0.437
1956	0.416	0.728
1957	0.249	0.436
1958	0.368	0.644
1959	0.299	0.523

1960	0.313	0.548
1961	0.334	0.584
1962	0.224	0.392
1963	0.231	0.405
1964	0.249	0.435
1965	0.322	0.564
1966	0.262	0.459
1967	0.307	0.537
1968	0.538	0.942
1969	0.537	0.939
1970	0.796	1.393
1971	0.415	0.726
1972	0.315	0.551
1973	0.329	0.576
1974	0.371	0.650
1975	0.265	0.463
1976	0.290	0.507
1977	0.201	0.352
1978	0.327	0.573
1979	0.521	0.912
1980	0.257	0.450
1981	0.373	0.652
1982	0.373	0.653
1983	0.427	0.747
1984	0.250	0.437
1985	0.304	0.533
1986	0.463	0.810
1987	0.270	0.472
1988	0.270	0.473
1989	0.353	0.618
1990	0.216	0.378
1991	0.343	0.600
1992	0.228	0.399
1993	0.315	0.550
1994	0.270	0.473
1995	0.408	0.714
1996	0.582	1.019
1997	0.502	0.878
1998	0.483	0.846
1999	0.225	0.393
2000	0.222	0.389
2001	0.223	0.390
2002	0.385	0.675
2003	0.297	0.520
2004	0.372	0.652
2005	0.451	0.789
2006	0.382	0.669
2007	0.329	0.576
2008	0.838	1.466

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #5

Rank	Predeveloped	Mitigated
1	0.8380	1.4664
2	0.7961	1.3932
3	0.6062	1.0609
4	0.5825	1.0194
5	0.5382	0.9419

6	0.5366	0.9391
7	0.5213	0.9122
8	0.5017	0.8780
9	0.4834	0.8459
10	0.4631	0.8104
11	0.4522	0.7914
12	0.4509	0.7891
13	0.4271	0.7475
14	0.4159	0.7278
15	0.4147	0.7257
16	0.4081	0.7142
17	0.3855	0.6746
18	0.3820	0.6685
19	0.3734	0.6535
20	0.3726	0.6521
21	0.3724	0.6516
22	0.3713	0.6499
23	0.3679	0.6438
24	0.3539	0.6193
25	0.3529	0.6176
26	0.3466	0.6065
27	0.3431	0.6004
28	0.3337	0.5840
29	0.3294	0.5765
30	0.3291	0.5760
31	0.3274	0.5730
32	0.3222	0.5638
33	0.3147	0.5507
34	0.3145	0.5504
35	0.3130	0.5477
36	0.3067	0.5367
37	0.3044	0.5327
38	0.2987	0.5227
39	0.2969	0.5196
40	0.2899	0.5073
41	0.2828	0.4950
42	0.2704	0.4732
43	0.2703	0.4730
44	0.2699	0.4724
45	0.2647	0.4633
46	0.2623	0.4590
47	0.2572	0.4502
48	0.2535	0.4436
49	0.2499	0.4373
50	0.2498	0.4372
51	0.2490	0.4357
52	0.2486	0.4350
53	0.2312	0.4047
54	0.2280	0.3990
55	0.2246	0.3930
56	0.2239	0.3918
57	0.2230	0.3902
58	0.2221	0.3886
59	0.2162	0.3783
60	0.2010	0.3518

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1648	1282	7218	563	Fail
0.1703	1126	6621	588	Fail
0.1758	1012	6116	604	Fail
0.1813	899	5596	622	Fail
0.1868	805	5154	640	Fail
0.1923	715	4738	662	Fail
0.1977	652	4382	672	Fail
0.2032	574	3991	695	Fail
0.2087	519	3720	716	Fail
0.2142	455	3423	752	Fail
0.2197	418	3194	764	Fail
0.2252	372	2937	789	Fail
0.2306	333	2727	818	Fail
0.2361	306	2512	820	Fail
0.2416	272	2335	858	Fail
0.2471	251	2154	858	Fail
0.2526	230	2013	875	Fail
0.2581	209	1850	885	Fail
0.2635	199	1740	874	Fail
0.2690	181	1598	882	Fail
0.2745	169	1508	892	Fail
0.2800	160	1410	881	Fail
0.2855	149	1307	877	Fail
0.2910	137	1233	900	Fail
0.2964	127	1144	900	Fail
0.3019	114	1073	941	Fail
0.3074	104	1001	962	Fail
0.3129	99	943	952	Fail
0.3184	89	883	992	Fail
0.3239	87	831	955	Fail
0.3293	81	775	956	Fail
0.3348	77	725	941	Fail
0.3403	74	687	928	Fail
0.3458	70	652	931	Fail
0.3513	66	604	915	Fail
0.3568	61	570	934	Fail
0.3622	56	536	957	Fail
0.3677	50	504	1008	Fail
0.3732	41	468	1141	Fail
0.3787	39	436	1117	Fail
0.3842	37	414	1118	Fail
0.3897	36	390	1083	Fail
0.3951	34	367	1079	Fail
0.4006	34	341	1002	Fail
0.4061	33	322	975	Fail
0.4116	30	313	1043	Fail
0.4171	25	292	1168	Fail
0.4226	25	272	1088	Fail
0.4280	24	256	1066	Fail
0.4335	22	250	1136	Fail
0.4390	19	236	1242	Fail
0.4445	18	225	1250	Fail
0.4500	17	214	1258	Fail
0.4555	15	206	1373	Fail

0.4609	15	199	1326	Fail
0.4664	14	192	1371	Fail
0.4719	14	180	1285	Fail
0.4774	13	172	1323	Fail
0.4829	12	169	1408	Fail
0.4884	11	160	1454	Fail
0.4938	11	155	1409	Fail
0.4993	11	149	1354	Fail
0.5048	10	140	1400	Fail
0.5103	9	136	1511	Fail
0.5158	9	130	1444	Fail
0.5213	8	121	1512	Fail
0.5267	7	116	1657	Fail
0.5322	7	109	1557	Fail
0.5377	6	104	1733	Fail
0.5432	5	101	2020	Fail
0.5487	5	96	1920	Fail
0.5542	5	89	1779	Fail
0.5596	5	89	1779	Fail
0.5651	5	87	1740	Fail
0.5706	5	83	1660	Fail
0.5761	5	80	1600	Fail
0.5816	5	78	1560	Fail
0.5871	4	77	1925	Fail
0.5925	4	75	1875	Fail
0.5980	4	74	1850	Fail
0.6035	4	70	1750	Fail
0.6090	3	67	2233	Fail
0.6145	3	66	2200	Fail
0.6200	3	63	2100	Fail
0.6254	3	60	2000	Fail
0.6309	3	59	1966	Fail
0.6364	3	56	1866	Fail
0.6419	2	52	2600	Fail
0.6474	2	47	2350	Fail
0.6529	2	43	2150	Fail
0.6583	2	39	1950	Fail
0.6638	2	39	1950	Fail
0.6693	2	37	1850	Fail
0.6748	2	37	1850	Fail
0.6803	2	36	1800	Fail
0.6858	2	36	1800	Fail
0.6912	2	34	1700	Fail
0.6967	2	34	1700	Fail
0.7022	2	33	1650	Fail
0.7077	2	33	1650	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

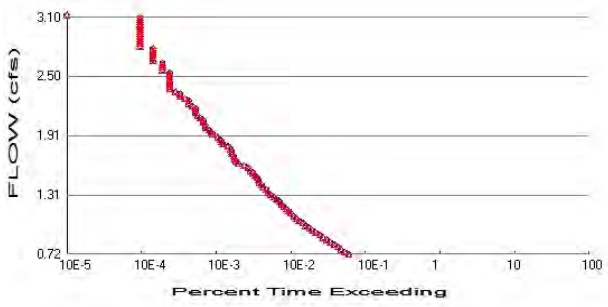
Water Quality BMP Flow and Volume for POC #5

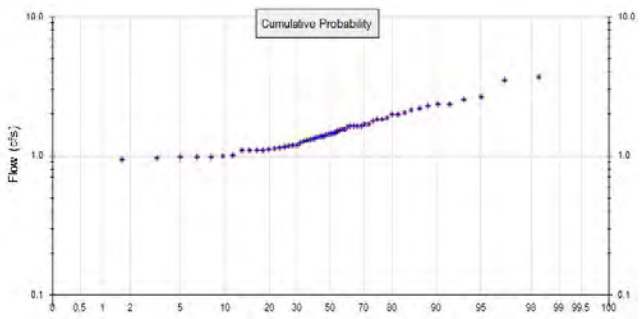
On-line facility volume:	0.1576 acre-feet
On-line facility target flow:	0.1994 cfs.
Adjusted for 15 min:	0.2254 cfs.
Off-line facility target flow:	0.1137 cfs.
Adjusted for 15 min:	0.1284 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment

POC 6





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #6
Total Pervious Area: 0
Total Impervious Area: 3.5

Mitigated Landuse Totals for POC #6
Total Pervious Area: 0
Total Impervious Area: 3.5

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #6

Return Period	**Flow(cfs)**
2 year	1.442353
5 year	1.916875
10 year	2.25911
25 year	2.724614
50 year	3.096171
100 year	3.489617

Flow Frequency Return Periods for Mitigated. POC #6

Return Period	**Flow(cfs)**
2 year	1.442353
5 year	1.916875
10 year	2.25911
25 year	2.724614
50 year	3.096171
100 year	3.489617

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #6

Year	**Predeveloped**	**Mitigated**
1949	2.652	2.652
1950	1.237	1.237
1951	1.516	1.516
1952	1.548	1.548
1953	1.109	1.109
1954	1.979	1.979
1955	1.093	1.093
1956	1.820	1.820
1957	1.089	1.089
1958	1.610	1.610
1959	1.307	1.307

1960	1.369	1.369
1961	1.460	1.460
1962	0.979	0.979
1963	1.012	1.012
1964	1.087	1.087
1965	1.410	1.410
1966	1.148	1.148
1967	1.342	1.342
1968	2.355	2.355
1969	2.348	2.348
1970	3.483	3.483
1971	1.814	1.814
1972	1.377	1.377
1973	1.440	1.440
1974	1.625	1.625
1975	1.158	1.158
1976	1.268	1.268
1977	0.880	0.880
1978	1.432	1.432
1979	2.281	2.281
1980	1.125	1.125
1981	1.630	1.630
1982	1.634	1.634
1983	1.869	1.869
1984	1.093	1.093
1985	1.332	1.332
1986	2.026	2.026
1987	1.181	1.181
1988	1.183	1.183
1989	1.544	1.544
1990	0.946	0.946
1991	1.501	1.501
1992	0.998	0.998
1993	1.376	1.376
1994	1.183	1.183
1995	1.786	1.786
1996	2.548	2.548
1997	2.195	2.195
1998	2.115	2.115
1999	0.982	0.982
2000	0.972	0.972
2001	0.975	0.975
2002	1.686	1.686
2003	1.299	1.299
2004	1.629	1.629
2005	1.973	1.973
2006	1.671	1.671
2007	1.441	1.441
2008	3.666	3.666

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #6

Rank	Predeveloped	Mitigated
1	3.6660	3.6660
2	3.4831	3.4831
3	2.6522	2.6522
4	2.5484	2.5484
5	2.3548	2.3548

6	2.3476	2.3476
7	2.2806	2.2806
8	2.1949	2.1949
9	2.1149	2.1149
10	2.0260	2.0260
11	1.9786	1.9786
12	1.9728	1.9728
13	1.8687	1.8687
14	1.8195	1.8195
15	1.8141	1.8141
16	1.7856	1.7856
17	1.6864	1.6864
18	1.6713	1.6713
19	1.6337	1.6337
20	1.6303	1.6303
21	1.6291	1.6291
22	1.6246	1.6246
23	1.6095	1.6095
24	1.5482	1.5482
25	1.5441	1.5441
26	1.5163	1.5163
27	1.5009	1.5009
28	1.4600	1.4600
29	1.4412	1.4412
30	1.4399	1.4399
31	1.4324	1.4324
32	1.4095	1.4095
33	1.3768	1.3768
34	1.3760	1.3760
35	1.3693	1.3693
36	1.3419	1.3419
37	1.3317	1.3317
38	1.3067	1.3067
39	1.2989	1.2989
40	1.2682	1.2682
41	1.2374	1.2374
42	1.1829	1.1829
43	1.1826	1.1826
44	1.1810	1.1810
45	1.1582	1.1582
46	1.1476	1.1476
47	1.1254	1.1254
48	1.1089	1.1089
49	1.0933	1.0933
50	1.0931	1.0931
51	1.0892	1.0892
52	1.0875	1.0875
53	1.0116	1.0116
54	0.9976	0.9976
55	0.9824	0.9824
56	0.9795	0.9795
57	0.9755	0.9755
58	0.9715	0.9715
59	0.9457	0.9457
60	0.8795	0.8795

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.7212	1258	1258	100	Pass
0.7452	1117	1117	100	Pass
0.7692	992	992	100	Pass
0.7931	894	894	100	Pass
0.8171	797	797	100	Pass
0.8411	712	712	100	Pass
0.8651	643	643	100	Pass
0.8891	572	572	100	Pass
0.9131	514	514	100	Pass
0.9371	455	455	100	Pass
0.9611	412	412	100	Pass
0.9851	372	372	100	Pass
1.0091	332	332	100	Pass
1.0330	305	305	100	Pass
1.0570	270	270	100	Pass
1.0810	251	251	100	Pass
1.1050	230	230	100	Pass
1.1290	209	209	100	Pass
1.1530	199	199	100	Pass
1.1770	183	183	100	Pass
1.2010	169	169	100	Pass
1.2250	158	158	100	Pass
1.2490	149	149	100	Pass
1.2729	136	136	100	Pass
1.2969	126	126	100	Pass
1.3209	112	112	100	Pass
1.3449	104	104	100	Pass
1.3689	99	99	100	Pass
1.3929	89	89	100	Pass
1.4169	87	87	100	Pass
1.4409	80	80	100	Pass
1.4649	77	77	100	Pass
1.4889	74	74	100	Pass
1.5128	70	70	100	Pass
1.5368	66	66	100	Pass
1.5608	61	61	100	Pass
1.5848	56	56	100	Pass
1.6088	50	50	100	Pass
1.6328	41	41	100	Pass
1.6568	39	39	100	Pass
1.6808	37	37	100	Pass
1.7048	36	36	100	Pass
1.7287	34	34	100	Pass
1.7527	34	34	100	Pass
1.7767	33	33	100	Pass
1.8007	30	30	100	Pass
1.8247	26	26	100	Pass
1.8487	25	25	100	Pass
1.8727	24	24	100	Pass
1.8967	22	22	100	Pass
1.9207	19	19	100	Pass
1.9447	18	18	100	Pass
1.9686	17	17	100	Pass

1.9926	15	15	100	Pass
2.0166	15	15	100	Pass
2.0406	14	14	100	Pass
2.0646	14	14	100	Pass
2.0886	13	13	100	Pass
2.1126	12	12	100	Pass
2.1366	11	11	100	Pass
2.1606	11	11	100	Pass
2.1846	11	11	100	Pass
2.2085	10	10	100	Pass
2.2325	9	9	100	Pass
2.2565	9	9	100	Pass
2.2805	8	8	100	Pass
2.3045	7	7	100	Pass
2.3285	7	7	100	Pass
2.3525	6	6	100	Pass
2.3765	5	5	100	Pass
2.4005	5	5	100	Pass
2.4245	5	5	100	Pass
2.4484	5	5	100	Pass
2.4724	5	5	100	Pass
2.4964	5	5	100	Pass
2.5204	5	5	100	Pass
2.5444	5	5	100	Pass
2.5684	4	4	100	Pass
2.5924	4	4	100	Pass
2.6164	4	4	100	Pass
2.6404	4	4	100	Pass
2.6644	3	3	100	Pass
2.6883	3	3	100	Pass
2.7123	3	3	100	Pass
2.7363	3	3	100	Pass
2.7603	3	3	100	Pass
2.7843	3	3	100	Pass
2.8083	2	2	100	Pass
2.8323	2	2	100	Pass
2.8563	2	2	100	Pass
2.8803	2	2	100	Pass
2.9043	2	2	100	Pass
2.9282	2	2	100	Pass
2.9522	2	2	100	Pass
2.9762	2	2	100	Pass
3.0002	2	2	100	Pass
3.0242	2	2	100	Pass
3.0482	2	2	100	Pass
3.0722	2	2	100	Pass
3.0962	2	2	100	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #6

On-line facility volume:	0.6083 acre-feet
On-line facility target flow:	0.7694 cfs.
Adjusted for 15 min:	0.8695 cfs.
Off-line facility target flow:	0.4386 cfs.
Adjusted for 15 min:	0.4956 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2008 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   VE_Construction2015_02-23.wdm
MESSU       25   PreVE_Construction2015_02-23.MES
            27   PreVE_Construction2015_02-23.L61
            28   PreVE_Construction2015_02-23.L62
            30   POCVE_Construction2015_02-231.dat
            31   POCVE_Construction2015_02-232.dat
            32   POCVE_Construction2015_02-233.dat
            33   POCVE_Construction2015_02-234.dat
            34   POCVE_Construction2015_02-235.dat
            35   POCVE_Construction2015_02-236.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      IMPLND       5
      PERLND       4
      IMPLND       1
      COPY       501
      COPY       502
      COPY       503
      COPY       504
      COPY       505
      COPY       506
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY       4
      DISPLY       5
      DISPLY       6
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Area 200 - Existing         MAX                    1    2   30    9
    2        Area 300 - Existing         MAX                    1    2   31    9
    3        Area 400 - Existing         MAX                    1    2   32    9
    4        Area 500 - Existing         MAX                    1    2   33    9
    5        Area 600 - Existing         MAX                    1    2   34    9
    6        RailImp - Existing          MAX                    1    2   35    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  504         1    1
  505         1    1
  506         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
```

```
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    4     A/B, Pasture, Flat      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    4         0    0    1    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    4         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    4         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    4             0         5       1.5       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    4             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    4          0.15       0.5       0.3         0       0.7       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
    4             0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                       User  t-series Engl Metr ***
                                      in  out           ***
    5      DRIVEWAYS/FLAT         1    1    1   27    0
    1      ROADS/FLAT             1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
```

```
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    5         0    0    1    0    0    0
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    5         0    0    4    0    0    0    1    9
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    5         0    0    0    0    0
    1         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    5            400      0.01       0.1       0.1
    1            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    5              0         0
    1              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    5              0         0
    1              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Area 200 - Existing***
IMPLND   5                         7.8     COPY   501     15
Area 300 - Existing***
IMPLND   5                        20.8     COPY   502     15
Area 400 - Existing***
PERLND   4                         0.5     COPY   503     12
PERLND   4                         0.5     COPY   503     13
IMPLND   1                         0.7     COPY   503     15
IMPLND   5                         1.1     COPY   503     15
Area 500 - Existing***
PERLND   4                         1.5     COPY   504     12
PERLND   4                         1.5     COPY   504     13
IMPLND   1                           1     COPY   504     15
IMPLND   5                         2.4     COPY   504     15
Area 600 - Existing***
IMPLND   1                         0.1     COPY   505     15
IMPLND   5                         0.7     COPY   505     15
RailImp - Existing***
IMPLND   5                         3.5     COPY   506     15

******Routing******
END SCHEMATIC

NETWORK
```

```
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1
COPY   505 OUTPUT MEAN   1 1   48.4        DISPLY   5     INPUT  TIMSER 1
COPY   506 OUTPUT MEAN   1 1   48.4        DISPLY   6     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                          in  out                           ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                     ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.02           PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.02           IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.8            PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.8            IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
```

```
COPY    501 OUTPUT MEAN    1 1     48.4       WDM    501 FLOW     ENGL      REPL
COPY    502 OUTPUT MEAN    1 1     48.4       WDM    502 FLOW     ENGL      REPL
COPY    503 OUTPUT MEAN    1 1     48.4       WDM    503 FLOW     ENGL      REPL
COPY    504 OUTPUT MEAN    1 1     48.4       WDM    504 FLOW     ENGL      REPL
COPY    505 OUTPUT MEAN    1 1     48.4       WDM    505 FLOW     ENGL      REPL
COPY    506 OUTPUT MEAN    1 1     48.4       WDM    506 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    12

  MASS-LINK        13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    13

  MASS-LINK        15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2008 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   VE_Construction2015_02-23.wdm
MESSU       25   MitVE_Construction2015_02-23.MES
            27   MitVE_Construction2015_02-23.L61
            28   MitVE_Construction2015_02-23.L62
            30   POCVE_Construction2015_02-231.dat
            31   POCVE_Construction2015_02-232.dat
            32   POCVE_Construction2015_02-233.dat
            33   POCVE_Construction2015_02-234.dat
            34   POCVE_Construction2015_02-235.dat
            35   POCVE_Construction2015_02-236.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       4
      IMPLND       1
      IMPLND       5
      COPY       501
      COPY       502
      COPY       503
      COPY       504
      COPY       505
      COPY       506
      DISPLY       1
      DISPLY       2
      DISPLY       3
      DISPLY       4
      DISPLY       5
      DISPLY       6
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Area 200 - Construction     MAX                   1    2   30    9
    2        Area 300 - Construction     MAX                   1    2   31    9
    3        Area 400 - Construction     MAX                   1    2   32    9
    4        Area 500 - Construction     MAX                   1    2   33    9
    5        Area 600 - Construction     MAX                   1    2   34    9
    6        RailImp - Construction      MAX                   1    2   35    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  502         1    1
  503         1    1
  504         1    1
  505         1    1
  506         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
```

```
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    4     A/B, Pasture, Flat      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    4         0    0    1    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    4         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    4         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    4             0         5       1.5       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    4             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    4          0.15       0.5       0.3         0       0.7       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS       AGWS      GWVS
    4             0         0         0         0         3          1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                       User  t-series Engl Metr ***
                                      in  out           ***
    1      ROADS/FLAT             1    1    1   27    0
    5      DRIVEWAYS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
```

```
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
    5         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
    5         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
    5         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
    5            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    5              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    5              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Area 200 - Construction***
PERLND   4                       0.1     COPY   501     12
PERLND   4                       0.1     COPY   501     13
IMPLND   1                       0.6     COPY   501     15
IMPLND   5                      46.6     COPY   501     15
Area 300 - Construction***
IMPLND   1                       0.3     COPY   502     15
IMPLND   5                      24.6     COPY   502     15
Area 400 - Construction***
IMPLND   5                       2.2     COPY   503     15
Area 500 - Construction***
PERLND   4                       0.5     COPY   504     12
PERLND   4                       0.5     COPY   504     13
IMPLND   1                       3.2     COPY   504     15
IMPLND   5                       9.2     COPY   504     15
Area 600 - Construction***
IMPLND   1                       0.3     COPY   505     15
IMPLND   5                       1.1     COPY   505     15
RailImp - Construction***
IMPLND   5                       3.5     COPY   506     15

******Routing******
END SCHEMATIC
```

```
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
COPY   502 OUTPUT MEAN   1 1   48.4        DISPLY   2     INPUT  TIMSER 1
COPY   503 OUTPUT MEAN   1 1   48.4        DISPLY   3     INPUT  TIMSER 1
COPY   504 OUTPUT MEAN   1 1   48.4        DISPLY   4     INPUT  TIMSER 1
COPY   505 OUTPUT MEAN   1 1   48.4        DISPLY   5     INPUT  TIMSER 1
COPY   506 OUTPUT MEAN   1 1   48.4        DISPLY   6     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG            ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                 ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                    ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.02           PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.02           IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.8            PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.8            IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
```

```
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
COPY     2 OUTPUT MEAN   1 1     48.4      WDM    702 FLOW     ENGL      REPL
COPY   502 OUTPUT MEAN   1 1     48.4      WDM    802 FLOW     ENGL      REPL
COPY     3 OUTPUT MEAN   1 1     48.4      WDM    703 FLOW     ENGL      REPL
COPY   503 OUTPUT MEAN   1 1     48.4      WDM    803 FLOW     ENGL      REPL
COPY     4 OUTPUT MEAN   1 1     48.4      WDM    704 FLOW     ENGL      REPL
COPY   504 OUTPUT MEAN   1 1     48.4      WDM    804 FLOW     ENGL      REPL
COPY     5 OUTPUT MEAN   1 1     48.4      WDM    705 FLOW     ENGL      REPL
COPY   505 OUTPUT MEAN   1 1     48.4      WDM    805 FLOW     ENGL      REPL
COPY     6 OUTPUT MEAN   1 1     48.4      WDM    706 FLOW     ENGL      REPL
COPY   506 OUTPUT MEAN   1 1     48.4      WDM    806 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    12

  MASS-LINK        13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    13

  MASS-LINK        15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    15


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

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Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

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VANCOUVER ENERGY

Construction Stormwater, Control Flow Rates

(per SWMM Element #3)

Area 200 - Rail Unloading:

Disturbed Construction Area:	$A := 10.33\text{acre}$
10-Year, 24-Hour Rainfall Amount:	$I := 3.2\text{in}$
10-Year, 24-Hour Storm Volume:	$V := A \cdot I \cdot 1.5 = 1346418.04\ \text{gal}$
Required Minimum Treatment Rate:	$Q := 750\text{gpm}$
Assumed Treatment Operation (per day):	$t := 20\text{hr}$
Required Tankage Volume:	$V_{tank} := V - Q \cdot t = 446418.04\ \text{gal}$
# of 20,000 gallon tanks:	$N_{tank} := \frac{V_{tank}}{20000\text{gal}} = 22.32$

Area 300 - Storage:

Disturbed Construction Area:	$A := 24.9\text{acre}$
10-Year, 24-Hour Rainfall Amount:	$I := 3.2\text{in}$
10-Year, 24-Hour Storm Volume:	$V := A \cdot I \cdot 1.5 = 3245480.07\ \text{gal}$
Required Minimum Treatment Rate:	$Q := 2500\text{gpm}$
Assumed Treatment Operation (per day):	$t := 20\text{hr}$
Required Tankage Volume:	$V_{tank} := V - Q \cdot t = 245480.07\ \text{gal}$
# of 20,000 gallon tanks:	$N_{tank} := \frac{V_{tank}}{20000\text{gal}} = 12.27$

Area 400 - Marine Terminal:

Disturbed Construction Area: $A := 2.6\,acre$

10-Year, 24-Hour Rainfall Amount: $I := 3.2\,in$

10-Year, 24-Hour Storm Volume: $V := A \cdot I \cdot 1.5 = 338885.47\,gal$

Required Minimum Treatment Rate: $Q := 250\,gpm$

Assumed Treatment Operation (per day): $t := 20\,hr$

Required Tankage Volume: $V_{tank} := V - Q \cdot t = 38885.47\,gal$

# of 20,000 gallon tanks: $N_{tank} := \frac{V_{tank}}{20000\,gal} = 1.94$

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GENERAL EROSION PREVENTION & SEDIMENT CONTROL NOTES

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED BY EFSEC OR THEIR DESIGNEE PRIOR TO THE COMMENCEMENT OF WORK. ONCE APPROVED, THE SITE MUST BE MAINTAINED THROUGH THE LIFE OF THE PROJECT AS SHOWN ON THE PLANS.
2. EROSION AND SEDIMENT CONTROL BMPS SHALL BE SITED, DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON.
3. THE DEVELOPER AND/OR OWNER IS RESPONSIBLE FOR MAINTAINING EROSION PREVENTION AND SEDIMENT CONTROL BMPS DURING AND AFTER INSTALLATION OF ALL UTILITY WORK ASSOCIATED WITH UTILITY TRENCHES.
4. PRIOR TO ANY SITE EXCAVATION, ALL STORM DRAIN INLETS SHALL BE PROTECTED DOWN SLOPE FROM ANY DISTURBED OR CONSTRUCTION AREAS PER STANDARD DETAIL E-2.20 TO PREVENT SEDIMENT FROM ENTERING THE STORM DRAINAGE SYSTEM PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREAS. CLEAN FILTER FABRIC AS NECESSARY TO MAINTAIN DRAINAGE. REMOVE FILTER AND CLEAN CATCH BASINS FOLLOWING COMPLETION OF SITE WORK.
5. NEWLY CONSTRUCTED OR MODIFIED INLETS AND CATCH BASINS SHALL BE PROTECTED FROM SEDIMENT IMMEDIATELY UPON INSTALLATION.
6. THE CONTRACTOR SHALL NOT ALLOW SEDIMENT OR DEBRIS TO ENTER NEW OR EXISTING PIPES, CATCH BASINS OR INFILTRATION SYSTEMS. IF THIS OCCURS, THE CONTRACTOR SHALL REMOVE ALL ACCUMULATED SEDIMENT FROM THE CATCH BASINS, DRYWELLS, AND STORM PIPES IMMEDIATELY.
7. PRIOR TO LEAVING A CONSTRUCTION SITE OR PRIOR TO DISCHARGING INTO AN INFILTRATION SYSTEM, SEDIMENT-LADEN WATER SHALL PASS THROUGH A SEDIMENT POND, TRAP, OR OTHER APPROVED BMP SYSTEM.
8. ALL EXPOSED AND UNWORKED SOILS SHALL BE STABILIZED BY THE APPROPRIATE BEST MANAGEMENT PRACTICES (BMPS). FROM OCTOBER 1 TO APRIL 30, NO SOILS SHALL BE EXPOSED AND UNWORKED FOR MORE THAN TWO (2) DAYS. FROM MAY 1 TO SEPTEMBER 30, NO SOILS SHALL BE EXPOSED AND UNWORKED FOR MORE THAN SEVEN (7) DAYS.
9. SOIL STOCKPILES SHALL BE STABILIZED FROM EROSION, PROTECTED WITH SEDIMENT TRAPPING MEASURES, AND WHEN POSSIBLE, BE LOCATED AWAY FROM STORM DRAIN INLETS, WATER WAYS AND DRAINAGE CHANNELS.
10. CONSTRUCTION ROADS AND PARKING AREAS SHALL BE STABILIZED WHEREVER THEY ARE CONSTRUCTED, WHETHER PERMANENT OR TEMPORARY, FOR THE USE OF CONSTRUCTION TRAFFIC.
11. IF THE BMPS APPLIED TO A SITE ARE INSUFFICIENT TO PREVENT SEDIMENT FROM REACHING WATER BODIES, ADJACENT PROPERTIES, STORM FACILITIES OR PUBLIC RIGHT-OF-WAY, THEN THE CONTRACTOR SHALL INSTALL ADDITIONAL ALTERNATIVE BMPS.

PROTECTION OF ADJACENT PROPERTIES, ROADS/STREETS AND PAVED SURFACES

12. PROVIDE A 12-INCH DEEP PAD OF CRUSHED ROCK FOR A DISTANCE OF 100 FEET INTO THE SITE FOR ALL ACCESS POINTS UTILIZED BY CONSTRUCTION EQUIPMENT AND TRUCKS. PAD WIDTH SHALL BE A MINIMUM OF 20 FEET. ALL VEHICLES LEAVING THE SITE SHALL EGRESS ACROSS THE PAD. ACCUMULATED SEDIMENT SHALL BE PERIODICALLY REMOVED, OR ADDITIONAL ROCK SHALL BE PLACED UPON THE PAD SURFACE. ROCK SHALL BE CLEAN 4-INCH TO 8-INCH QUARRY SPALLS. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS SHALL BE REMOVED IMMEDIATELY.
13. PAVEMENT SWEEPING AND SHOVELLING IS REQUIRED. WASHING THE PAVEMENT INTO THE STORM SYSTEM IS NOT PERMITTED.
14. IF SEDIMENT, MUD OR DEBRIS IS TRANSPORTED ONTO A PAVED SURFACE OR ROADWAY, THE PAVED SURFACE OR ROADWAY SHALL BE THOROUGHLY CLEANED WITH HIGH EFFICIENCY STREET SWEEPERS AT THE END OF EACH WORKDAY, OR MORE OFTEN IF NECESSARY. SIGNIFICANT SOIL DEPOSITS SHALL BE REMOVED FROM ROADS BY SHOVELLING AND SWEEPING. STREET WASHING IS NOT ALLOWED UNLESS APPROVED BY EFSEC AND ONLY AFTER SEDIMENT IS REMOVED IN THE MANNER DESCRIBED ABOVE.
15. A WHEEL WASH MAY BE REQUIRED IF CONSTRUCTION ENTRANCE IS NOT SUFFICIENT IN PREVENTING SEDIMENT FROM BEING TRACKED ONTO PAVEMENT. WHEEL WASH SHALL BE PER STANDARD PLAN E-1.06 AND THE STORMWATER MANUAL.
16. INSTALL SEDIMENT FENCE PER STANDARD PLAN E-2.33 PRIOR TO BUILDING CONSTRUCTION AND/OR EXCAVATION TO PREVENT SILT INTRUSION UPON ADJACENT LOTS. IF CONSTRUCTION OCCURS SIMULTANEOUSLY ON ADJACENT LOTS AND THE LOTS HAVE THE SAME OWNER DURING CONSTRUCTION, THE SILT FENCE ALONG THE COMMON LOT LINE MAY BE ELIMINATED.
17. PROPOSED PERMEABLE PAVEMENT AREAS SHALL BE SHOWN ON THE EROSION CONTROL PLAN. PERMEABLE PAVEMENT AREAS SHALL BE PROTECTED FROM SEDIMENT DURING AND AFTER INSTALLATION.

MAINTENANCE OF EROSION PREVENTION AND SEDIMENT CONTROL BMPS

18. ALL EROSION PREVENTION AND SEDIMENT CONTROL BMPS SHALL BE REGULARLY INSPECTED AND MAINTAINED TO ENSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.
19. THE CONTRACTOR SHALL MAINTAIN AND HAVE ON-SITE A WRITTEN LOG OF EROSION PREVENTION AND SEDIMENT CONTROL BMP MAINTENANCE.
20. ALL TEMPORARY EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER SITE STABILIZATION IS ACHIEVED OR AFTER TEMPORARY BMPS ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED PER THE STORMWATER MANUAL.

DUST CONTROL

21. IN AREAS SUBJECT TO SURFACE AND AIR MOVEMENT OF DUST, REFER TO THE STORMWATER MANUAL FOR DUST CONTROL BMPS.

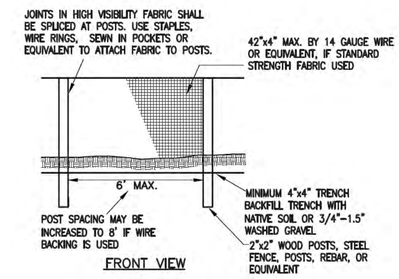
TEMPORARY SEEDING

22. EXPOSED SURFACES THAT WILL NOT BE BROUGHT TO FINAL GRADE OR GIVEN A PERMANENT COVER TREATMENT WITHIN 30 DAYS OF THE EXPOSURE SHALL HAVE SEED MIX AND MULCH PLACED TO STABILIZE THE SOIL AND REDUCE EROSION SEDIMENTATION. SEEDED AREAS SHALL BE CHECKED REGULARLY TO ASSURE A GOOD STAND OF GRASS IS BEING MAINTAINED. AREAS THAT FAIL TO ESTABLISH VEGETATION COVER ADEQUATE TO PREVENT EROSION WILL BE RESEEDED AS SOON AS SUCH AREAS ARE IDENTIFIED.
23. AN APPROVED TEMPORARY SEEDING MIXTURE SHALL BE APPLIED TO THE PREPARED SEED BED AT A RATE OF 120 LBS/ACRE. NOTE: "HYDROSEEDING" APPLICATIONS WITH APPROVED SEED-MULCH-FERTILIZER MIXTURES MAY ALSO BE USED.

GENERAL CONSTRUCTION, STORMWATER MONITORING AND TREATMENT NOTES

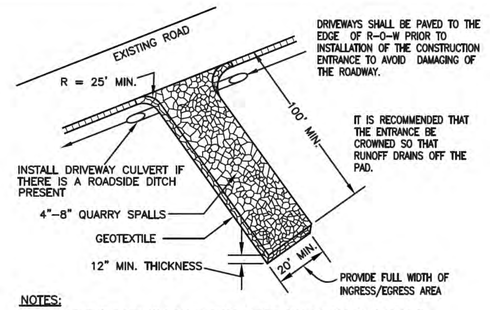
1.

~ NOTES PENDING PERMIT APPROVALS ~



NOTES:
1. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
2. IF THE HIGH VISIBILITY FABRIC HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.

HIGH VISIBILITY FENCE (1) — NTS — BMP C103



NOTES:
1. IF THE ENTRANCE SITS ON A SLOPE, PLACE A FILTER FABRIC FENCE DOWN GRADIENT.
2. TOP DRESS THE PAD WITH CLEAN 3" MINUS ROCK WHEN THE CONSTRUCTION ENTRANCE BECOMES CLOGGED WITH SEDIMENTS.
3. ANY SEDIMENT CARRIED FROM THE SITE ONTO THE STREET SHALL BE CLEANED UP IMMEDIATELY.
4. IF EQUIPMENT TRAVELS EXTENSIVELY ON UNSTABILIZED ROADS ON THE SITE, A TIRE AND VEHICLE UNDERCARRIAGE WASH NEAR THE ENTRANCE WILL BE NEEDED. PERFORM WASHING ON CRUSHED ROCK. WASH WATER WILL REQUIRE TREATMENT IN A SEDIMENT POND OR TRAP.
5. WHERE CONSTRUCTION ACCESS ABUTS A CURB, MINIMUM 2" DIAMETER PVC PIPE AND COLD-PATCH ASPHALT SHOULD BE USED TO CONSTRUCT THE APPROACH IN ORDER TO PROTECT THE CURB AND MINIMIZE OBSTRUCTION TO STORMWATER FLOW IN THE GUTTER.
6. TRUCKS LEAVING THE SITE SHALL EGRESS ACROSS THE FULL LENGTH OF THE PAD.
7. SINGLE FAMILY LOT ENTRANCES MAY HAVE THE PAD LENGTH REDUCED TO 2 0 FEET IN LENGTH AND ROCK SHALL BE CLEANED 2 INCH TO 4INCH.

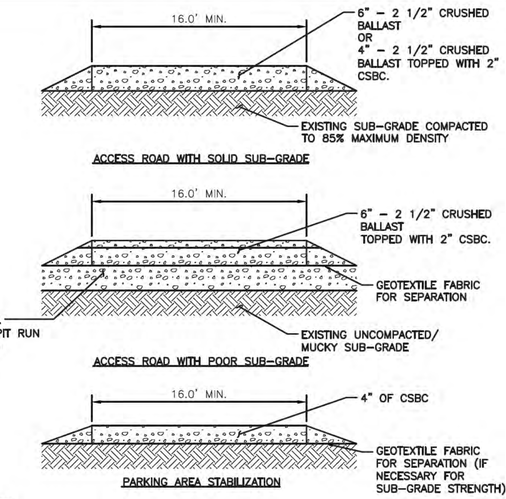
STABILIZED CONSTRUCTION ENTRANCE/EXIT (2) — NTS — BMP C105

LEGEND

HIGH VISIBILITY FENCE — HVF
INTERCEPTOR DIKE AND SWALE
SILT FENCE
COMPOST SOCK — CS
WICK DRAINS — WD
TURBIDITY CURTAIN — TC
STABILIZED CONSTRUCTION ENTRANCE/EXIT
CONSTRUCTION ROAD/PARKING AREA STABILIZATION
SURFACE ROUGHENING
LAYDOWN AREA
WHEEL WASH
CONCRETE WASHOUT AREA
STORM DRAIN INLET PROTECTION
WEIR/STORAGE TANKS
ENHANCED SAND FILTRATION

NOTES:
1. WHEEL WASH SHALL BE CAPABLE OF WASHING UP TO 150 TRUCKS PER DAY. WHEEL WASH SHALL BE AN IN-GROUND TEMPORARY MODEL WITH INTEGRAL SOLIDS REMOVAL.
2. WHEEL WASH WATER SHALL BE FILTERED OR REPLACED EACH DAY. MAY BE CONNECTED TO SANITARY SEWER.
3. UNIT SHALL BE INSPECTED DAILY TO ENSURE PROPER OPERATION.
4. WHEEL WASH SHALL BE CONLINE 400C OR EQUAL.

WHEEL WASH (3) — NTS — BMP C106



NOTES:
1. CONSTRUCTION ROAD AND PARKING AREA STABILIZATION NECESSARY WHERE EXISTING ASPHALT OR EXISTING GRAVEL ROADS ARE NOT AVAILABLE OR ARE INSUFFICIENT TO SUPPORT CONSTRUCTION LOADS.

CONSTRUCTION ROAD/PARKING AREA STABILIZATION (1) — NTS — BMP C107

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS — STATE OF WASHINGTON — 37330 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: ENVIRONMENTAL CONTROL NOTES AND DETAILS – 1

DESIGN:	DRS	START DATE:	2/18/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/26/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-EC-001	1/1	

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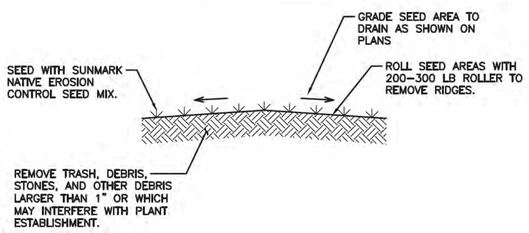
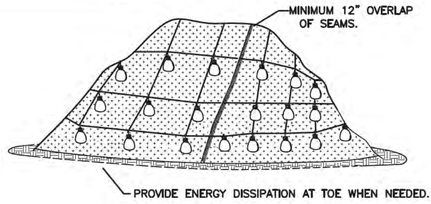


NOTES:

1. SEEDING SHALL BE ACCOMPLISHED WITH A HYDROSEED/MULCH MIXTURE. HYDROSEEDING SHALL OCCUR BETWEEN MARCH 1 AND MAY 15 AND SEPTEMBER 1 TO OCTOBER 1. PROCEED WITH SEEDING ONLY WHEN EXISTING AND FORECASTED WEATHER CONDITIONS ARE SUITABLE FOR WORK. DO NOT SEED WHEN THE GROUND IS FROZEN, SNOW COVERED, MUDDY OR WHEN AIR TEMPERATURES EXCEEDS 90 DEGREES FAHRENHEIT.
2. EROSION CONTROL SEED MIX SHALL BE SUNMARK NATIVE EROSION CONTROL SEED MIX OR APPROVED EQUAL. SUNMARK SEEDS INTERNATIONAL, INC 18032 NE AIRPORT WAY, PORTLAND, OREGON 97230. (1–888–214–7333). SEED MIX SHALL MEET THE FOLLOWING COMPOSITION BY WEIGHT:
   a. NATIVE EROSION CONTROL MIX (1 LB/1000 SF OR 45 LBS. PER ACRE)
   (Tony Add Table from 0100–LA–001)
3. HYROSEED MULCH SHALL BE A 100% BIODEGRADABLE DYED–WOOD CELLULOSE FIBER MULCH APPLIEDAT 2,000 LBS PER ACRE WITH NON–ASPHALTIC TACKIFIER PER MANUFACTURER'S RECOMMENDATIONS.
4. 100% OF HYDROSEED AREAS SHALL SHOW A UNIFORM DISTRIBUTION OF MATERIALS. AREAS NOT RECEIVING A UNIFORM APPLICATION OF SEED, MULCH OR MULCH AT THE SPECIFIED RATE SHALL BE RESEEDED AT THE CONTRACTORS EXPENSE.
5. PROTECT STRUCTURES, SIDEWALKS, PAVEMENTS AND OTHER FACILITIES, TREES, SHRUBS, AND PLANTINGS FROM OVER–SPRAYING OR OTHER DAMAGE CAUSED BY SEEDING OPERATIONS.
6. MAINTENANCE OF THE PLANTED AREAS THROUGH THE ESTABLISHMENT PERIOD SHALL INCLUDE WATERING, PROTECTION FROM INSECTS, AND DISEASES AND WEEDING.
7. CONTRACTOR SHALL PROVIDE TEMPORARY ESTABLISHMENT WATERING OF NON IRRIGATED EROSION CONTROL SEED AREAS DURING ESTABLISHMENT AND MAINTENANCE PERIOD. UNLESS OTHERWISE INDICATED, CONTRACTOR SHALL REMOVE TEMPORARY IRRIGATION EQUIPMENT AT THE END OF THE MAINTENANCE AND WARRANTY PERIOD.
8. RE–SEED STAGING AREAS AND OTHER AREAS DISTURBED DURING CONSTRUCTION.
9. CONTRACTOR SHALL MAINTAIN SEEDED AREAS FOR A MINIMUM OF 6 MONTHS FOLLOWING THE END OF CONSTRUCTION. CONTRACTOR SHALL WARRANTY ALL SEEDED AREAS FOR A MINIMUM OF 2–YEARS FOLLOWING CONSTRUCTION.

TEMPORARY SEEDING (1 – BMP C120)
NTS

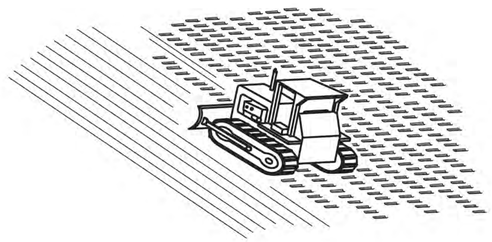


PLASTIC SHEETING

NOTES:

1. PLASTIC SHEETING IS USED TO PROVIDE IMMEDIATE PROTECTION TO SLOPES AND STOCKPILES.
2. DO NOT USE PLASTIC COVERING UPSLOPE OF AREAS SUCH AS STEEP AND/OR UNSTABLE SLOPES THAT MIGHT BE ADVERSELY AFFECTED BY CONCENTRATED RUNOFF.
3. WHEN POSSIBLE, INSTALL AN INTERCEPTOR DIKE AT THE TOP OF THE PLASTIC TO DIVERT FLOWS AWAY FROM THE PLASTIC.
4. TOE–IN THE TOP OF THE SHEETING IN A 6"x6" TRENCH BACKFILLED WITH COMPACTED NATIVE MATERIAL.
5. INSTALL A GRAVEL BERM, RIPRAP, OR OTHER SUITABLE PROTECTION AT THE TOP OF THE SLOPE IN ORDER TO DISSIPATE RUNOFF VELOCITY.
6. ANCHOR THE PLASTIC USING SANDBAGS OR OTHER SUITABLE TETHERED ANCHOR SYSTEM SPACED ON A 10' GRID SPACING IN ALL DIRECTIONS.
7. OVERLAP SEAMS 1–2', TAPE, ROLL AND STAKE THE SEAMS AND THEN WEIGH DOWN THE ENTIRE LENGTH.
8. PROVIDE ENERGY DISSIPATION AT TOE WHEN NEEDED.
9. REPLACE TORN SHEETS AND REPAIR OPEN SEAMS. COMPLETELY REMOVE AND REPLACE PLASTIC WHEN IT BEGINS TO DETERIORATE.

PLASTIC COVERING (2 – BMP C123)
NTS

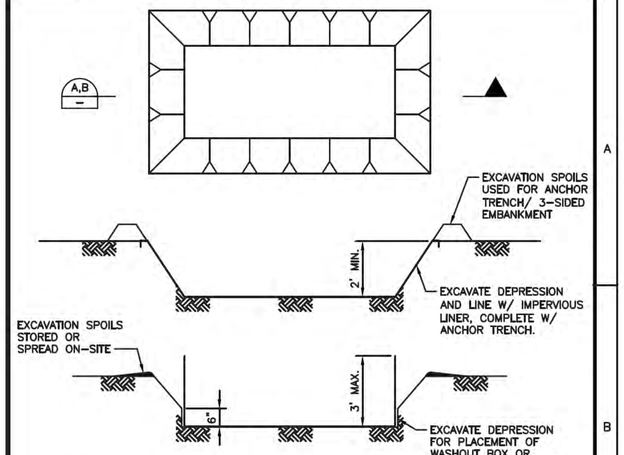


TRACKING

NOTES:

'TRACKING' WITH MACHINERY UP AND DOWN THE SLOPE PROVIDES GROOVES THAT WILL CATCH SEED, FERTILIZER, MULCH, RAINFALL AND DECREASE RUNOFF.

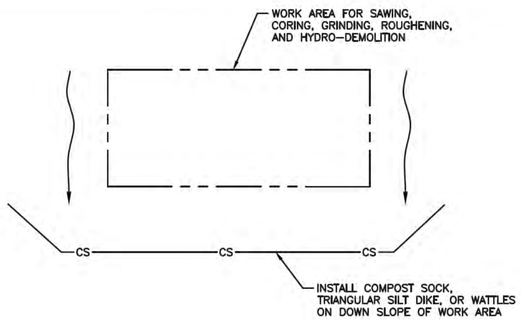
SURFACE ROUGHENING (3 – BMP C130)
NTS



NOTES:

1. PROVIDE DESIGNATED CONCRETE WASHOUT AREAS.
2. DISPOSAL OF SOLIDS SHALL BE TO LANDFILL OR RE–USE TO QUARRY, OR BATCH PLANT.
3. LIQUIDS SHALL BE PH NEUTRALIZED PRIOR TO HAUL OFF OR DISPOSAL TO SANITARY SEWER.
4. USE SUCTION STYLE PUMPS W/ 1/4" TRASH SCREEN ON INLET PIPING TO REMOVE LIQUID WASTE.

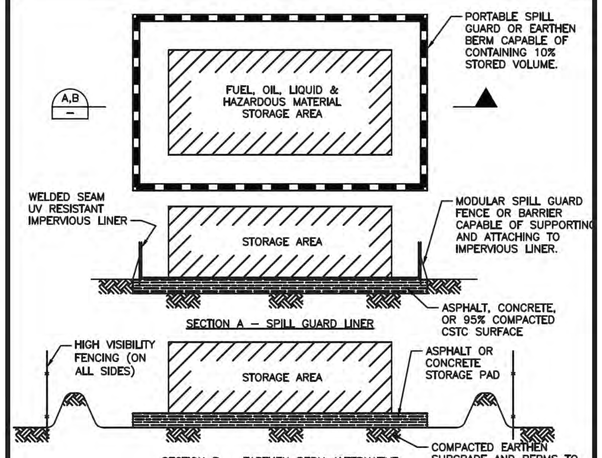
CONCRETE WASHOUT AREA (4 – BMP C151)
NTS



NOTES:

1. INSTALL TEMPORARY CONTAINMENT MEASURES ON DOWNSLOPE SIDE OF WORK AREAS.
2. VACUUM SLURRY AND CUTTINGS DURING CUTTING AND SURFACING OPERATIONS.
3. SLURRY AND CUTTINGS SHALL NOT REMAIN ON PERMANENT CONCRETE OR ASPHALT PAVEMENT OVERNIGHT.
4. SLURRY AND CUTTINGS SHALL NOT DRAIN TO ANY NATURAL OR CONSTRUCTED DRAINAGE CONVEYANCE INCLUDING STORMWATER SYSTEMS. THIS MAY REQUIRE ADDITIONAL BLOCKING OF CATCH BASINS.
5. DISPOSE OF COLLECTED SLURRY AND CUTTINGS IN A MANNER THAT DOES NOT VIOLATE GROUND WATER OR SURFACE WATER QUALITY STANDARDS.
6. DO NOT ALLOW PROCESS WATER GENERATED DURING HYDRO–DEMOLITION, SURFACE ROUGHENING, OR SIMILAR OPERATIONS TO DRAIN TO ANY NATURAL OR CONSTRUCTED DRAINAGE CONVEYANCE INCLUDING STORMWATER SYSTEMS. DISPOSE OF PROCESS WATER IN A MANNER THAT DOES NOT VIOLATE GROUND WATER OR SURFACE WATER QUALITY STANDARDS.
7. HANDLE AND DISPOSE OF CLEANING WASTE MATERIAL AND DEMOLITION DEBRIS IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF WATER. DISPOSE OF SWEEPING MATERIAL FROM A PICK–UP SWEEPER AT AN APPROPRIATE DISPOSAL SITE.

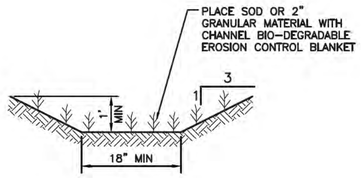
SAWCUTTING AND SURFACING POLLUTION PREVENTION (5 – BMP C152)
NTS



NOTES:

1. PROVIDE DELINEATED MATERIAL DELIVERY, STORAGE & CONTAINMENT AREA AT ALL PROJECT SITES.
2. INSPECT ALL CONTAINERS DAILY FOR EVIDENCE OF DAMAGE OR LEAKS AND REPLACE IMMEDIATELY.
3. CLEAN CONTAINMENT AREA INCLUDING SOIL EXCAVATION/REPLACEMENT AFTER ANY SPILL.

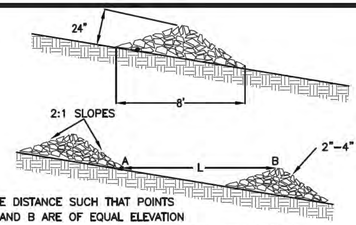
MATERIAL DELIVERY, STORAGE AND CONTAINMENT (6 – BMP C153)
NTS



NOTES:

1. GRADE CUTOFF DITCHES WHERE SHOWN ON–SITE @ MINIMUM 1% LONGITUDINAL SLOPE.
2. SEE LANDSCAPE DRAWING 0100_LA–001 FOR EROSION CONTROL SEED MIX. APPLY WITH TACKIFIER.
3. INSTALL ROCK CHECK DAMS PER DETAIL 8.
4. MAINTAIN VEGETATION IN DITCH DURING CONSTRUCTION UNTIL FINAL GRADING AND INSTALLATION OF STORM DRAIN SYSTEM.

INTERSEPTOR SWALE (7 – BMP C200)
NTS



L = THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION

SPACING BETWEEN CHECK DAMS

CHECK DAM NOTES:

1. CHECK DAMS ARE CONSTRUCTED ACROSS A SWALE OR DITCH TO REDUCE VELOCITIES OF CONCENTRATED FLOWS, THEREBY REDUCING EROSION AND ALLOWING A SIGNIFICANT AMOUNT OF SUSPENDED SEDIMENT TO SETTLE OUT.
2. CHECK DAMS SHALL BE USED IN TEMPORARY OR PERMANENT CHANNELS THAT DRAIN 10 ACRES OR LESS, ARE NOT YET VEGETATED, AND WHEN INSTALLING CHANNEL LINING IS NOT FEASIBLE.
3. USE TYPICAL ROCK SIZE OF 2–4 INCH. PLACE ROCK BY HAND OR BY MECHANICAL MEANS RATHER THAN DUMPING THE ROCK. BRIDGE ENTIRE DITCH OR SWALE WIDTH AND ENSURE THE CENTER OF THE DAM IS 6" LOWER THAN THE OUTER ENDS. FOR HIGHER VELOCITY FLOWS: ±5 FPS USE 6"–12" RIPRAP, AND HAND PLACE LARGER ROCK ON UPSTREAM SIDE OF DAM.
4. REMOVE CHECK DAMS FROM GRASS–LINED DITCHES AND SWALES ONCE THE GRASS IS ESTABLISHED. SEED, MULCH OR MAT THE AREA WHERE THE CHECK DAMS WERE, IMMEDIATELY FOLLOWING REMOVAL.
5. INSPECT ONCE PER WEEK ON ACTIVE SITES, ONCE EVERY TWO WEEKS ON INACTIVE SITES, AND WITHIN 24 HOURS FOLLOWING A 0.5 INCH RAIN EVENT. REMOVE SEDIMENT ONCE IT REACHES ONE–THIRD THE DEPTH OF THE ROCK WEIR. REPLACE ROCK WEIR WHEN FILTERING CAPACITY IS REDUCED BY ONE–HALF.
6. SPACING TABLE FOR CHECK DAMS:

DITCH GRADE	MINIMUM WEIR DEPTH		
	6 INCH	12 INCH	18 INCH
6%	**	L= 16 ft O.C.	L=26 ft O.C.
5%	**	L= 20 ft	L= 30 ft
4%	**	L= 26 ft	L= 40 ft
3%	15 ft	L= 33 ft	L= 50 ft
2%	25 ft	L= 50 ft	L= 80 ft
1%	25 ft	L= 50 ft	L= 80 ft

**NOT ALLOWED

CHECK DAMS (8 – BMP C207)
NTS

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: ENVIRONMENTAL CONTROL NOTES AND DETAILS – 2

DESIGN:	DRS	START DATE:	2/19/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/26/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100–EC–002 | SHEET: 1/1 | REV.

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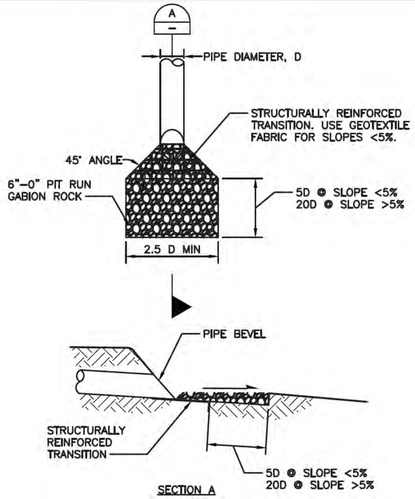
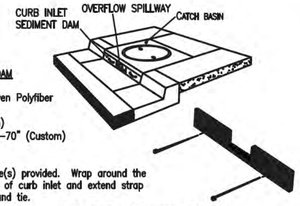


NOTES:
1. DETAIL PROVIDED FOR GENERAL GUIDANCE ONLY. FOR LARGE DIAMETER OUTLETS > 12", HIGH VELOCITY DISCHARGES, OR SUBMERGED OUTLETS PROTECTION SHALL BE SITE SPECIFICALLY ENGINEERED.
2. INSTALL CHECK DAMS ON OUTLET ON STEEP SLOPES AND NATURAL STONE LEVEL SPREADER EVERY 10 FEET.

OUTLET PROTECTION
NTS BMP C209 — 1

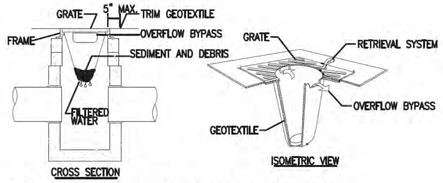


CURB INLET SEDIMENT DAM

Material: 100% Non–woven Polyfiber
Color: Blue
Height: 5" (Custom)
Widths: 36" – 54" –70" (Custom)

Installation:
Place strap through hole(s) provided. Wrap around the horizontal rod in mouth of curb inlet and extend strap through adjacent hole and tie.

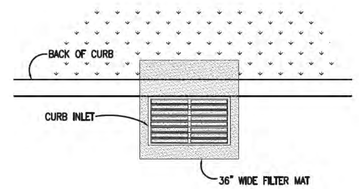
CURB INLET SEDIMENT DAM



1. INLET PROTECTION MUST BE REGULARLY INSPECTED TO INSURE PROPER PLACEMENT/FUNCTION AND MAINTENANCE.

FILTER BAG

NOTES:
1. SIZE THE BELOW GRATE INLET DEVICE (BGID) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
2. THE REMOVAL SYSTEM MUST ALLOW REMOVAL OF THE BGID WITHOUT SPILLING THE COLLECTED MATERIAL.
3. THE BGID SHALL HAVE A BUILT–IN HIGH–FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
4. THE CONTRACTOR SHALL INSPECT THE BAG AFTER EACH STORM EVENT AND AT REGULAR INTERVALS.
5. THE FILTER BAG SHALL BE CLEANED OR REPLACED WHEN THE BAG BECOMES HALF FULL.

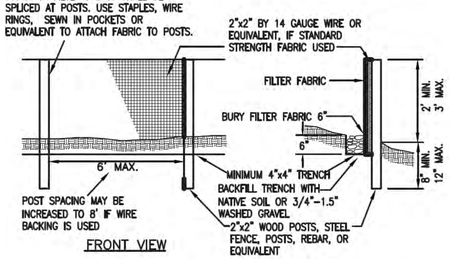


FILTER MAT

NOTES:
1. USE FILTER MAT SEDIMENT BARRIER WHEN CURB INLET IS LOCATED IN GENTLY SLOPING STREET, WITH MINIMAL NEED, WHERE WATER CAN FILTER AND ALLOW SEDIMENT TO SEPARATE FROM RUNOFF.
2. BARRIER SHALL ALLOW FOR OVERFLOW FROM SEVERE STORM EVENT.
3. INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT. SEDIMENT MUST BE REMOVED FROM THE TRAVELED WAY IMMEDIATELY.

STORM DRAIN INLET PROTECTION
NTS BMP C220 — 2

JOINTS IN FILTER FABRIC SHALL BE SPLICED AT POSTS. USE STAPLES, WIRE RINGS, SEWN IN POCKETS OR EQUIVALENT TO ATTACH FABRIC TO POSTS.

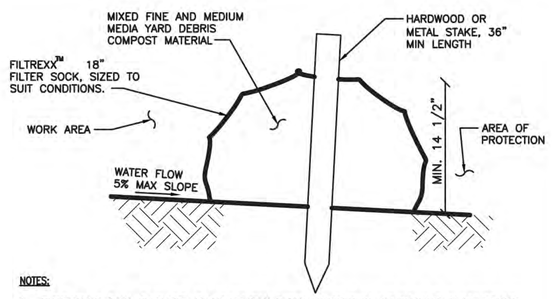


NOTE: FILTER FABRIC FENCES SHALL BE INSTALLED ALONG CONTOUR WHENEVER POSSIBLE

MAINTENANCE STANDARDS: ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY

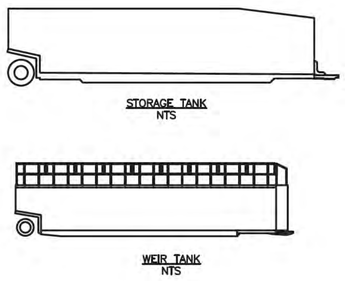
1. SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT POND.
3. IT IS IMPORTANT TO CHECK THE UPHILL SIDE OF THE FENCE FOR SIGNS OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF FLOWS PARALLEL TO THE FENCE. IF THIS OCCURS, REPLACE THE FENCE OR REMOVE THE TRAPPED SEDIMENT.
4. SEDIMENT DEPOSITS SHALL EITHER BE REMOVED WHEN THE DEPOSIT REACHES APPROXIMATELY ONE–THIRD THE HEIGHT OF THE SILT FENCE, OR A SECOND SILT FENCE SHALL BE INSTALLED.
5. IF THE FILTER FABRIC (GEOTEXTILE) HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.

SILT FENCE
NTS BMP C233 — 3



NOTES:
1. FILTER SOCKS SHALL BE PLACED AT THE LOCATION SHOWN ON THE PLAN AND INSTALLED IN ACCORDANCE WITH MANUFACTURER SPECIFICATIONS.
2. USE 2"x2"x36" HARD WOOD STAKES FOR INSTALLS WITH A MINIMUM 12" DRIVE DEPTH.
3. STEEL POSTS MAY BE USED AND SHALL BE ROLLED FROM HIGH CARBON STEEL AND HAVE A MINIMUM OF 1.25 LB/FT. POSTS SHALL BE PAINTED WITH HIGH–GRADE WEATHER RESISTANT BROWN OR BLACK STEEL PAINT. STEEL POSTS SHALL BE EQUIPPED WITH ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. POSTS SHALL BE STUDDED, EMBOSSED, OR BUNCHED. POSTS AND ANCHOR POSTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702.
4. FILTER SOCKS FILLED AT PROJECT SITE MAY BE UP TO 250 FEET LONG. CONNECTED SOCKS SHALL BE OVERLAPPED A MINIMUM OF 5 FEET.
5. REMOVE SEDIMENT FROM BEHIND FILTER SOCK ONCE IT ACCUMULATES TO ONE–HALF OF THE ORIGINAL HEIGHT OF THE FILTER SOCK.
6. INSPECT FILTER SOCKS AFTER EACH RUNOFF EVENT. REMOVE AND REPLACE IF THERE ARE ANY SIGNS OF UNDERCUTTING OR DOWNSTREAM RILLS ARE OBSERVED.
7. FILTER SOCKS SHALL BE REMOVED FROM SLOPES AFTER STABILIZATION IS COMPLETE UNLESS DIRECTED TO LEAVE IN PLACE BY PERMITTING AGENCY.

COMPOST SOCK DETAIL
NTS BMP C235 — 4

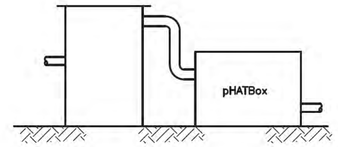


NOTES:
1. TANKS FOR STORAGE AND DEWATERING WATER SHALL BE CLEANED AND TESTED PRIOR TO DELIVERY. TANKS SHALL BE FREE OF ALL CHEMICAL AND HAZARDOUS MATERIAL RESIDUE.
2. STORAGE TANKS SHALL BE COATED INTERNALLY.
3. TANKS SHALL BE PRE–MANUFACTURED, FIXED AXLE WITH ALL NECESSARY PIPING CONNECTIONS AND VALVING.
4. INSPECTION AND CLEANING MAN–WAYS SHALL BE PROVIDED FOR EACH BAY W/I WEIR TANKS.
5. PIPING CONNECTIONS SHALL BE FITTED WITH CONTROL VALVES.
6. TANKS SHALL HAVE LEVEL GAUGE.
7. CONSTRUCTED SEDIMENT PONDS MEETING REQUIREMENTS OF BMP C241 MAY BE SUBSTITUTED.

WEIR AND STORAGE TANKS
NTS BMP C241 — 5

NOTES:
1. PROVIDE SAND FILTRATION DEVICES WITH OPTION FOR ADDITION OF BIOLOGICALLY FRIENDLY FLOCCULANT. IF ADDITIONAL PRETREATMENT IS REQUIRED USE WEIR TANKS W/ FLOCCULANT UPSTREAM.
2. SYSTEM SHALL BE CAPABLE OF AUTOMATIC BACKWASH FOR TIMED, PRESSURE DIFFERENTIAL OR MANUAL BACKWASH INTERVALS.
3. PROVIDE DOWNSTREAM FLOW COMPOSITE WATER QUALITY MONITOR TO TEST FOR TURBIDITY, ZINC, AND COPPER.
4. PROVIDE ADDITIONAL CARTRIDGE OR BAG FILTERS TO ENSURE WATER QUALITY BENCHMARKS ARE ACHIEVED.
5. INSPECT AND PROVIDE PERSONNEL FOR MONITORING DAILY. REPLACE MEDIA AS NECESSARY.

ENHANCED SAND FILTRATION
NTS BMP C250/C251 — 6



NOTES:
1. PH NEUTRALIZATION SYSTEMS SHALL INCLUDE REAL TIME PH MONITORING AND DATA RECORDING.
2. SYSTEM SHALL BE FULLY AUTOMATED AND CAPABLE OF MEETING NECESSARY DESIGN FLOW RATES.
3. CONTRACTOR SHALL INSPECT AND MONITOR SYSTEM DAILY.

PH NEUTRALIZATION
NTS BMP C253 — 7

SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: ENVIRONMENTAL CONTROL NOTES AND DETAILS – 3

DESIGN:	DRS	START DATE:	12/23/2014	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/19/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100–EC–003 | SHEET: 1/1 | REV.

Last Saved by: Tony.pritchett on: Dec 29, 2014 2:36 PM File: Q:\Vancouver\2013\A13.0287102\CADD\Dwgs\03_0100-EC-003.dwg

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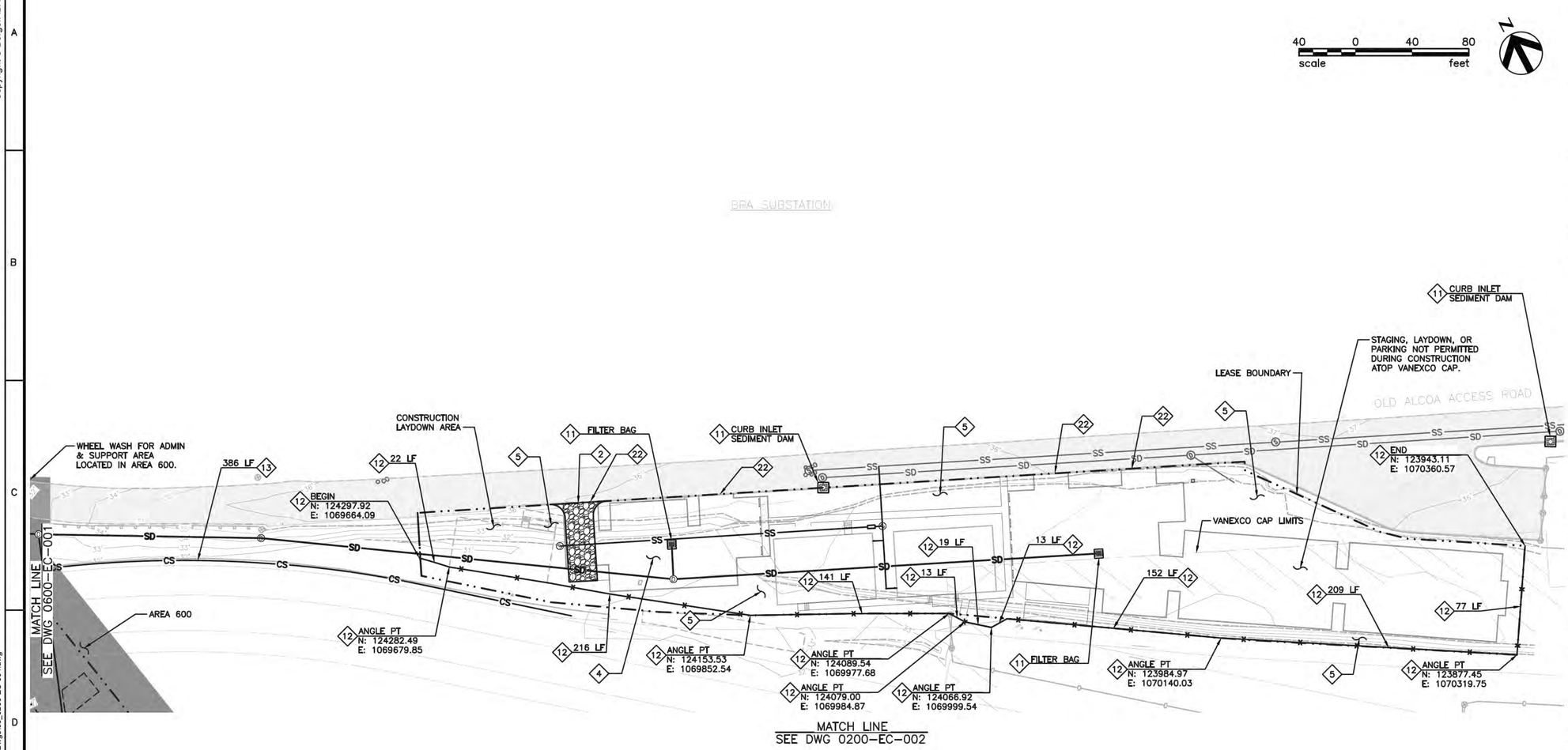

GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL, AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

2 INSTALL STABILIZED CONSTRUCTION ENTRANCE/EXIT. SEE DETAIL 2 ON DWG 0100-EC-001.

4 CONSTRUCT PARKING AREA STABILIZATION ON-SITE IN LAYDOWN, STAGING, AND CONSTRUCTION PERSONNEL PARKING AREAS. SEE DETAIL 1 ON DWG 0100-EC-002.

5 INSTALL TEMPORARY AND PERMANENT SEEDING IMMEDIATELY FOLLOWING FINAL GRADING. SEE DETAIL 2 ON DWG 0100-EC-002.

7 CONCRETE WASHOUT IS LOCATED IN AREA 300. SEE DWG 0300-EC-001 AND 0300-EC-002 FOR LOCATION.

11 INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.

12 INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-ED-003.

13 INSTALL COMPOST SOCK IN ACCORDANCE WITH DETAIL 4 ON DWG 0100-ED-003. INSTALL DOWN GRADIENT ON ALL TRENCHING AND UTILITY INSTALLATIONS OUTSIDE OF SILT FENCING AREAS. OVERLAP WITH SILT FENC A MINIMUM OF 50'.

22 INSTALL COMPOST SOCK CONTAINMENT TEMPORARILY DURING SAWCUTTING. VACUUM SLURRY AND DISPOSE OF TO SANITARY SEWER. CONTRACTOR SHALL PROTECT ALL SURFACE WATER FROM SAWCUTTING SLURRIES, AND PROVIDE CONTAINMENT FOR ALL CONCRETE OR ASPHALT DEBRIS.

SAM ADAMS
STATE OF WASHINGTON
27330
REGISTERED
PROFESSIONAL ENGINEER

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BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
ENVIRONMENTAL CONTROL PLAN – 1

DESIGN:	DRS	START DATE:	2/19/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-EC-001	1/1	

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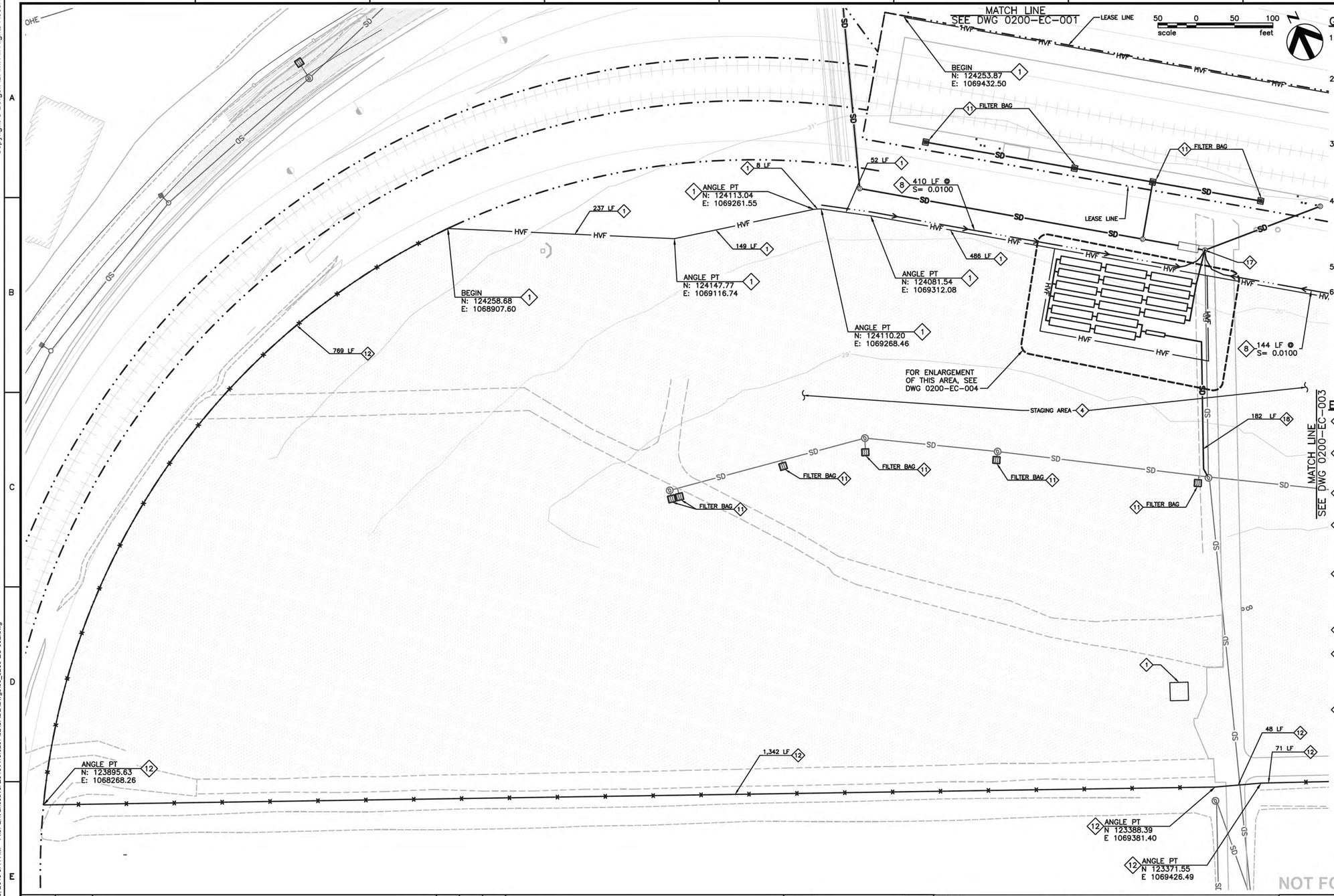

GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL, AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCING. SEE DETAIL 1 ON DWG 0100-EC-001.
4. CONSTRUCT PARKING AREA STABILIZATION ON-SITE IN LAYDOWN, STAGING, AND CONSTRUCTION PERSONNEL PARKING AREAS. SEE DETAIL 1 ON DWG 0100-EC-002.
7. CONCRETE WASHOUT IS LOCATED IN AREA 300. SEE DWG 0300-EC-002 FOR LOCATION.
8. CONSTRUCT STORMWATER INTERCEPTOR IN THE LOCATION SHOWN. GENTLY GRADE LAYDOWN AREA TO INTERCEPTOR SWALE AS NECESSARY. SEE DETAIL 7 ON DWG 0100-EC-002.
11. INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.
12. INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.
17. INSTALL PIPE PLUG ON DOWNSTREAM SIDE OF EXISTING STORM DRAIN STRUCTURE. CONTRACTOR SHALL PROVIDE PACKAGE STORMWATER HANDLING SUCTION PRIME PUMPING SYSTEM COMPLETE WITH GENERATOR, ON-SITE REDUNDANT PUMP, AND AUTODIALER NOTIFICATION SYSTEM.
18. INSTALL SOLID WALL, FUSED TEMPORARY HDPE PUMP EFFLUENT LINE AND MANIFOLD TO STORAGE/SURGE TANKS FOR TREATMENT.

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SAM ADAMS
STATE OF WASHINGTON
27330
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NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200
ENVIRONMENTAL CONTROL PLAN - 2

DESIGN:	DRS	START DATE:	2/20/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0200-EC-002
SHEET: 1/1
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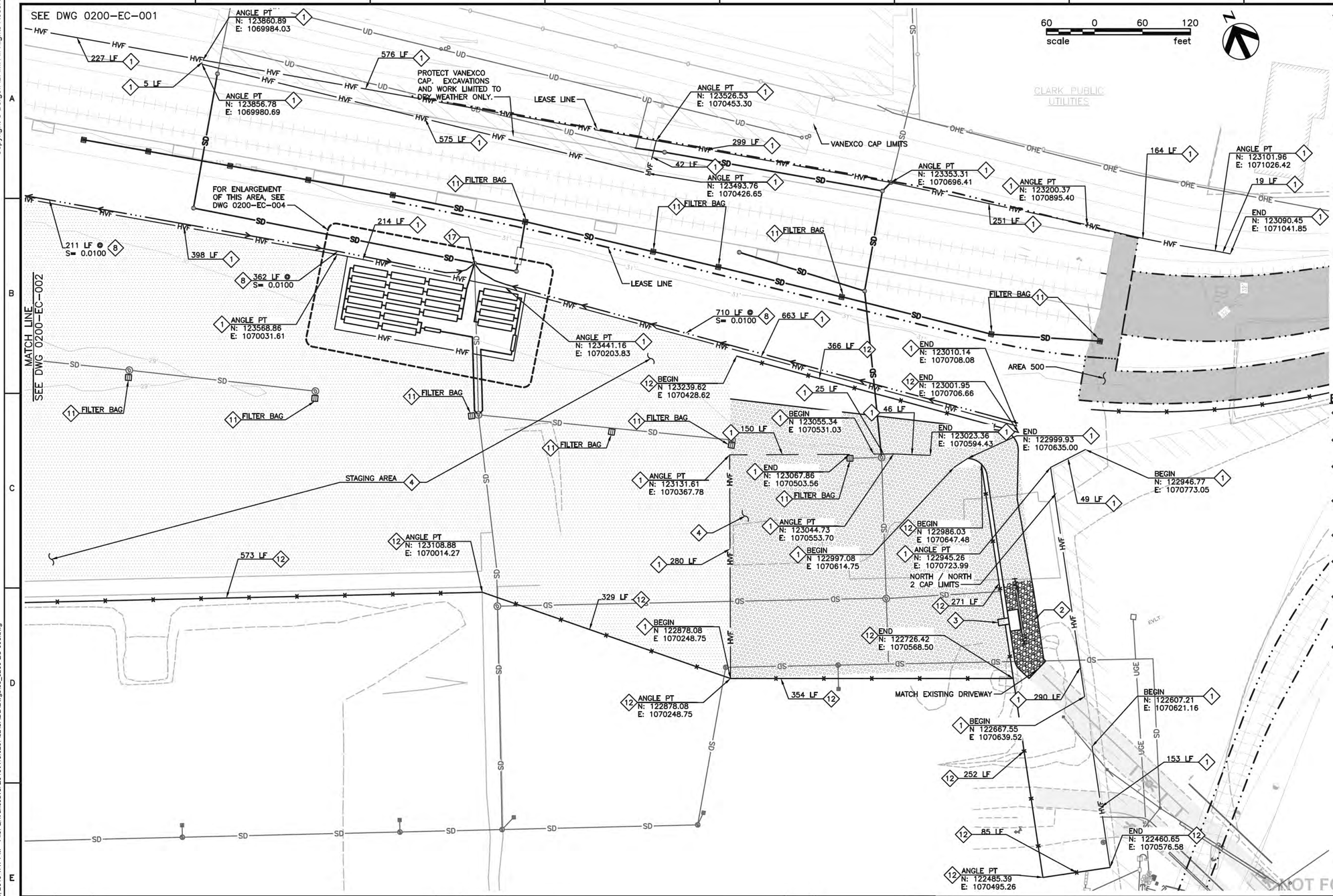

GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL, AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
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4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCING. SEE DETAIL 1 ON DWG 0100-EC-001.
2. INSTALL STABILIZED CONSTRUCTION ENTRANCE/EXIT. SEE DETAIL 2 ON DWG 0100-EC-001.
3. INSTALL PACKAGED WHEEL WASH DURING PERIODS OF GROUND DISTURBANCE DURING THE WET SEASON. SEE DETAIL 3 ON DWG 0100-EC-001.
4. CONSTRUCT PARKING AREA STABILIZATION ON-SITE IN LAYDOWN, STAGING, AND CONSTRUCTION PERSONNEL PARKING AREAS. SEE DETAIL 1 ON DWG 0100-EC-002.
7. CONCRETE WASHOUT IS LOCATED IN AREA 300. SEE DWG 0300-EC-001 AND 0300-EC-003 FOR LOCATION.
8. CONSTRUCT STORMWATER INTERCEPTOR IN THE LOCATION SHOWN. GENTLY GRADE LAYDOWN AREA TO INTERCEPTOR SWALE AS NECESSARY. SEE DETAIL 7 ON DWG 0100-EC-002.
11. INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.
12. INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.

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SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
ENVIRONMENTAL CONTROL PLAN - 3

DESIGN:	DRS	START DATE:	2/24/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0200-EC-003	1 / 1	

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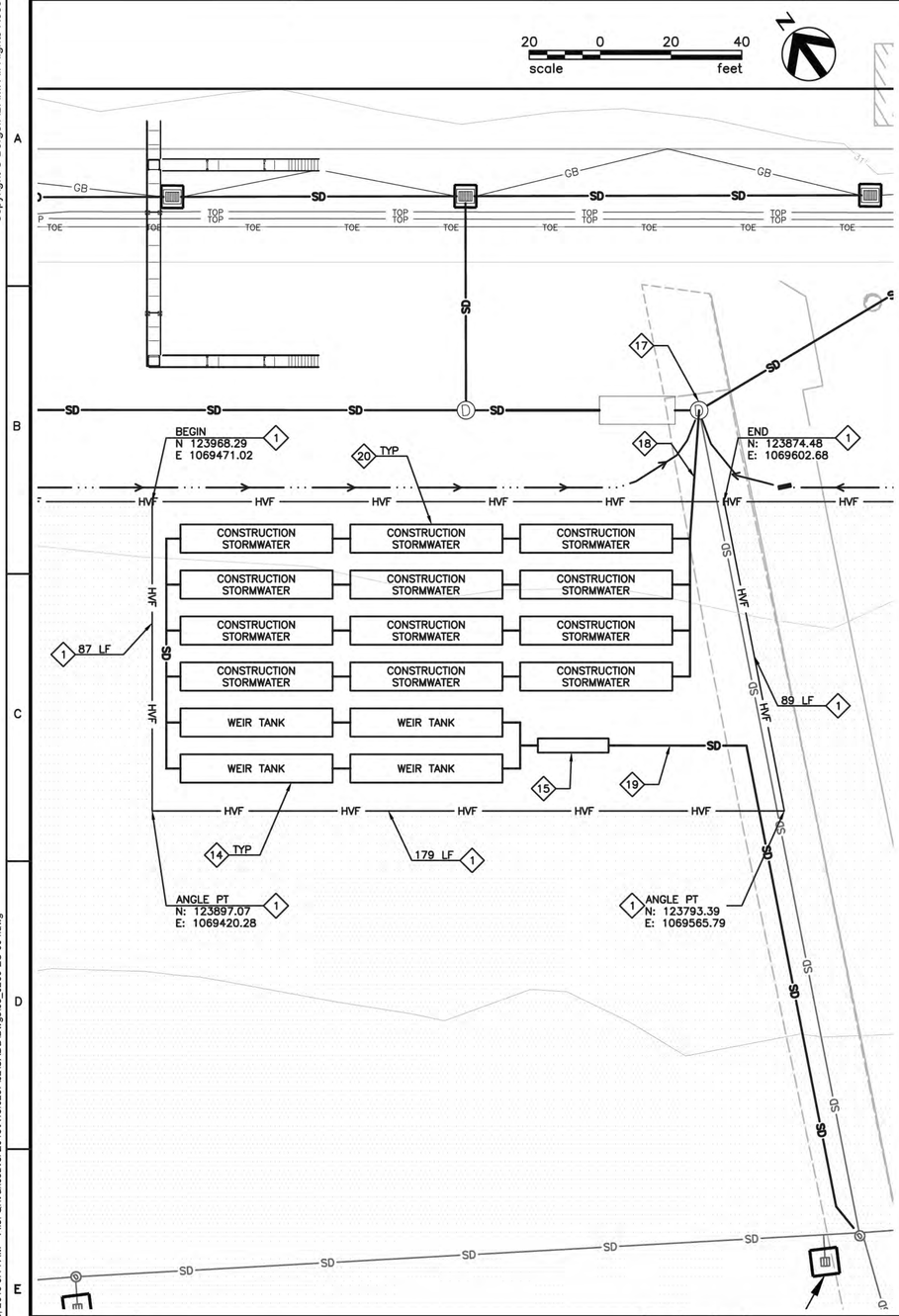

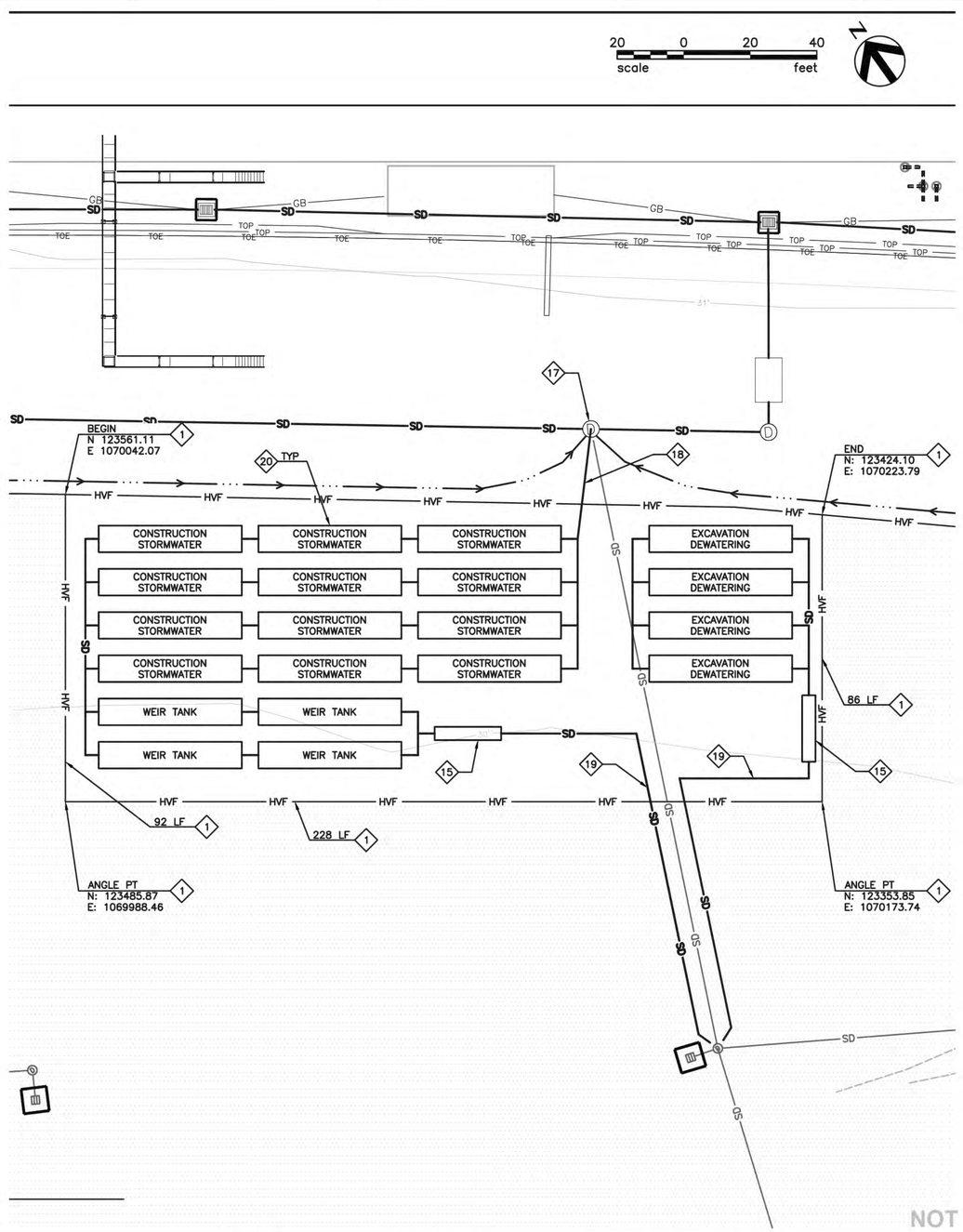

GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
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4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCING. SEE DETAIL 1 ON DWG 0100-EC-001.
4. CONSTRUCT PARKING AREA STABILIZATION ON-SITE IN LAYDOWN, STAGING, AND CONSTRUCTION PERSONNEL PARKING AREAS. SEE DETAIL 1 ON DWG 0100-EC-002.
8. CONSTRUCT STORMWATER INTERCEPTOR IN THE LOCATION SHOWN. GENTLY GRADE LAYDOWN AREA TO INTERCEPTOR SWALE AS NECESSARY. SEE DETAIL 7 ON DWG 0100-EC-002.
11. INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.
12. INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.
14. INSTALL WEIR TANKS FOR BASIC SEDIMENT TREATMENT. SEE DETAIL 5 ON DWG 0100-EC-003.
15. INSTALL ENHANCED SAND FILTRATION AND ADDITIONAL TREATMENT AS REQUIRED TO MEET PERMIT CONDITIONS. SEE DETAIL 6 ON DWG 0100-EC-003.
17. INSTALL PIPE PLUG ON DOWNSTREAM SIDE OF EXISTING STORM DRAIN STRUCTURE. CONTRACTOR SHALL PROVIDE PACKAGE STORMWATER HANDLING SUCTION PRIME PUMPING SYSTEM COMPLETE WITH GENERATOR, ON-SITE REDUNDANT PUMP, AND AUTODIALER NOTIFICATION SYSTEM.
18. INSTALL SOLID WALL, FUSED TEMPORARY HDPE PUMP EFFLUENT LINE AND MANIFOLD TO STORAGE/SURGE TANKS FOR TREATMENT.
19. INSTALL STORMWATER TREATMENT SYSTEM OUTFALL PIPING TO EXISTING STORM DRAIN. CONTRACTOR SHALL PROVIDE FLOW COMPOSITE SAMPLER AND PORT TO EXTRACT DAILY GRAB SAMPLES.
20. INSTALL 1.5 MILLION GALLONS OF STORAGE/SURGE TANKS.

SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200
ENVIRONMENTAL CONTROL PLAN – 4

DESIGN:	DRS	START DATE:	2/20/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/20/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0200-EC-004
SHEET: 1/1
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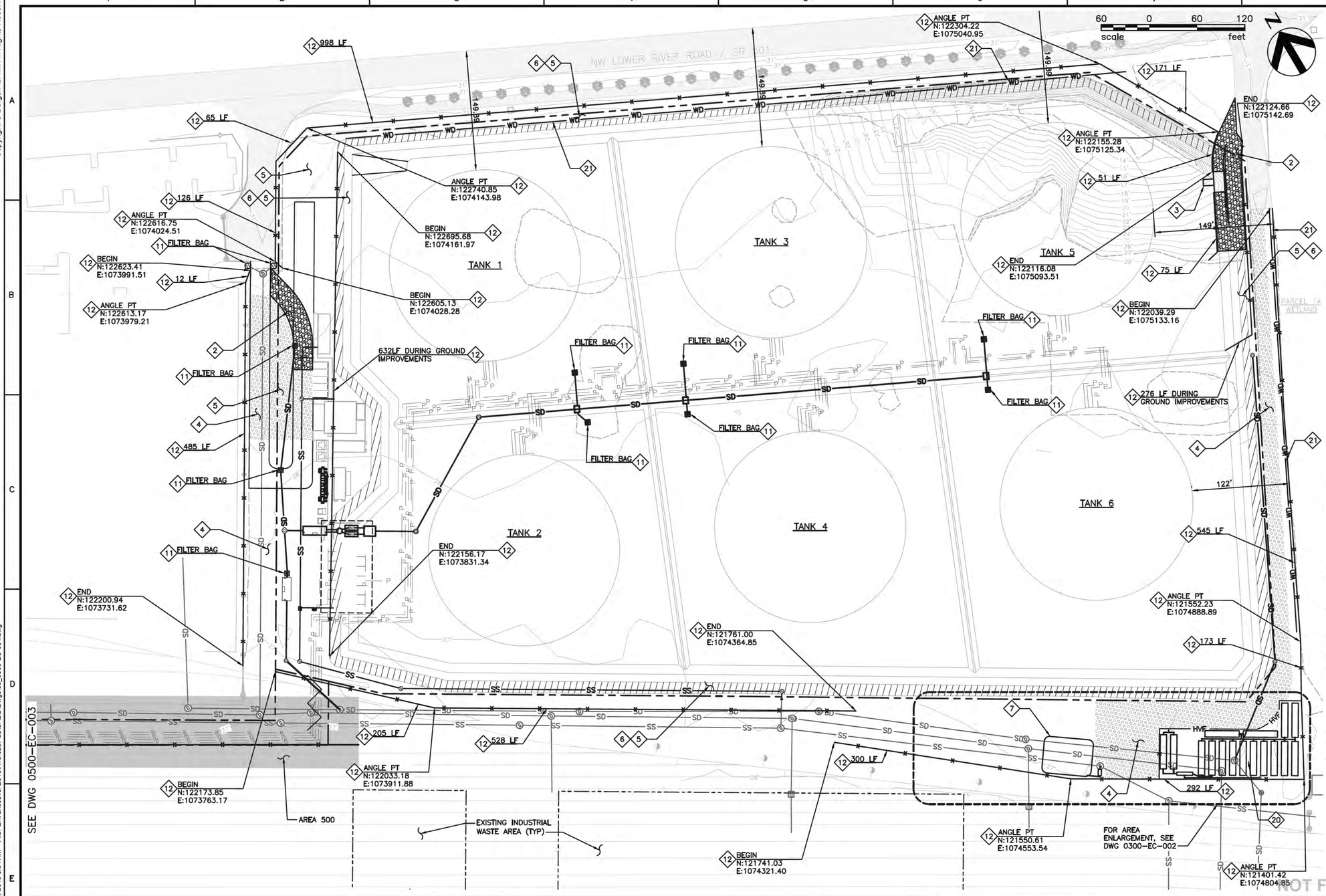

GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL, AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCING. SEE DETAIL 1 ON DWG 0100-EC-001.
2. INSTALL STABILIZED CONSTRUCTION ENTRANCE/EXIT. SEE DETAIL 2 ON DWG 0100-EC-001.
3. INSTALL PACKAGED WHEEL WASH DURING PERIODS OF GROUND DISTURBANCE DURING THE WET SEASON. SEE DETAIL 3 ON DWG 0100-EC-001.
4. CONSTRUCT PARKING AREA STABILIZATION ON-SITE IN LAYDOWN, STAGING, AND CONSTRUCTION PERSONNEL PARKING AREAS. SEE DETAIL 1 ON DWG 0100-EC-002.
5. INSTALL TEMPORARY AND PERMANENT SEEDING IMMEDIATELY FOLLOWING FINAL GRADING. SEE DETAIL 2 ON DWG 0100-EC-002.
6. PERFORM SURFACE ROUGHENING ON PRIMARY CONTAINMENT BERMS DURING CONSTRUCTION. SEE DETAIL 4 ON DWG 0100-EC-002.
7. INSTALL CONCRETE WASHOUT AREA IN ACCORDANCE WITH DETAIL 6 ON DRAWING 0100-EC-002.
8. CONSTRUCT STORMWATER INTERCEPTOR IN THE LOCATION SHOWN. GENTLY GRADE LAYDOWN AREA TO INTERCEPTOR SWALE AS NECESSARY. SEE DETAIL 7 ON DWG 0100-EC-002.
11. INSTALL CHECK DAMS IN EXISTING BIOFILTRATION SWALE AS SHOWN. SEE DETAIL 8 ON DWG 0100-EC-002.
12. INSTALL SILT FENCE. SEE DETAIL 3 IN DWG0100-EC-003.
20. INSTALL 60,000 GALLONS OF STORAGE/SURGE TANKS.
21. INSTALL WICK DRAINS AT 16' O.C. MINIMUM SPACING WHERE SHOWN WHEN GROUND IMPROVEMENTS ARE WITHIN 150 FEET OF ADJACENT WETLANDS. CONTRACTOR SHALL SUBMIT ENGINEERED DESIGN FOR REVIEW AND APPROVAL.

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
ENVIRONMENTAL CONTROL PLAN

DESIGN:	DRS	START DATE:	2/23/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0300-EC-001 | SHEET: 1/1 | REV.:

Last Saved by: Tony.pritchett on: Feb 23, 2015 8:34 AM File: Q:\Vancouver\2013\A13.0267\02\CADD\Dwgs\03_0300-EC-001.dwg

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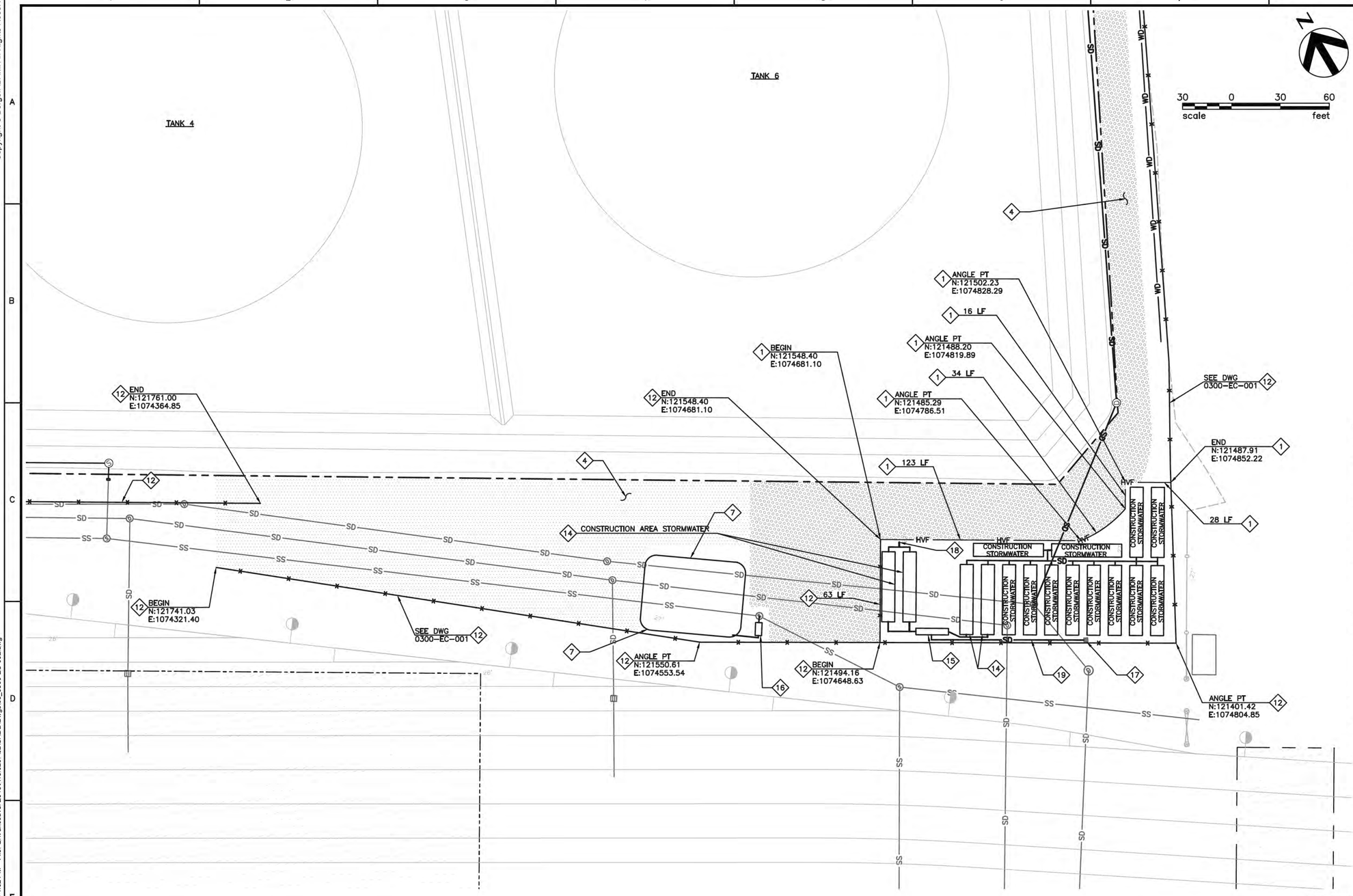

GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL, AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCING. SEE DETAIL 1 ON DWG 0100-EC-001.
4. CONSTRUCT PARKING AREA STABILIZATION ON-SITE IN LAYDOWN, STAGING, AND CONSTRUCTION PERSONNEL PARKING AREAS. SEE DETAIL 1 ON DWG 0100-EC-002.
7. INSTALL CONCRETE WASHOUT AREA. SEE DETAIL 6 ON DWG 0100-EC-002
8. CONSTRUCT STORMWATER INTERCEPTOR IN THE LOCATION SHOWN. GENTLY GRADE LAYDOWN AREA TO INTERCEPTOR SWALE AS NECESSARY. SEE DETAIL 7 ON DWG 0100-EC-002.
11. INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.
12. INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.
14. INSTALL WEIR TANKS FOR BASIC SEDIMENT TREATMENT. SEE DETAIL 6 ON DWG 0100-EC-003.
15. INSTALL ENHANCED SAND FILTRATION AND ADDITIONAL TREATMENT AS REQUIRED TO MEET PERMIT CONDITIONS. SEE DETAIL 6 ON DWG 0100-EC-003.
16. INSTALL PH NEUTRALIZATION TREATMENT AS REQUIRED TO MEET PERMIT CONDITIONS. SEE DETAIL 7 ON DWG 0100-EC-003.
18. INSTALL SOLID WALL, FUSED TEMPORARY HDPE PUMP EFFLUENT LINE AND MANIFOLD TO STORAGE/SURGE TANKS FOR TREATMENT.
19. INSTALL STORMWATER TREATMENT SYSTEM OUTFALL PIPING TO EXISTING STORM DRAIN. CONTRACTOR SHALL PROVIDE FLOW COMPOSIT SAMPLER AND PORT TO EXTRACT DAILY GRAB SAMPLES.
20. INSTALL 60,000 GALLONS OF STORAGE/SURGE TANKS.

SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 300
ENVIRONMENTAL CONTROL PLAN

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/20/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0300-EC-002 | SHEET: 1/1 | REV.

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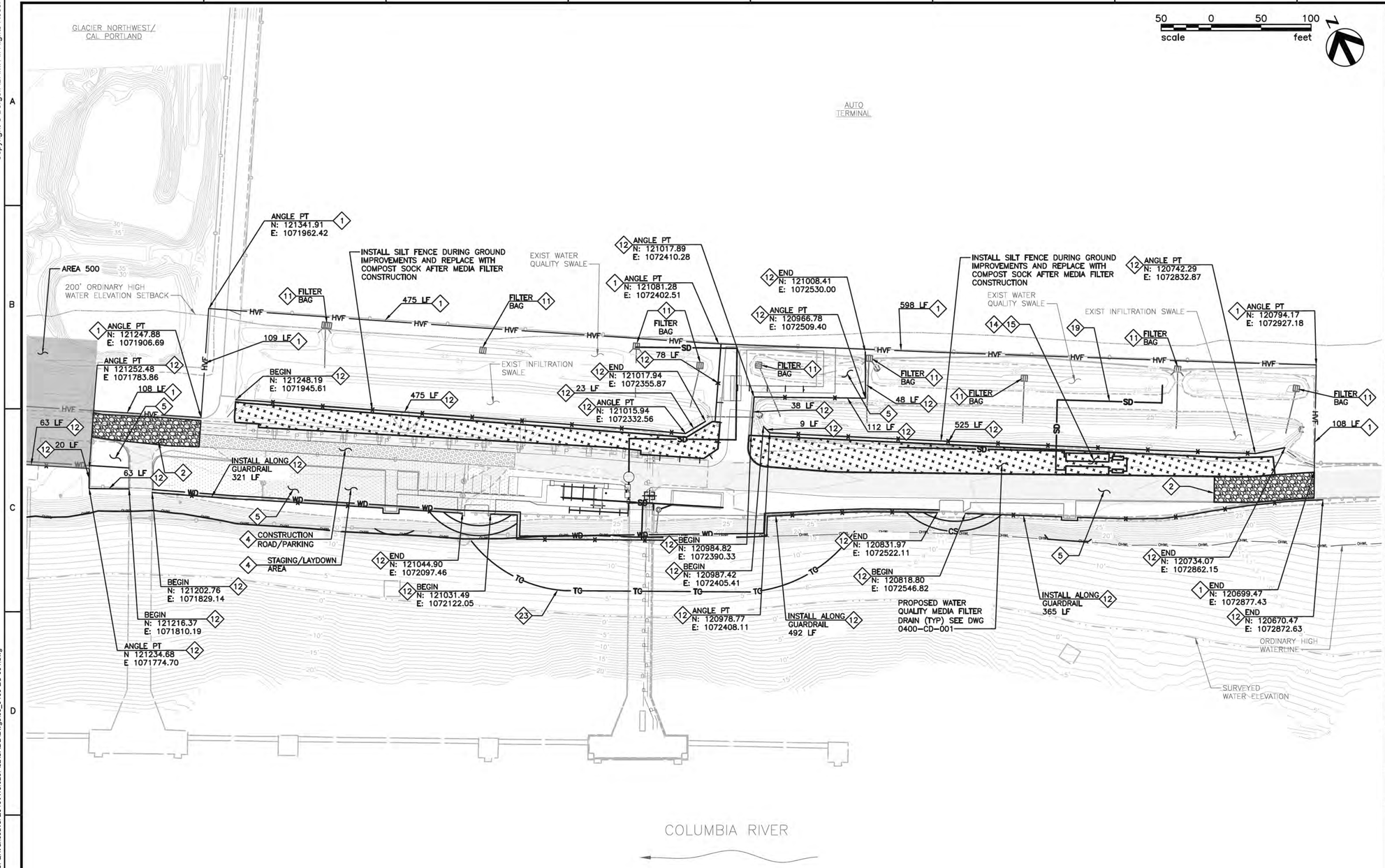

GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL, AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCING. SEE DETAIL 1 ON DWG 0100-EC-001.
2. INSTALL STABILIZED CONSTRUCTION ENTRANCE/EXIT. SEE DETAIL 2 ON DWG 0100-EC-001.
3. INSTALL PACKAGED WHEEL WASH DURING PERIODS OF GROUND DISTURBANCE DURING THE WET SEASON. SEE DETAIL 3 ON DWG 0100-EC-001.
4. CONSTRUCT PARKING AREA STABILIZATION ON-SITE IN LAYDOWN, STAGING, AND CONSTRUCTION PERSONNEL PARKING AREAS. SEE DETAIL 1 ON DWG 0100-EC-002.
5. INSTALL TEMPORARY AND PERMANENT SEEDING IMMEDIATELY FOLLOWING FINAL GRADING. SEE DETAIL 2 ON DWG 0100-EC-002.
7. CONCRETE WASHOUT IS LOCATED IN AREA 300. SEE DWG 0300-EC-001 AND 0300-EC-002 FOR LOCATION.
9. INSTALL CHECK DAMS IN EXISTING BIOFILTRATION SWALE AS SHOWN. SEE DETAIL 8 ON DWG 0100-EC-002.
11. INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.
12. INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.
13. INSTALL COMPOST SOCK IN ACCORDANCE WITH DETAIL 4 ON DRAWING 0100-EC-003
14. INSTALL WEIR TANKS FOR BASIC SEDIMENT TREATMENT. SEE DETAIL 5 ON DWG 0100-EC-003.
15. INSTALL ENHANCED SAND FILTRATION AND ADDITIONAL TREATMENT AS REQUIRED TO MEET PERMIT CONDITIONS. SEE DETAIL 6 ON DWG 0100-EC-003.
19. INSTALL STORMWATER TREATMENT SYSTEM OUTFALL PIPING TO EXISTING STORM DRAIN. CONTRACTOR SHALL PROVIDE FLOW COMPOSITE SAMPLER AND PORT TO EXTRACT DAILY GRAB SAMPLES.
21. INSTALL WICK DRAINS AT 8' O.C. MAXIMUM SPACING ALONG COLUMBIA RIVER WATERFRONT. CONTRACTOR SHALL SUBMIT ENGINEERED DESIGN FOR REVIEW AND APPROVAL.
23. INSTALL TYPE II TURBIDITY CURTAIN DURING GROUND IMPROVEMENT WORK NEAR THE ABUTMENT.

SAM ADAMS YOUNG STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 400
ENVIRONMENTAL CONTROL PLAN

DESIGN:	DRS	START DATE:	2/23/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0400-EC-001	1/1	

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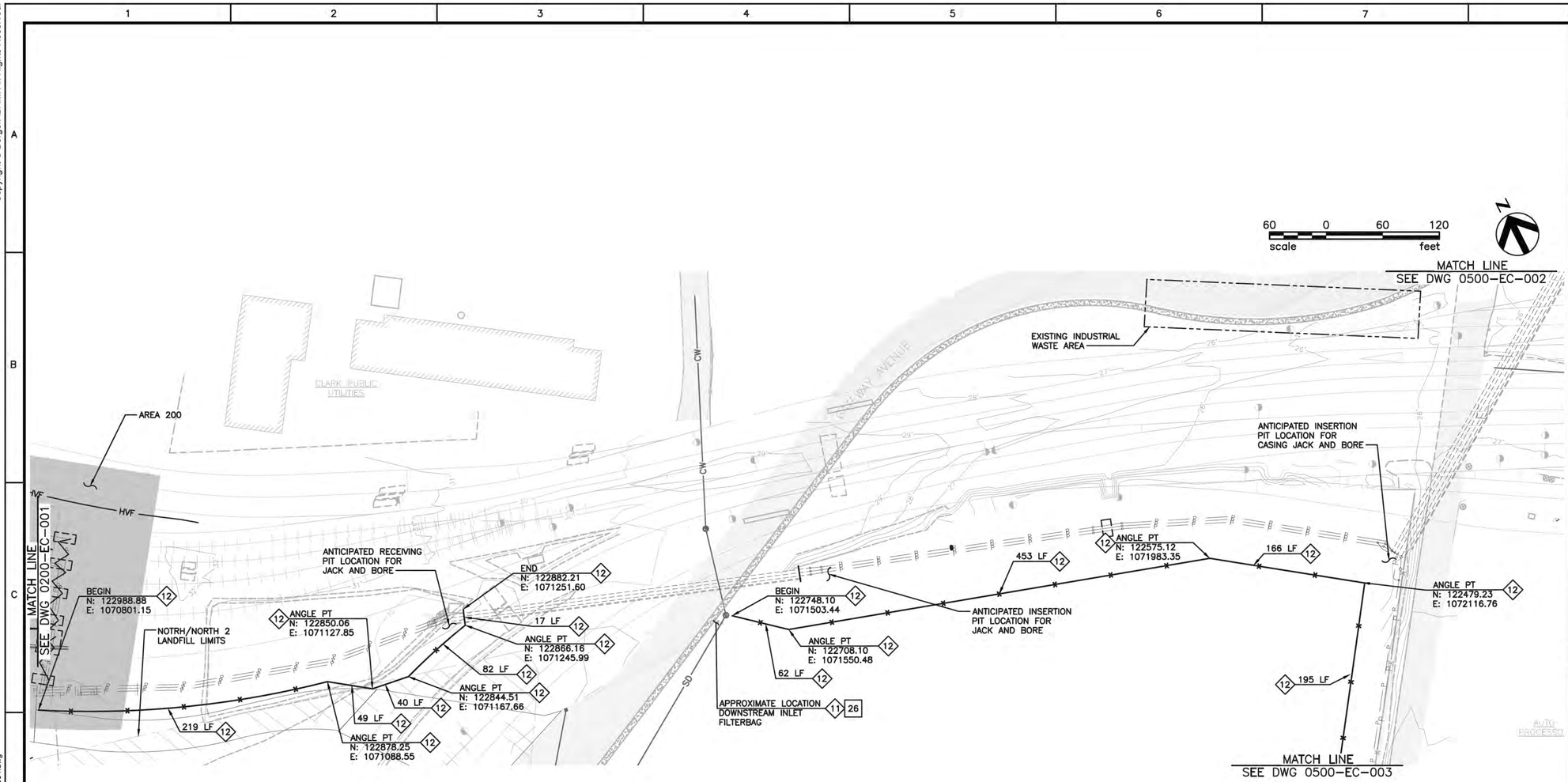


GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL, AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

(1) INSTALL HIGH VISIBILITY FENCING. SEE DETAIL 1 ON DWG 0100-EC-001.

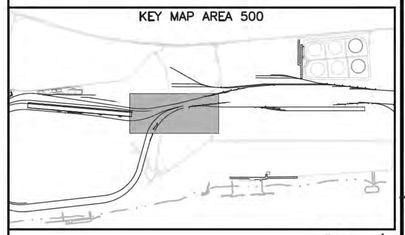
(11) INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.

(12) INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.

DRAINAGE NOTES:

[26] RETROFIT SPILL TRAP WITHIN EXISTING INLET PER DETAIL 4 ON DRAWING 0100-CD-006.

KEY MAP AREA 500



PRELIMINARY
SAM ADAMS
STATE OF WASHINGTON
27330
REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
ENVIRONMENTAL CONTROL PLAN – TRANSFER PIPELINE AREA – 1

DESIGN:	DRS	START DATE:	2/23/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0500-EC-001
SHEET: 1/1
REV:

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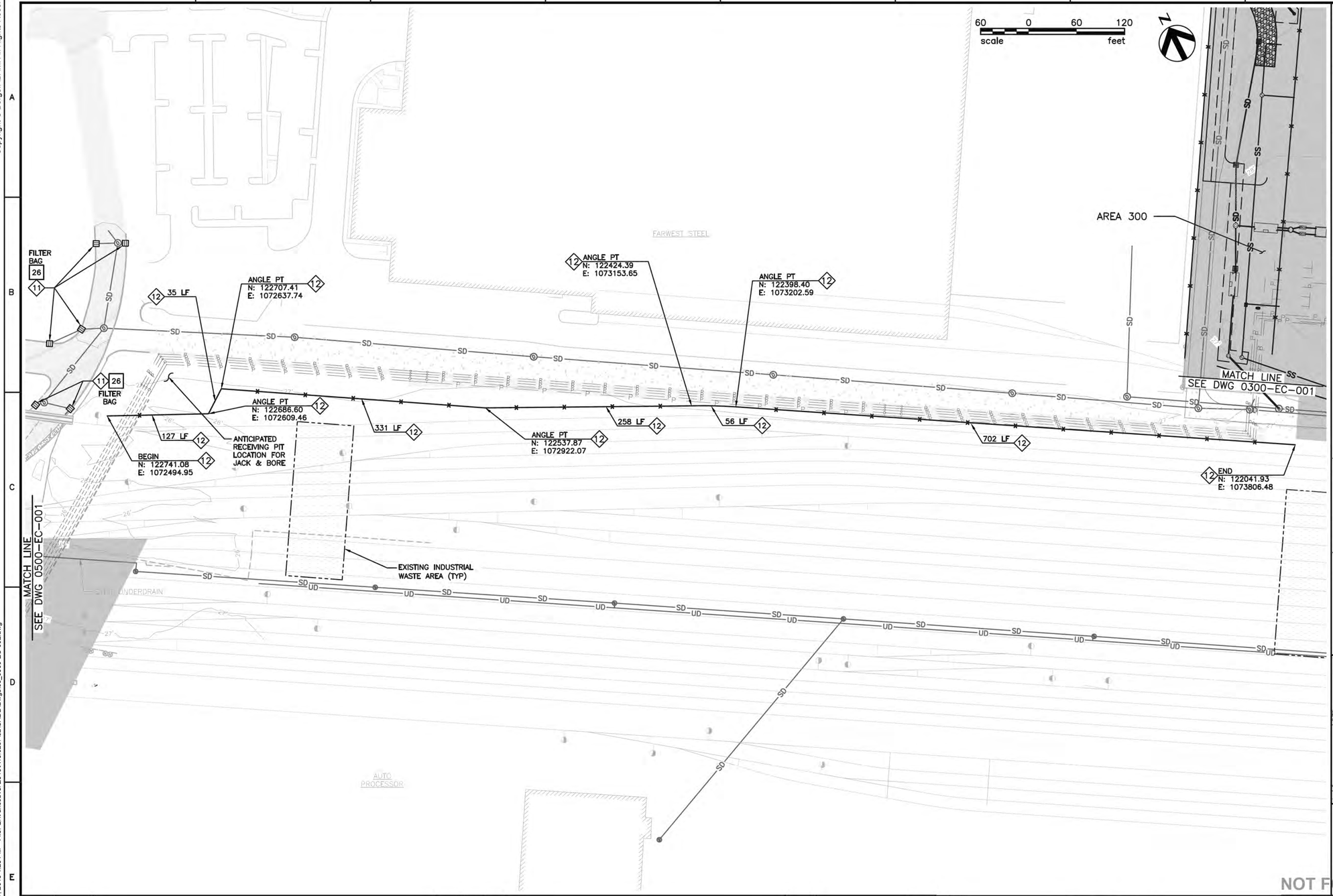


GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

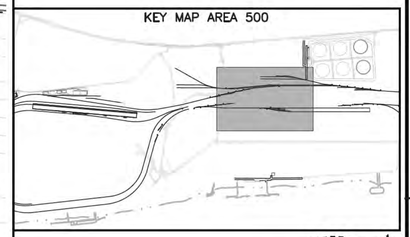
(11) INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.

(12) INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.

DRAINAGE NOTES:

26 RETROFIT SPILL TRAP WITHIN EXISTING INLET PER DETAIL 4 ON DRAWING 0100-CD-006.

KEY MAP AREA 500



PRELIMINARY

SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
ENVIRONMENTAL CONTROL PLAN – TRANSFER PIPELINE AREA – 2

DESIGN:	DRS	START DATE:	2/17/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/23/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0500-EC-002	1/1	

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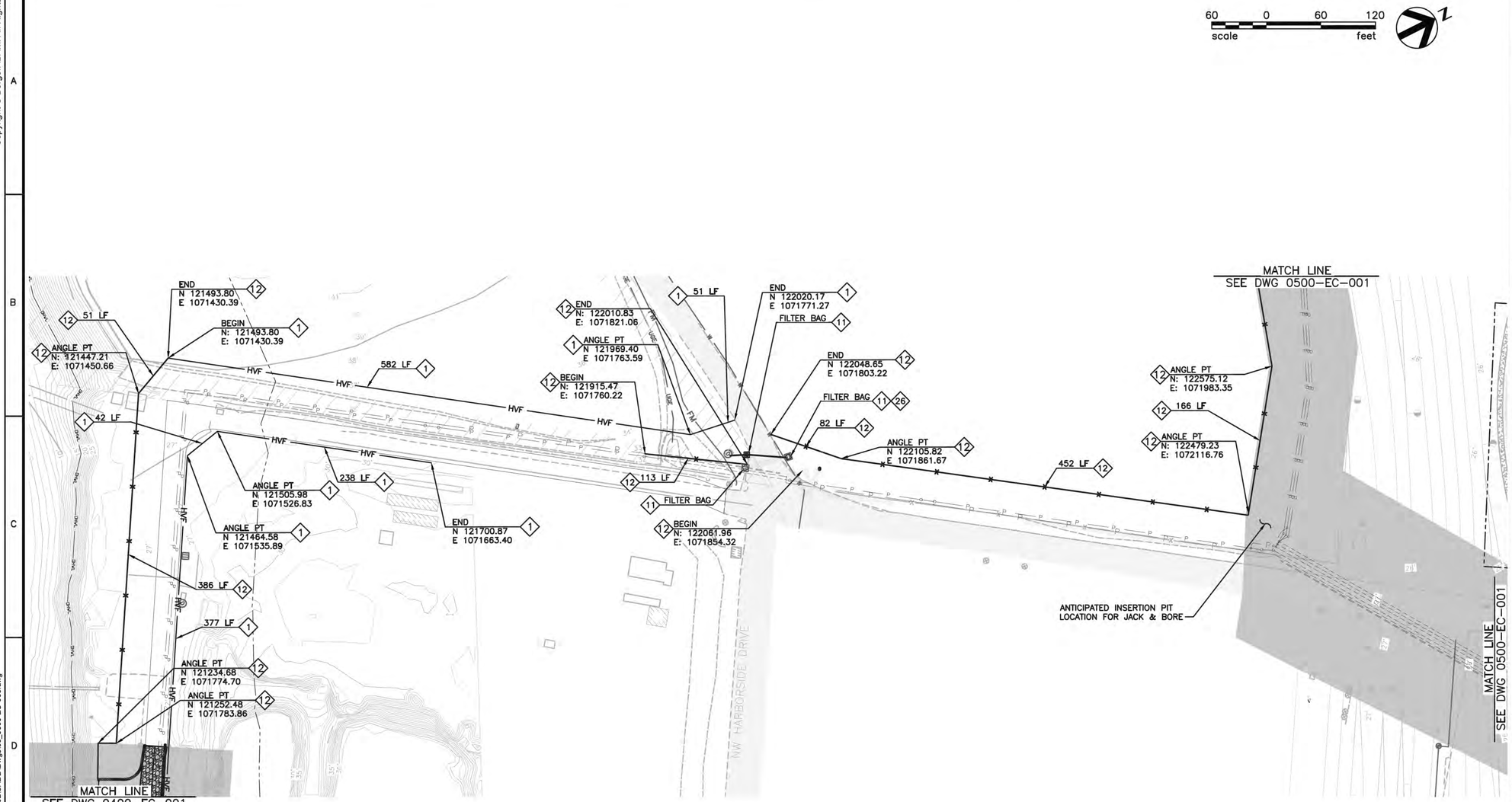


GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL, AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

1 INSTALL HIGH VISIBILITY FENCING. SEE DETAIL 1 ON DWG 0100-EC-001.

11 INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.

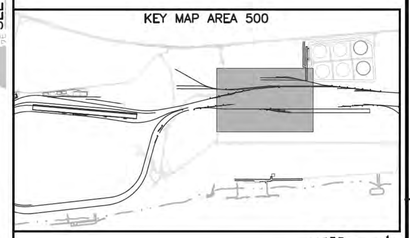
12 INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.

13 INSTALL COMPOST SOCK IN ACCORDANCE WITH DETAIL 4 ON DRAWING 0100-EC-003

DRAINAGE NOTES:

26 RETROFIT SPILL TRAP WITHIN EXISTING INLET PER DETAIL 4 ON DRAWING 0100-CD-006.

KEY MAP AREA 500



PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMEY PRELIMINARY
STATE OF WASHINGTON
27330
REGISTERED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
ENVIRONMENTAL CONTROL PLAN – TRANSFER PIPELINE AREA – 3

DESIGN:	DRS	START DATE:	2/24/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0500-EC-003	1/1	

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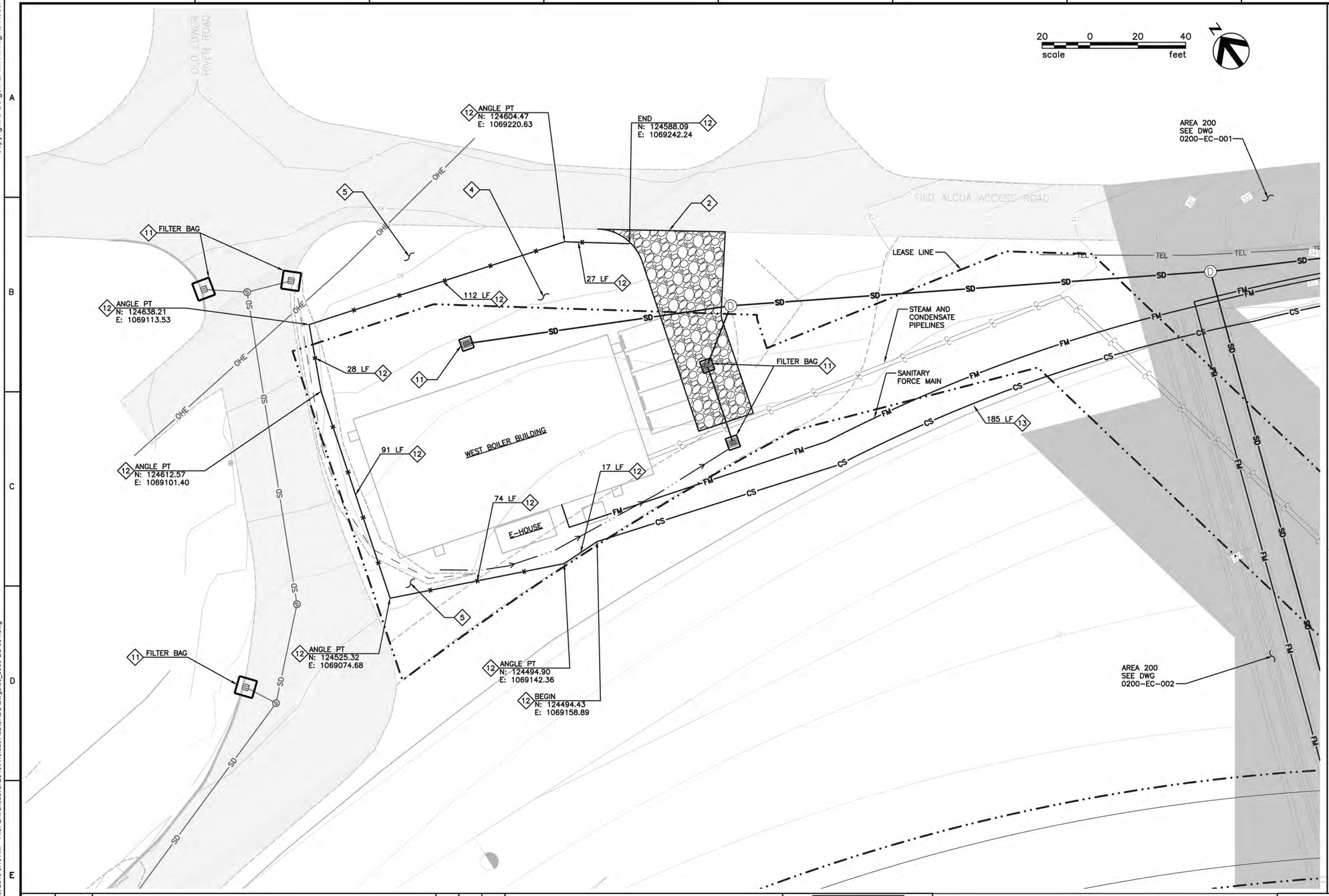

GENERAL NOTES:

1. SEE LEGEND ON SHEET 0100-EC-001 FOR SPECIFIC EROSION PREVENTION, SEDIMENT CONTROL, AND CONSTRUCTION STORMWATER RELATED SYMBOLOGY. SEE LEGEND ON SHEET 0100-CD-001 FOR EXISTING AND PROPOSED SITE DEVELOPMENT FEATURES.
2. LAYOUT OF PROPOSED ENVIRONMENTAL CONTROL ELEMENTS IS SCHEMATIC, ACTUAL LOCATIONS AND CONFIGURATIONS MAY VARY. CONTRACTOR SHALL REVIEW ALL PERMIT DOCUMENTS, CONDITIONS OF APPROVAL AND APPLICABLE SITE SPECIFIC STORMWATER POLLUTION CONTROL PLANS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONSTRUCT ALL ENVIRONMENTAL CONTROL ELEMENTS IN ACCORDANCE WITH DOCUMENT PERMIT REQUIREMENTS.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ENVIRONMENTAL CONTROLS IN-PLACE DURING CONSTRUCTION ARE SUFFICIENT TO MEET PERMIT REQUIREMENTS AND ARE MAINTAINED AT ALL TIMES. ENVIRONMENTAL CONTROL PLANS ASSUME WET SEASON CONSTRUCTION. CONTRACTOR MAY NEED TO SUPPLEMENT CONTROLS AS NECESSARY TO MEET PERMITTED CONDITIONS.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH PLASTIC COVERING TO THE MAXIMUM EXTENT PRACTICAL DURING WET-WEATHER SEASON. STOCKPILED MATERIAL NOT USED FOR 3 DAYS DURING DRY SEASON SHALL BE COVERED. WHERE FORECAST CALLS FOR RAIN AND/OR HIGH WINDS DURING DRY SEASON INSTALL PLASTIC COVERING ON STOCKPILED MATERIAL. SEE DETAIL 3 ON DWG 0100-EC-002.
5. PROVIDE MATERIAL, STORAGE AND CONTAINMENT BMPs FOR LIQUIDS AND HAZARDOUS MATERIAL. SEE DETAIL 5 ON DWG 0100-EC-002.
6. DURING TRENCHING AND DEEP EXCAVATIONS WHERE GROUNDWATER IS ENCOUNTERED AND EXCAVATION DEWATERING OCCURS, CONTRACTOR SHALL PROVIDE DEWATERING PUMPS AND ON-SITE STORAGE TANKS. CONTRACTOR SHALL TEST ALL DEWATERING WATER IN ACCORDANCE WITH MONITORING REQUIREMENTS ON DWG 0100-EC-001. CONTRACTOR SHALL HAUL OFF AND LEGALLY DISPOSE OF CONTAMINATED EXCAVATION DEWATERING WATER OR PROVIDE TREATMENT FOR DEWATERING WATER IF NECESSARY PRIOR TO RELEASE TO STORM DRAIN.

ENVIRONMENTAL CONTROL NOTES:

2. INSTALL STABILIZED CONSTRUCTION ENTRANCE/EXIT. SEE DETAIL 2 ON DWG 0100-EC-001.
4. CONSTRUCT PARKING AREA STABILIZATION ON-SITE IN LAYDOWN, STAGING, AND CONSTRUCTION PERSONNEL PARKING AREAS. SEE DETAIL 1 ON DWG 0100-EC-002.
5. INSTALL TEMPORARY AND PERMANENT SEEDING IMMEDIATELY FOLLOWING FINAL GRADING. SEE DETAIL 2 ON DWG 0100-EC-002.
7. CONCRETE WASHOUT IS LOCATED IN AREA 300. SEE DWG 0300-EC-001 AND 0300-EC-002 FOR LOCATION. OR INSTALL CONCRETE WASHOUT AREA IN ACCORDANCE WITH DETAIL 6 ON DRAWING 0100-EC-002.
11. INSTALL INLET PROTECTION (TYPE AS NOTED) AT ALL EXISTING INLETS PRIOR TO BEGINNING CONSTRUCTION. INSTALL INLET PROTECTION AT ALL NEWLY CONSTRUCTED FACILITIES IMMEDIATELY UPON INSTALLATION. SEE DETAIL 2 ON DWG 0100-EC-003.
12. INSTALL SILT FENCE. SEE DETAIL 3 ON DWG 0100-EC-003.
13. INSTALL COMPOST SOCK IN ACCORDANCE WITH DETAIL 4 ON DRAWING 0100-EC-003 DURING TRENCHING AND CONSTRUCTION OF FORCE MAIN AND PIPELINES.

SAM ADAMS STATE OF WASHINGTON 27330 REGISTERED PROFESSIONAL ENGINEER

PRELIMINARY
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NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 600
ENVIRONMENTAL CONTROL PLAN

DESIGN:	DRS	START DATE:	2/23/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/24/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0600-EC-001 | SHEET: 1/1 | REV.

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Construction Stormwater Pollution Prevention Plan

Vancouver Energy
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix H
Construction BMPs

BMP C103: High Visibility Fence

Purpose

Fencing is intended to:

1. Restrict clearing to approved limits.
2. Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed.
3. Limit construction traffic to designated construction entrances, exits, or internal roads.
4. Protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

Design and Installation Specifications

High visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high visibility orange. The fence tensile strength shall be 360 lbs./ft. using the ASTM D4595 testing method.

If appropriate install fabric silt fence in accordance with BMP C233 to act as high visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.

Metal fences shall be designed and installed according to the manufacturer's specifications.

Metal fences shall be at least 3 feet high and must be highly visible.

Fences shall not be wired or stapled to trees.

Maintenance Standards

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C105: Stabilized Construction Entrance / Exit

Purpose

Stabilized Construction entrances are established to reduce the amount of sediment transported onto paved roads by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for construction sites.

Conditions of use

Construction entrances shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

For residential construction provide stabilized construction entrances for each residence, rather than only at the main subdivision entrance.

Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size/configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation Specifications

See Figure 4.1.1 for details. Note: the 100' minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').

Construct stabilized construction entrances with a 12-inch thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction entrance stabilization because these products raise pH levels in stormwater and concrete discharge to surface waters of the State is prohibited.

A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards:

Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMP C103) shall be installed as necessary to restrict traffic to the construction entrance.

- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction entrances should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction entrance must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.

Maintenance Standards

Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions of the entrance, or the installation of a wheel wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when high efficiency sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s), fencing (see BMP C103) shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

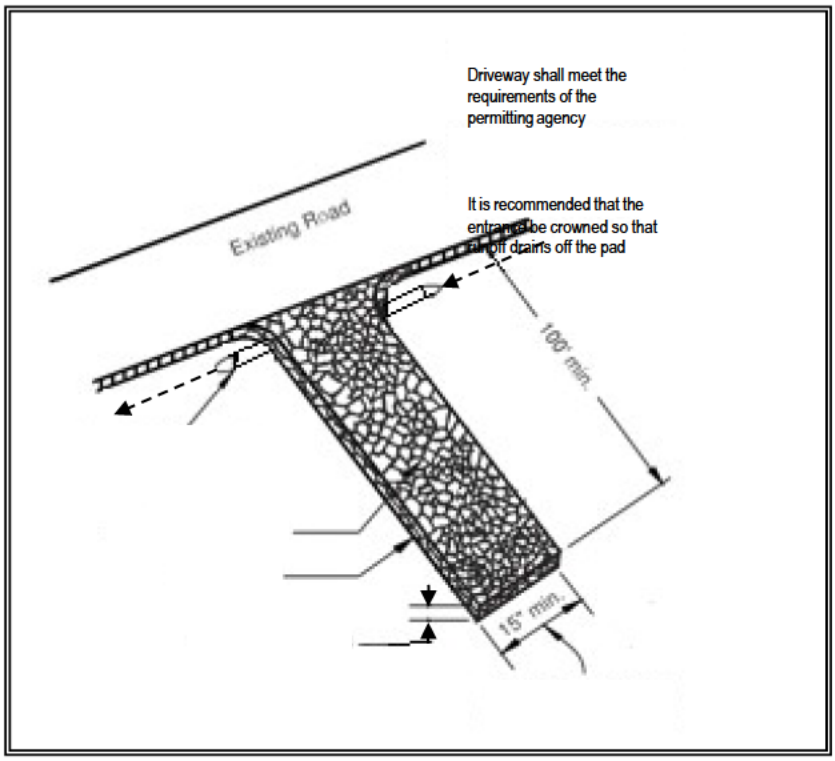

Figure 4.1.1 – Stabilized Construction Entrance

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C105. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C106: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles.

Conditions of Use

When a stabilized construction entrance (see BMP C105) is not preventing sediment from being tracked onto pavement.

- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.
- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.
- Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland land application, or to the sanitary sewer with local sewer district approval.
- Wheel wash or tire bath wastewater should not include wastewater from concrete washout areas.

Design and Installation Specifications

Suggested details are shown in Figure 4.1.2. The Local Permitting Authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.

Use a low clearance truck to test the wheel wash before paving. Either a belly dump or lowboy will work well to test clearance.

Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.

Midpoint spray nozzles are only needed in extremely muddy conditions.

Wheel wash systems should be designed with a small grade change, 6- to 12-inches for a 10-foot-wide pond, to allow sediment to flow to the low side of pond to help prevent re-suspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow for easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel wash water at a rate of 0.25 - 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the wash water.

Maintenance Standards

The wheel wash should start out the day with fresh water.

The wash water should be changed a minimum of once per day. On large earthwork jobs where more than 10-20 trucks per hour are expected, the wash water will need to be changed more often.

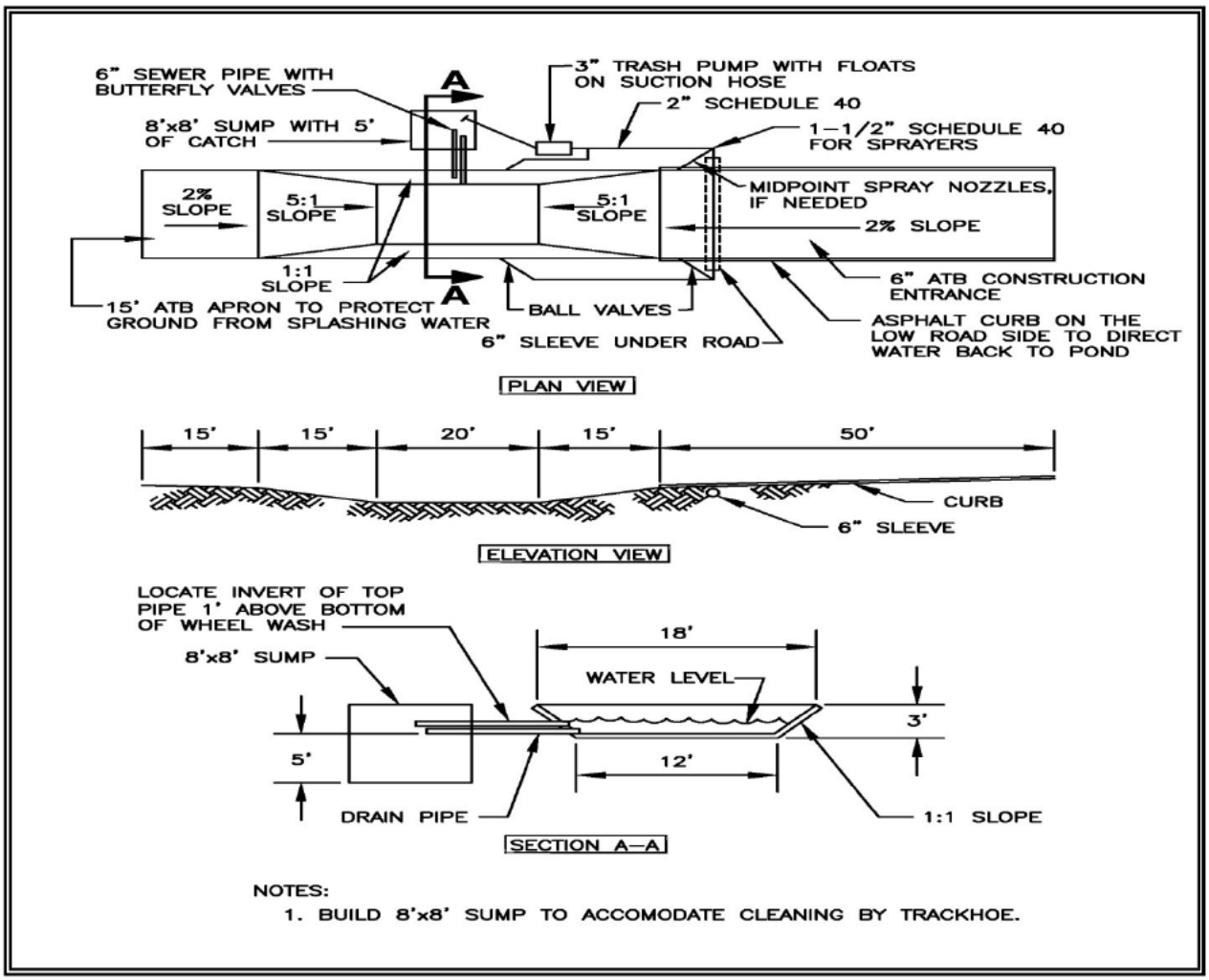

Figure 4.1.2 – Wheel Wash

Notes:

1. Asphalt construction entrance 6 in. asphalt treated base (ATB).
2. 3-inch trash pump with floats on the suction hose.
3. Midpoint spray nozzles, if needed.
4. 6-inch sewer pipe with butterfly valves. Bottom one is a drain. Locate top pipe's invert 1 foot above bottom of wheel wash.
5. 8 foot x 8 foot sump with 5 feet of catch. Build so the sump can be cleaned with a trackhoe.
6. Asphalt curb on the low road side to direct water back to pond.
7. 6-inch sleeve under road.
8. Ball valves.
9. 15 foot. ATB apron to protect ground from splashing water.

BMP C107: Construction Road/Parking Area Stabilization

Purpose

Stabilizing subdivision roads, parking areas, and other on-site vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or runoff.

Conditions of Use

Roads or parking areas shall be stabilized wherever they are constructed, whether permanent or temporary, for use by construction traffic.

- High Visibility Fencing (see BMP C103) shall be installed, if necessary, to limit the access of vehicles to only those roads and parking areas that are stabilized.

Design and Installation Specifications

- On areas that will receive asphalt as part of the project, install the first lift as soon as possible.
- A 6-inch depth of 2- to 4-inch crushed rock, gravel base, or crushed surfacing base course shall be applied immediately after grading or utility installation. A 4-inch course of asphalt treated base (ATB) may also be used, or the road/parking area may be paved. It may also be possible to use cement or calcium chloride for soil stabilization. If cement or cement kiln dust is used for roadbase stabilization, pH monitoring and BMPs (BMPs C252 and C253) are necessary to evaluate and minimize the effects on stormwater. If the area will not be used for permanent roads, parking areas, or structures, a 6-inch depth of hog fuel may also be used, but this is likely to require more maintenance. Whenever possible, construction roads and parking areas shall be placed on a firm, compacted subgrade.
- Temporary road gradients shall not exceed 15 percent. Roadways shall be carefully graded to drain. Drainage ditches shall be provided on each side of the roadway in the case of a crowned section, or on one side in the case of a super-elevated section. Drainage ditches shall be directed to a sediment control BMP.
- Rather than relying on ditches, it may also be possible to grade the road so that runoff sheet-flows into a heavily vegetated area with a well-developed topsoil. Landscaped areas are not adequate. If this area has at least 50 feet of vegetation that water can flow through, then it is generally preferable to use the vegetation to treat runoff, rather than a sediment pond or trap. The 50 feet shall not include wetlands or their buffers. If runoff is allowed to sheetflow through adjacent vegetated areas, it is vital to design the roadways and parking areas so that no concentrated runoff is created.
- Storm drain inlets shall be protected to prevent sediment-laden water entering the storm drain system (see BMP C220).

Maintenance Standards

Inspect stabilized areas regularly, especially after large storm events. Crushed rock, gravel base, etc., shall be added as required to maintain a stable driving surface and to stabilize any areas that have eroded.

Following construction, these areas shall be restored to pre-construction

condition or better to prevent future erosion.

Perform street cleaning at the end of each day or more often if necessary.

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.

The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1.

Between July 1 and August 30 seeding requires irrigation until 75 percent grass cover is established.

Between October 1 and March 30 seeding requires a cover of mulch with straw or an erosion control blanket until 75 percent grass cover is established.

Review all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.

- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching for specifications.
- Seed and mulch, all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) which will prevent erosion.

Design and Installation Specifications

Seed retention/detention ponds as required.

Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix. For vegetated channels that will have high flows, install erosion control blankets over hydroseed. Before allowing water to flow in vegetated channels, establish 75 percent vegetation cover. If vegetated channels cannot be established by seed before water flow; install sod in the channel bottom—over hydromulch and erosion control blankets.

- Confirm the installation of all required surface water control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. See BMP C121: Mulching for specifications.
- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed

soil surface before application.

- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Enhance vegetation establishment by dividing the hydromulch operation into two phases:

  1. Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift.
  2. Phase 2- Install the rest of the mulch and tackifier over the first lift.

  Or, enhance vegetation by:

  1. Installing the mulch, seed, fertilizer, and tackifier in one lift.
  2. Spread or blow straw over the top of the hydromulch at a rate of 800-1000 pounds per acre.
  3. Hold straw in place with a standard tackifier.

Both of these approaches will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

- Irrigation.
- Reapplication of mulch.
- Repair of failed slope surfaces.

This technique works with standard hydromulch (1,500 pounds per acre minimum) and BFM/MBFMs (3,000 pounds per acre minimum).

- Seed may be installed by hand if:
- Temporary and covered by straw, mulch, or topsoil.
- Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- The seed mixes listed in the tables below include recommended mixes for both temporary and permanent seeding.
- Apply these mixes, with the exception of the wetland mix at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used.
- Consult the local suppliers or the local conservation district for their recommendations because the appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the local authority may be used.
- Other mixes may be appropriate, depending on the soil type and

hydrology of the area.

- Table 4.1.2 lists the standard mix for areas requiring a temporary vegetative cover

Table 4.1.2
Temporary Erosion Control Seed Mix

	% Weight	% Purity	% Germination
Chewings or annual blue grass *Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye - *Lolium perenne*	50	98	90
Redtop or colonial bentgrass *Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover *Trifolium repens*	5	98	90

- Table 4.1.3 lists a recommended mix for landscaping seed.

Table 4.1.3
Landscaping Seed Mix

	% Weight	% Purity	% Germination
Perennial rye blend *Lolium perenne*	70	98	90
Chewings and red fescue blend *Festuca rubra var. commutata* or *Festuca rubra*	30	98	90

- Table 4.1.4 lists a turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.

Table 4.1.4
Low-Growing Turf Seed Mix

	% Weight	% Purity	% Germination
Dwarf tall fescue (several varieties) *Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay) *Lolium perenne var. barclay*	30	98	90
Red fescue *Festuca rubra*	20	98	90
Colonial bentgrass *Agrostis tenuis*	5	98	90

- Table 4.1.5 lists a mix for bioswales and other intermittently wet areas.

Table 4.1.5
Bioswale Seed Mix*

	% Weight	% Purity	% Germination
Tall or meadow fescue *Festuca arundinacea* or *Festuca elatior*	75-80	98	90
Seaside/Creeping bentgrass *Agrostis palustris*	10-15	92	85
Redtop bentgrass *Agrostis alba* or *Agrostis gigantea*	5-10	90	80

* *Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix*

- Table 4.1.6 lists a low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Apply this mixture at a rate of 60 pounds per acre. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.

Table 4.1.6
Wet Area Seed Mix*

	% Weight	% Purity	% Germination
Tall or meadow fescue *Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass *Agrostis palustris*	10-15	98	85
Meadow foxtail *Alepocurus pratensis*	10-15	90	80
Alsike clover *Trifolium hybridum*	1-6	98	90
Redtop bentgrass *Agrostis alba*	1-6	92	85

** Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix*

- Table 4.1.7 lists a recommended meadow seed mix for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.

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Table 4.1.7
Meadow Seed Mix

	% Weight	% Purity	% Germination
Redtop or Oregon bentgrass *Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue *Festuca rubra*	70	98	90
White dutch clover *Trifolium repens*	10	98	90

- **Roughening and Rototilling:**
  - The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Backblading or smoothing of slopes greater than 4H:1V is not allowed if they are to be seeded.
  - Restoration-based landscape practices require deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall use soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches complete the rototilling process in multiple lifts, or prepare the engineered soil system per specifications and place to achieve the specified depth.
- **Fertilizers:**
  - Conducting soil tests to determine the exact type and quantity of fertilizer is recommended. This will prevent the over-application of fertilizer.
  - Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form.
  - In general, use 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer at a rate of 90 pounds per acre. Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow-release coating.
  - There are numerous products available that take the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent cottonseed meal is used as the mulch in hydroseed, chemical

fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.

- **Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix:**
  - On steep slopes use Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products. Apply BFM/MBFM products at a minimum rate of 3,000 pounds per acre of mulch with approximately 10 percent tackifier. Achieve a minimum of 95 percent soil coverage during application. Numerous products are available commercially. Installed products per manufacturer's instructions. Most products require 24-36 hours to cure before rainfall and cannot be installed on wet or saturated soils

Generally, products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.

- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include:
- BFM and MBFMs do not require surface preparation.
- Helicopters can assist in installing BFM and MBFMs in remote areas.
- On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
- Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.

Maintenance Standards

Reseed any seeded areas that fail to establish at least 80 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, use an alternate method such as sodding, mulching, or nets/blankets. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. Reseed and protect by mulch any eroded area.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes runoff.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C120. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html.

BMP C121: Mulching

Purpose

Mulching soils provides immediate temporary protection from erosion.

Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures.

There is an enormous variety of mulches that can be used. This section discusses only the most common types of mulch.

Conditions of Use

As a temporary cover measure, mulch should be used:

- For less than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.

Mulch may be applied at any time of the year and must be refreshed periodically.

- For seeded areas mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, kenaf; compost; or blends of these. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table 4.1.8. Always use a 2-inch minimum mulch thickness; increase the thickness until the ground is 95% covered (i.e. not visible under the mulch layer).

Note: Thickness may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Where the option of "Compost" is selected, it should be a coarse compost that meets the following size gradations when tested in accordance with the U.S. Composting Council "Test Methods for the Examination of Compost and Composting" (TMECC) Test Method 02.02-B.

Coarse Compost

Minimum Percent passing 3" sieve openings 100%

Minimum Percent passing 1" sieve openings 90%

Minimum Percent passing ¾" sieve openings 70%

Minimum Percent passing ¼" sieve openings 40%

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult Hydraulic Permit Authority (HPA) for

mulch mixes if applicable.

Maintenance Standards

- The thickness of the cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

Table 4.1.8
Mulch Standards and Guidelines

Mulch Material	Quality Standards	Application Rates	Remarks
Straw	Air-dried; free from undesirable seed and coarse material.	2"-3" thick; 5 bales per 1,000 sf or 2-3 tons per acre	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	No growth inhibiting factors.	Approx. 25-30 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about ¾-1 inch clog hydromulch equipment. Fibers should be kept to less than ¾ inch.
Compost	No visible water or dust during handling. Must be produced per WAC 173-350, Solid Waste Handling Standards, but may have up to 35% biosolids.	2" thick min.; approx. 100 tons per acre (approx. 800 lbs per yard)	More effective control can be obtained by increasing thickness to 3". Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125 or BMP T5.13 (see Chapter 5 of Volume V of this manual) It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use near wetlands or near phosphorous impaired water bodies.
Chipped Site Vegetation	Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.	2" thick min.;	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.

Wood-based Mulch or Wood Straw	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.	2” thick min.; approx. 100 tons per acre (approx. 800 lbs. per cubic yard)	This material is often called “hog or hogged fuel.” The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Wood Strand Mulch	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.	2” thick min.	Cost-effective protection when applied with adequate thickness. A minimum of 95-percent of the wood strand shall have lengths between 2 and 10-inches, with a width and thickness between 1/16 and ⅜-inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. (WSDOT specification (9-14.4(4))

BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than six months) applications.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- While plastic is inexpensive to purchase, the added cost of installation, maintenance, removal, and disposal make this an expensive material, up to $1.50-2.00 per square yard.
- Whenever plastic is used to protect slopes install water collection measures at the base of the slope. These measures include plastic- covered berms, channels, and pipes used to covey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
    1. Temporary ditch liner.
    2. Pond liner in temporary sediment pond.
    3. Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored.
    4. Emergency slope protection during heavy rains.
    5. Temporary drainpipe ("elephant trunk") used to direct water.

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
    1. Run plastic up and down slope, not across slope.
    2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet.
    3. Minimum of 8-inch overlap at seams.
    4. On long or wide slopes, or slopes subject to wind, tape all seams.

5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil which causes extreme erosion.
8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.

- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C123. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding.

Conditions for Use

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding..
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure 4.1.5 for tracking and contour furrows. Factors to be considered in choosing a method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3H:1V) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes steeper than 3H:1V but less than 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance

- Areas that are graded in this manner should be seeded as quickly as

possible.

- Regular inspections should be made of the area. If rills appear, they should be re-graded and re-seeded immediately.

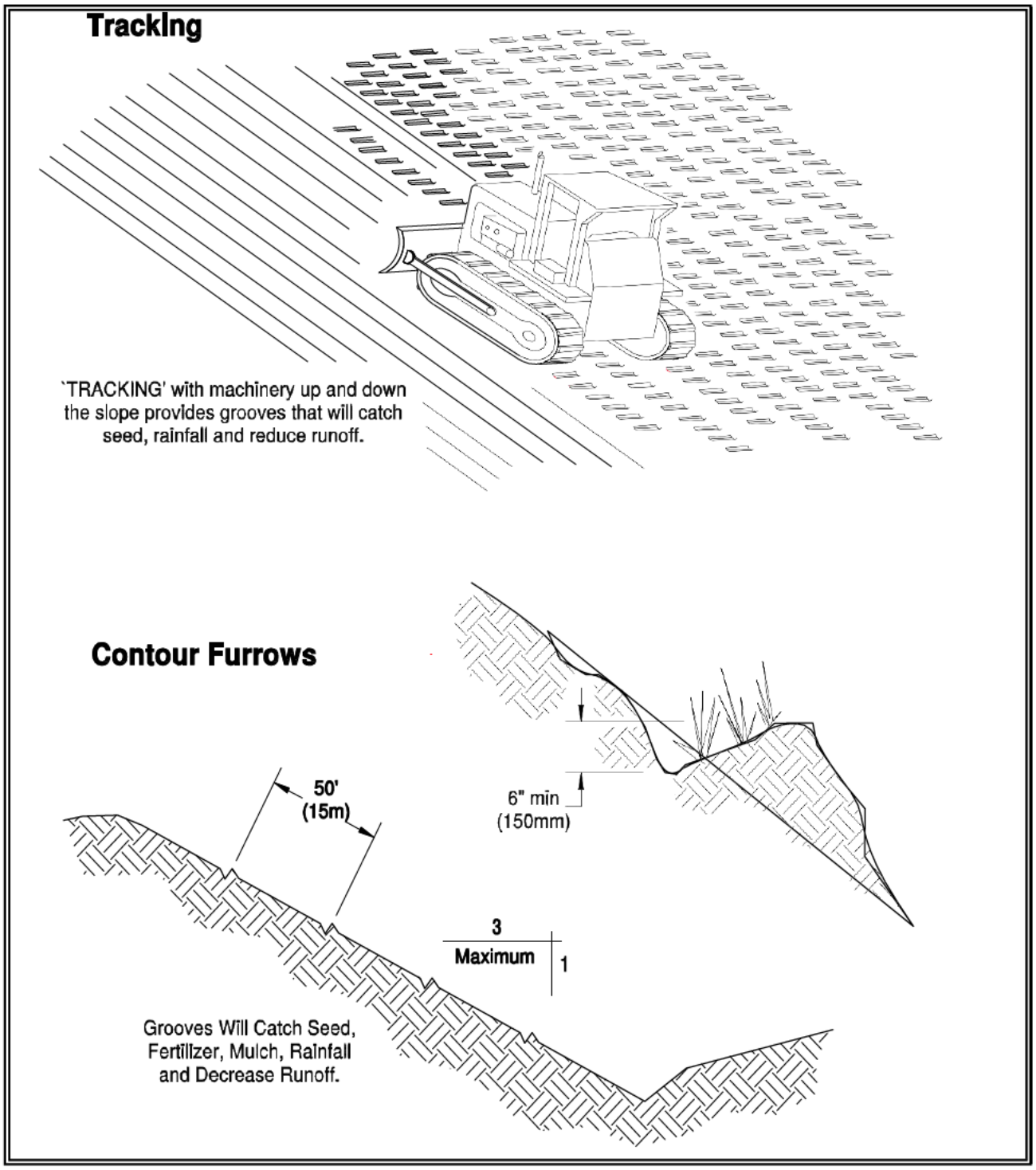


Figure 4.1.5 – Surface Roughening by Tracking and Contour Furrows

BMP C140: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Conditions of Use

In areas (including roadways) subject to surface and air movement of dust where on-site and off-site impacts to roadways, drainage ways, or surface waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until surface is wet. Repeat as needed. To prevent carryout of mud onto street, refer to Stabilized Construction Entrance (BMP C105).
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local governments may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126) added to water at a rate of 0.5 lbs. per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may actually reduce the quantity of water needed for dust control. Use of PAM could be a cost-effective dust control method.

Techniques that can be used for unpaved roads and lots include:

- Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
- Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
- Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 mm) to 10 to 20 percent.
- Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.

- Encourage the use of alternate, paved routes, if available.
- Restrict use of paved roadways by tracked vehicles and heavy trucks to prevent damage to road surface and base.
- Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
- Pave unpaved permanent roads and other trafficked areas.
- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Limit dust-causing work on windy days.
- Contact your local Air Pollution Control Authority for guidance and training on other dust control measures. Compliance with the local Air Pollution Control Authority constitutes compliance with this BMP.

Maintenance Standards

Respray area as necessary to keep dust to a minimum

BMP C150: Materials on Hand

Purpose

Keep quantities of erosion prevention and sediment control materials on the project site at all times to be used for regular maintenance and emergency situations such as unexpected heavy summer rains. Having these materials on-site reduces the time needed to implement BMPs when inspections indicate that existing BMPs are not meeting the Construction SWPPP requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions of Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric and steel "T" posts.
- Materials are stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A large contractor or developer could keep a stockpile of materials that are available for use on several projects.
- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

Design and Installation Specifications

Depending on project type, size, complexity, and length, materials and quantities will vary. A good minimum list of items that will cover numerous situations includes:

Material
Clear Plastic, 6 mil
Drainpipe, 6 or 8 inch diameter
Sandbags, filled
Straw Bales for mulching,
Quarry Spalls
Washed Gravel
Geotextile Fabric
Catch Basin Inserts
Steel "T" Posts
Silt fence material
Straw Wattles

Maintenance Standards

- All materials with the exception of the quarry spalls, steel "T" posts, and gravel should be kept covered and out of both sun and rain.
- Re-stock materials used as needed.

BMP C151: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the state.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction projects include, but are not limited to, the following:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Design and Installation Specifications

- Assure that washout of concrete trucks, chutes, pumps, and internals is performed at an approved off-site location or in designated concrete washout areas. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams. Refer to BMP C154 for information on concrete washout areas.
- Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas.
- Wash off hand tools including, but not limited to, screeds, shovels, rakes, floats, and trowels into formed areas only.
- Wash equipment difficult to move, such as concrete pavers in areas that do not directly drain to natural or constructed stormwater conveyances.
- Do not allow washdown from areas, such as concrete aggregate driveways, to drain directly to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no formed areas are available. Dispose of contained concrete in a manner that does not violate ground water or surface water quality standards.
- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMPs C252 and C253 for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit for pH monitoring requirements if the project involves one of the following activities:

- Significant concrete work (greater than 1,000 cubic yards poured concrete or recycled concrete used over the life of a project).
- The use of engineered soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
- Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards Check containers for holes in the liner daily during concrete pours and repair the same day.

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contains fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry created through sawcutting or surfacing from entering waters of the State.

Conditions of Use

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to, the following:

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate ground water or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose process water in a manner that does not violate ground water or surface water quality standards.
- Handle and dispose cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and vacuum trucks.

BMP C153: Material Delivery, Storage and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., Polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents, and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (Oct 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, and within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic

covers are inexpensive and snap to the top of drums, preventing water from collecting.

Material Storage Areas and Secondary Containment Practices:

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.
- Keep material storage areas clean, organized and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:
    - 1-Water Resistant Nylon Bag
    - 3-Oil Absorbent Socks 3”x 4’
    - 2-Oil Absorbent Socks 3”x 10’
    - 12-Oil Absorbent Pads 17”x19”
    - 1-Pair Splash Resistant Goggles
    - 3-Pair Nitrile Gloves
    - 10-Disposable Bags with Ties
    - Instructions

BMP C154: Concrete Washout Area

Purpose

Prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout off-site, or performing on-site washout in a designated area to prevent pollutants from entering surface waters or ground water.

Conditions of Use

Concrete washout area best management practices are implemented on construction projects where:

- Concrete is used as a construction material
- It is not possible to dispose of all concrete wastewater and washout off-site (ready mix plant, etc.).
- Concrete trucks, pumpers, or other concrete coated equipment are washed on-site.
- Note: If less than 10 concrete trucks or pumpers need to be washed out on-site, the washwater may be disposed of in a formed area awaiting concrete or an upland disposal site where it will not contaminate surface or ground water. The upland disposal site shall be at least 50 feet from sensitive areas such as storm drains, open ditches, or water bodies, including wetlands.

Design and Installation Specifications

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Perform washout of concrete trucks at an approved off-site location or in designated concrete washout areas only.
- Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped on-site, except in designated concrete washout areas.
- Concrete washout areas may be prefabricated concrete washout containers, or self-installed structures (above-grade or below-grade).
- Prefabricated containers are most resistant to damage and protect against spills and leaks. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste.
- If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.
- Self-installed above-grade structures should only be used if excavation is not practical.

Education

- Discuss the concrete management techniques described in this BMP with the ready-mix concrete supplier before any deliveries are made.
- Educate employees and subcontractors on the concrete waste management techniques described in this BMP.
- Arrange for contractor's superintendent or Certified Erosion and Sediment Control Lead (CESCL) to oversee and enforce concrete waste management procedures.
- A sign should be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.

Contracts

Incorporate requirements for concrete waste management into concrete supplier and subcontractor agreements.

Location and Placement

- Locate washout area at least 50 feet from sensitive areas such as storm drains, open ditches, or water bodies, including wetlands.
- Allow convenient access for concrete trucks, preferably near the area where the concrete is being poured.
- If trucks need to leave a paved area to access washout, prevent track- out with a pad of rock or quarry spalls (see BMP C105). These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.
- The number of facilities you install should depend on the expected demand for storage capacity.
- On large sites with extensive concrete work, washouts should be placed in multiple locations for ease of use by concrete truck drivers.

On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures:

- Temporary concrete washout facilities shall be located a minimum of 50 ft from sensitive areas including storm drain inlets, open drainage facilities, and watercourses. See Figures 4.1.7 and 4.1.8.
- Concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- Washout of concrete trucks shall be performed in designated areas only.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of off-site.
- Once concrete wastes are washed into the designated area and allowed to

harden, the concrete should be broken up, removed, and disposed of per applicable solid waste regulations. Dispose of hardened concrete on a regular basis.

- Temporary Above-Grade Concrete Washout Facility
  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details below, with a recommended minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
- Temporary Below-Grade Concrete Washout Facility
  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details below, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
  - Lath and flagging should be commercial type.
  - Plastic lining material shall be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
  - Liner seams shall be installed in accordance with manufacturers' recommendations.
  - Soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Maintenance Standards

Inspection and Maintenance

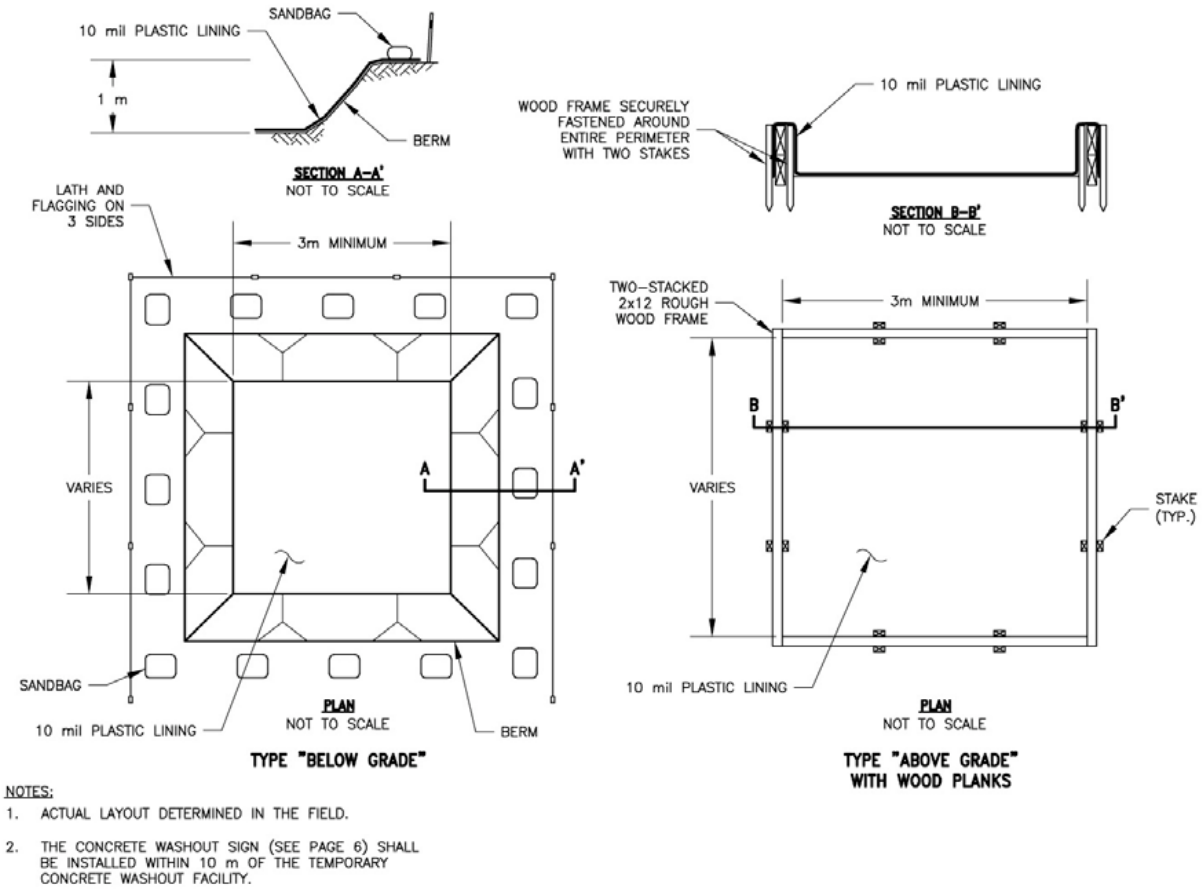
- Inspect and verify that concrete washout BMPs are in place prior to the commencement of concrete work.
- During periods of concrete work, inspect daily to verify continued performance.
  - Check overall condition and performance.
  - Check remaining capacity (% full).
  - If using self-installed washout facilities, verify plastic liners are intact and sidewalls are not damaged.
  - If using prefabricated containers, check for leaks.
- Washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 12 inches.
- Washout facilities must be cleaned, or new facilities must be

constructed and ready for use once the washout is 75% full.

- If the washout is nearing capacity, vacuum and dispose of the waste material in an approved manner.
    - Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.
    - Do not use sanitary sewer without local approval.
    - Place a secure, non-collapsing, non-water collecting cover over the concrete washout facility prior to predicted wet weather to prevent accumulation and overflow of precipitation.
    - Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete may be reused on-site or hauled away for disposal or recycling
- When you remove materials from the self-installed concrete washout, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of.
- Materials used to construct temporary concrete washout facilities shall be removed from the site of the work and disposed of or recycled.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled, repaired, and stabilized to prevent erosion.



NOTES:

1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN (SEE PAGE 6) SHALL BE INSTALLED WITHIN 10 m OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Figure 4.1.7a – Concrete Washout Area

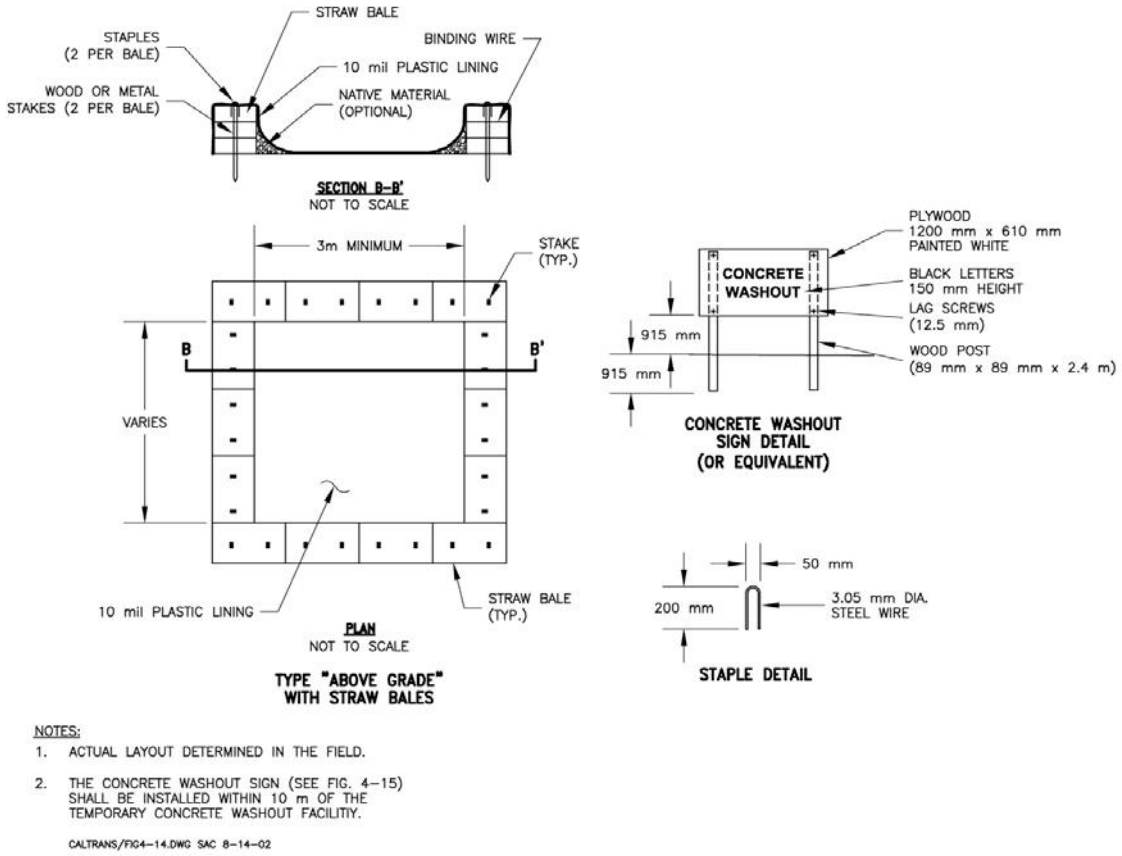


Figure 4.1.7b – Concrete Washout Area

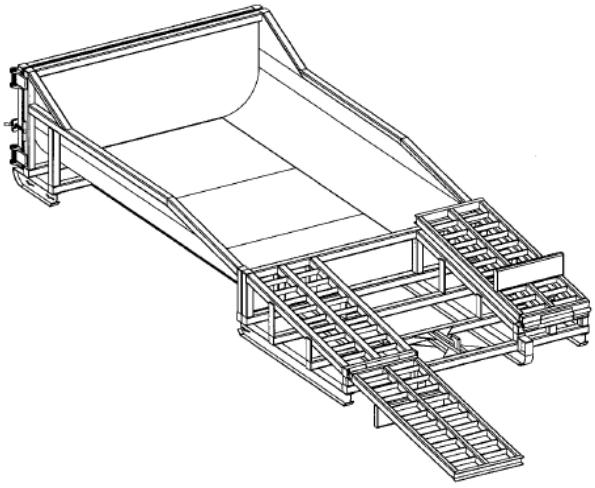


Figure 4.1.8 – Prefabricated Concrete Washout Container w/Ramp

BMP C160: Certified Erosion and Sediment Control Lead

Purpose

The project proponent designates at least one person as the responsible representative in charge of erosion and sediment control (ESC), and water quality protection. The designated person shall be the Certified Erosion and Sediment Control Lead (CESCL) who is responsible for ensuring compliance with all local, state, and federal erosion and sediment control and water quality requirements.

Conditions of Use

A CESCL shall be made available on projects one acre or larger that discharge stormwater to surface waters of the state. Sites less than one acre may have a person without CESCL certification conduct inspections; sampling is not required on sites that disturb less than an acre.

- The CESCL shall:
  - Have a current certificate proving attendance in an erosion and sediment control training course that meets the minimum ESC training and certification requirements established by Ecology (see details below).

    Ecology will maintain a list of ESC training and certification providers at:

    http://www.ecy.wa.gov/programs/wq/stormwater/cescl.html

    OR

  - Be a Certified Professional in Erosion and Sediment Control (CPESC); for additional information go to: www.cpesc.net

Specifications

- Certification shall remain valid for three years.
- The CESCL shall have authority to act on behalf of the contractor or developer and shall be available, or on-call, 24 hours per day throughout the period of construction.
- The Construction SWPPP shall include the name, telephone number, fax number, and address of the designated CESCL.
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region.

Duties and responsibilities of the CESCL shall include, but are not limited to the following:

- Maintaining permit file on site at all times which includes the Construction SWPPP and any associated permits and plans.
- Directing BMP installation, inspection, maintenance, modification, and removal.
- Updating all project drawings and the Construction SWPPP with changes made.
- Completing any sampling requirements including reporting results

using WebDMR.

- Keeping daily logs, and inspection reports. Inspection reports should include:
    - Inspection date/time.
    - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
    - A summary or list of all BMPs implemented, including observations of all erosion/sediment control structures or practices. The following shall be noted:
        1. Locations of BMPs inspected.
        2. Locations of BMPs that need maintenance.
        3. Locations of BMPs that failed to operate as designed or intended.
        4. Locations of where additional or different BMPs are required.
        5. Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
        6. Any water quality monitoring performed during inspection.
        7. General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.
- Facilitate, participate in, and take corrective actions resulting from inspections performed by outside agencies or the owner.

BMP C162: Scheduling

Purpose

Sequencing a construction project reduces the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Conditions of Use

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures planned for the project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of surface ground cover leaves a site vulnerable to accelerated erosion. Construction procedures that limit land clearing provide timely installation of erosion and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

Design Considerations

- Minimize construction during rainy periods.
- Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding in order to revegetate cut and fill slopes as the work progresses.

4.2 Runoff Conveyance and Treatment BMPs

This section contains the standards and specifications for Runoff Conveyance and Treatment BMPs. Table 4.2.1, below, shows the relationship of the BMPs in Section 4.2 to the Construction Stormwater Pollution Prevention Plan (SWPPP) Elements described in Section 3.3.3.

Table 4.2.1 Runoff Conveyance and Treatment BMPs by SWPPP Element

BMP or Element Name	**Element #3** Control Flow Rates	**Element #4** Install Sediment Controls	**Element #6** Protect Slopes	**Element #7** Protect Drain Inlets	**Element #8** Stabilize Channels and Outlets	**Element #9** Control Pollutants	**Element #10** Control De-Watering	**Element #13** Protect Low Impact Development
BMP C200: Interceptor Dike and Swale			✓					✓
BMP C201: Grass-Lined Channels			✓					✓
BMP C202: Channel Lining					✓			
BMP C203: Water Bars	✓		✓				✓	
BMP C204: Pipe Slope Drains			✓					
BMP C205: Subsurface Drains			✓					
BMP C206: Level Spreader			✓				✓	
BMP C207: Check Dams	✓		✓		✓			✓
BMP C208: Triangular Silt Dike (TSD) (Geotextile Encased Check Dam)			✓					✓
BMP C209: Outlet Protection	✓				✓			
BMP C220: Storm Drain Inlet Protection				✓				
BMP C231: Brush Barrier		✓						✓
BMP C232: Gravel Filter Berm		✓						
BMP C233: Silt Fence		✓						✓
BMP C234: Vegetated Strip		✓						✓
BMP C235: Wattles	✓	✓						
BMP C236: Vegetated Filtration							✓	
BMP C240: Sediment Trap	✓	✓						
BMP C241: Temporary Sediment Pond	✓	✓						
BMP C250: Construction Stormwater Chemical Treatment		✓				✓		
BMP C251: Construction Stormwater Filtration		✓				✓		
BMP C252: High pH Neutralization Using CO_2						✓		
BMP C253: pH Control for High pH Water						✓		

BMP C200: Interceptor Dike and Swale

Purpose

Provide a ridge of compacted soil, or a ridge with an upslope swale, at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Use the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Conditions of Use

Where the runoff from an exposed site or disturbed slope must be conveyed to an erosion control facility which can safely convey the stormwater.

- Locate upslope of a construction site to prevent runoff from entering disturbed area.
- When placed horizontally across a disturbed slope, it reduces the amount and velocity of runoff flowing down the slope.
- Locate downslope to collect runoff from a disturbed area and direct water to a sediment basin.

Design and Installation Specifications

- Dike and/or swale and channel must be stabilized with temporary or permanent vegetation or other channel protection during construction.
- Channel requires a positive grade for drainage; steeper grades require channel protection and check dams.
- Review construction for areas where overtopping may occur.
- Can be used at top of new fill before vegetation is established.
- May be used as a permanent diversion channel to carry the runoff.
- Sub-basin tributary area should be one acre or less.
- Design capacity for the peak volumetric flow rate calculated using a 10-minute time step from a 10-year, 24-hour storm, assuming a Type 1A rainfall distribution, for temporary facilities. Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model. For facilities that will also serve on a permanent basis, consult the local government's drainage requirements.

Interceptor dikes shall meet the following criteria:

Top Width	2 feet minimum
Height	1.5 feet minimum on berm
Side Slope	2H: 1V or flatter.
Grade	Depends on topography, however, dike system minimum is 0.5%, and maximum is 1%.
Compaction	Minimum of 90 percent ASTM D698 Standard proctor

Horizontal Spacing of Interceptor Dikes:

Average Slope	Slope Percent	Flowpath Length
20H:1V or less	3-5%	300 feet
(10 to 20)H:1V	5-10%	200 feet
(4 to 10)H:1V	10-25%	100 feet
(2 to 4)H:1V	25-50%	50 feet

Stabilization depends on velocity and reach

Slopes <5%	Seed and mulch applied within 5 days of dike construction (see BMP C121, Mulching).
Slopes 5 - 40%	Dependent on runoff velocities and dike materials. Stabilization should be done immediately using either sod or riprap or other measures to avoid erosion.

- The upslope side of the dike shall provide positive drainage to the dike outlet. No erosion shall occur at the outlet. Provide energy dissipation measures as necessary. Sediment-laden runoff must be released through a sediment trapping facility.
- Minimize construction traffic over temporary dikes. Use temporary cross culverts for channel crossing.

Interceptor swales shall meet the following criteria:

Bottom Width	2 feet minimum, the cross-section bottom shall be level.
Depth	1-foot minimum.
Side Slope	2H:1V of flatter.
Grade	Maximum 5 percent, with positive drainage to a suitable outlet (such as a sediment pond).
Stabilization	Seed as per BMP C120, *Temporary and Permanent Seeding*, or *BMP C202*, *Channel Lining*, 12 inches thick riprap pressed into the bank and extending at least 8 inches vertical from the bottom.

- Inspect diversion dikes and interceptor swales once a week and after every rainfall. Immediately remove sediment from the flow area.
- Damage caused by construction traffic or other activity must be repaired before the end of each working day.

Check outlets and make timely repairs as needed to avoid gully formation.

When the area below the temporary diversion dike is permanently stabilized, remove the dike and fill and stabilize the channel to blend with the natural surface.

BMP C202: Channel Lining

Purpose

To protect channels by providing a channel liner using either blankets or riprap.

Conditions of Use

When natural soils or vegetated stabilized soils in a channel are not adequate to prevent channel erosion.

- When a permanent ditch or pipe system is to be installed and a temporary measure is needed.
- In almost all cases, synthetic and organic coconut blankets are more effective than riprap for protecting channels from erosion. Blankets can be used with and without vegetation. Blanketed channels can be designed to handle any expected flow and longevity requirement. Some synthetic blankets have a predicted life span of 50 years or more, even in sunlight.
- Other reasons why blankets are better than rock include the availability of blankets over rock. In many areas of the state, rock is not easily obtainable or is very expensive to haul to a site. Blankets can be delivered anywhere. Rock requires the use of dump trucks to haul and heavy equipment to place. Blankets usually only require laborers with hand tools, and sometimes a backhoe.
- The Federal Highway Administration recommends not using flexible liners whenever the slope exceeds 10 percent or the shear stress exceeds 8 lbs/ft^2.

Design and Installation Specifications

See BMP C122 for information on blankets.

Since riprap is used where erosion potential is high, construction must be sequenced so that the riprap is put in place with the minimum possible delay.

- Disturbance of areas where riprap is to be placed should be undertaken only when final preparation and placement of the riprap can follow immediately behind the initial disturbance. Where riprap is used for outlet protection, the riprap should be placed before or in conjunction with the construction of the pipe or channel so that it is in place when the pipe or channel begins to operate.
- The designer, after determining the riprap size that will be stable under the flow conditions, shall consider that size to be a minimum size and then, based on riprap gradations actually available in the area, select the size or sizes that equal or exceed the minimum size. The possibility of drainage structure damage by children shall be considered in selecting a riprap size, especially if there is nearby water or a gully in which to toss the stones.
- Stone for riprap shall consist of field stone or quarry stone of approximately rectangular shape. The stone shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering and it shall be suitable in all respects for the purpose intended.
- A lining of engineering filter fabric (geotextile) shall be placed

between the riprap and the underlying soil surface to prevent soil movement into or through the riprap. The geotextile should be keyed in at the top of the bank.

- Filter fabric shall not be used on slopes greater than 1-1/2H:1V as slippage may occur. It should be used in conjunction with a layer of coarse aggregate (granular filter blanket) when the riprap to be placed is 12 inches and larger.

BMP C207: Check Dams

Purpose Construction of small dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Conditions of Use Where temporary channels or permanent channels are not yet vegetated, channel lining is infeasible, and/or velocity checks are required.

- Check dams may not be placed in streams unless approved by the State Department of Fish and Wildlife. Check dams may not be placed in wetlands without approval from a permitting agency.
- Do not place check dams below the expected backwater from any salmonid bearing water between October 1 and May 31 to ensure that there is no loss of high flow refuge habitat for overwintering juvenile salmonids and emergent salmonid fry.
- Construct rock check dams from appropriately sized rock. The rock used must be large enough to stay in place given the expected design flow through the channel. The rock must be placed by hand or by mechanical means (no dumping of rock to form dam) to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.
- Check dams may also be constructed of either rock or pea-gravel filled bags. Numerous new products are also available for this purpose. They tend to be re-usable, quick and easy to install, effective, and cost efficient.
- Place check dams perpendicular to the flow of water.
- The dam should form a triangle when viewed from the side. This prevents undercutting as water flows over the face of the dam rather than falling directly onto the ditch bottom.
- Before installing check dams impound and bypass upstream water flow away from the work area. Options for bypassing include pumps, siphons, or temporary channels.
- Check dams in association with sumps work more effectively at slowing flow and retaining sediment than just a check dam alone. A deep sump should be provided immediately upstream of the check dam.
- In some cases, if carefully located and designed, check dams can remain as permanent installations with very minor regrading. They may be left as either spillways, in which case accumulated sediment would be graded and seeded, or as check dams to prevent further sediment from leaving the site.
- The maximum spacing between the dams shall be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.
- Keep the maximum height at 2 feet at the center of the dam.
- Keep the center of the check dam at least 12 inches lower than the outer edges at natural ground elevation.
- Keep the side slopes of the check dam at 2H:1V or flatter.

- Key the stone into the ditch banks and extend it beyond the abutments a minimum of 18 inches to avoid washouts from overflow around the dam.
- Use filter fabric foundation under a rock or sand bag check dam. If a blanket ditch liner is used, filter fabric is not necessary. A piece of organic or synthetic blanket cut to fit will also work for this purpose.
- In the case of grass-lined ditches and swales, all check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale - unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- Ensure that channel appurtenances, such as culvert entrances below check dams, are not subject to damage or blockage from displaced stones. Figure 4.2.7 depicts a typical rock check dam.

Maintenance Standards

Check dams shall be monitored for performance and sediment accumulation during and after each runoff producing rainfall. Sediment shall be removed when it reaches one half the sump depth.

- Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam.
- If significant erosion occurs between dams, install a protective riprap liner in that portion of the channel.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C207. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

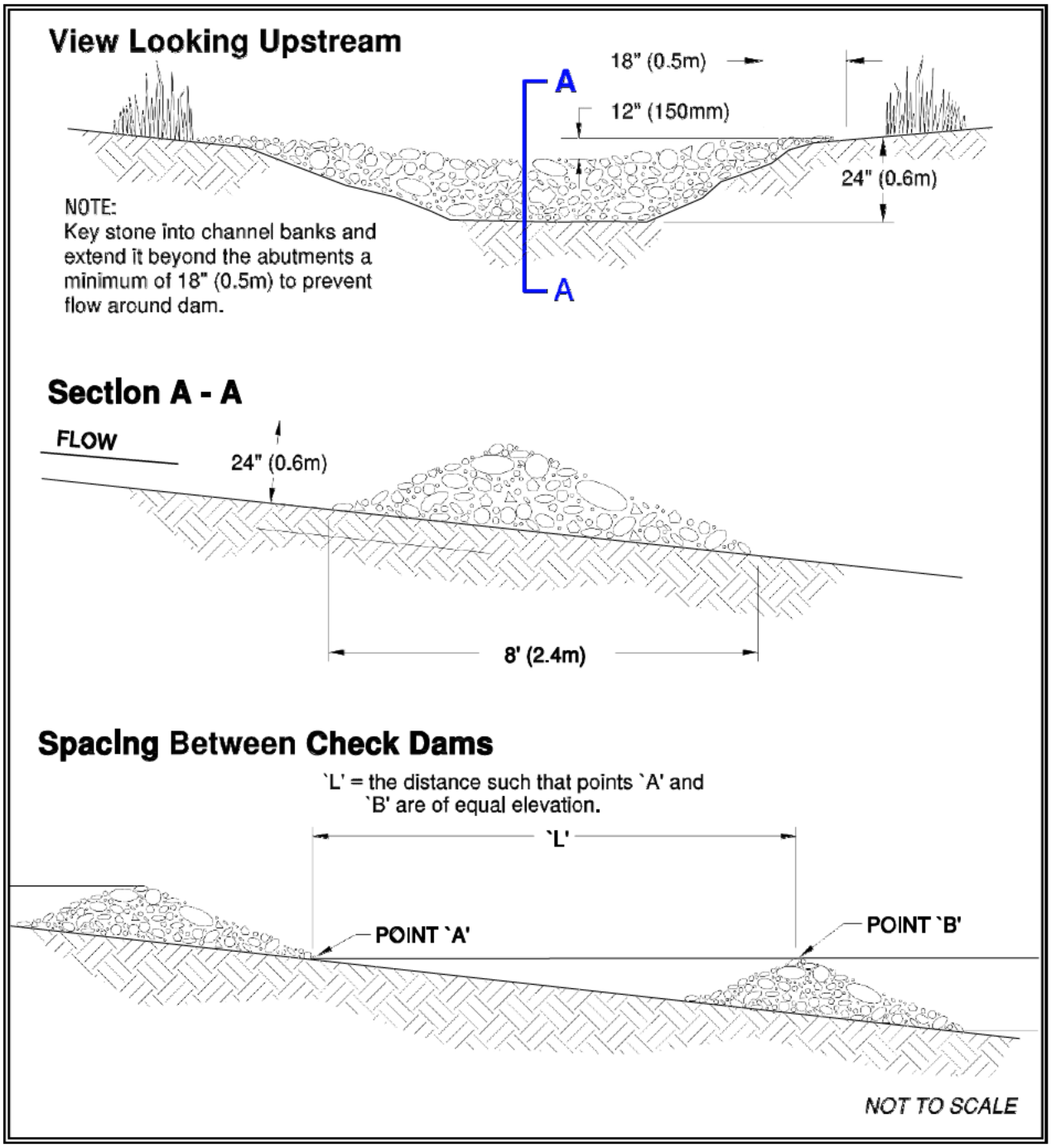


Figure 4.2.7 – Rock Check Dam

BMP C209: Outlet Protection

Purpose

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Conditions of use

Outlet protection is required at the outlets of all ponds, pipes, ditches, or other conveyances, and where runoff is conveyed to a natural or manmade drainage feature such as a stream, wetland, lake, or ditch.

Design and Installation Specifications

The receiving channel at the outlet of a culvert shall be protected from erosion by rock lining a minimum of 6 feet downstream and extending up the channel sides a minimum of 1–foot above the maximum tailwater elevation or 1-foot above the crown, whichever is higher. For large pipes (more than 18 inches in diameter), the outlet protection lining of the channel is lengthened to four times the diameter of the culvert.

- Standard wingwalls, and tapered outlets and paved channels should also be considered when appropriate for permanent culvert outlet protection. (See WSDOT Hydraulic Manual, available through WSDOT Engineering Publications).
- Organic or synthetic erosion blankets, with or without vegetation, are usually more effective than rock, cheaper, and easier to install. Materials can be chosen using manufacturer product specifications. ASTM test results are available for most products and the designer can choose the correct material for the expected flow.
- With low flows, vegetation (including sod) can be effective.
- The following guidelines shall be used for riprap outlet protection:
    1. If the discharge velocity at the outlet is less than 5 fps (pipe slope less than 1 percent), use 2-inch to 8-inch riprap. Minimum thickness is 1-foot.
    2. For 5 to 10 fps discharge velocity at the outlet (pipe slope less than 3 percent), use 24-inch to 48-inch riprap. Minimum thickness is 2 feet.
    3. For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), an engineered energy dissipater shall be used.
- Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion.
- New pipe outfalls can provide an opportunity for low-cost fish habitat improvements. For example, an alcove of low-velocity water can be created by constructing the pipe outfall and associated energy dissipater back from the stream edge and digging a channel, over- widened to the upstream side, from the outfall. Overwintering juvenile and migrating adult salmonids may use the alcove as shelter during high flows. Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a HPA. See Volume V for more information on outfall system design.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

BMP C220: Storm Drain Inlet Protection

Purpose

Storm drain inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use storm drain inlet protection at inlets that are operational before permanent stabilization of the disturbed drainage area. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless conveying runoff entering catch basins to a sediment pond or trap.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters in new home construction can add significant amounts of sediment into the roof drain system. If possible delay installing lawn and yard drains until just before landscaping or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18-inches of sod around each finished lawn and yard drain.

Table 4.2.2 lists several options for inlet protection. All of the methods for storm drain inlet protection tend to plug and require a high frequency of maintenance. Limit drainage areas to one acre or less. Possibly provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table 4.2.2

Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/ Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding will occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area Requirement: 30′ X 30′/acre
Block and gravel drop inlet protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No		Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with a wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.

Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap			18 month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection - An excavated impoundment around the storm drain. Sediment settles out of the stormwater prior to entering the storm drain.

- Provide a depth of 1-2 ft as measured from the crest of the inlet structure.
- Slope sides of excavation no steeper than 2H:1V.
- Minimum volume of excavation 35 cubic yards.
- Shape basin to fit site with longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water problems.
- Clear the area of all debris.
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter - A barrier formed around the storm drain inlet with standard concrete blocks and gravel. See Figure 4.2.8.

- Provide a height of 1 to 2 feet above inlet.
- Recess the first row 2-inches into the ground for stability.
- Support subsequent courses by placing a 2x4 through the block opening.
- Do not use mortar.
- Lay some blocks in the bottom row on their side for dewatering the pool.
- Place hardware cloth or comparable wire mesh with ½-inch openings over all block openings.
- Place gravel just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel donut.
- Provide an inlet slope of 3H:1V.

- Provide an outlet slope of 2H:1V.
- Provide a1-foot wide level stone area between the structure and the inlet.
- Use inlet slope stones 3 inches in diameter or larger.
- Use gravel ½- to ¾-inch at a minimum thickness of 1-foot for the outlet slope.

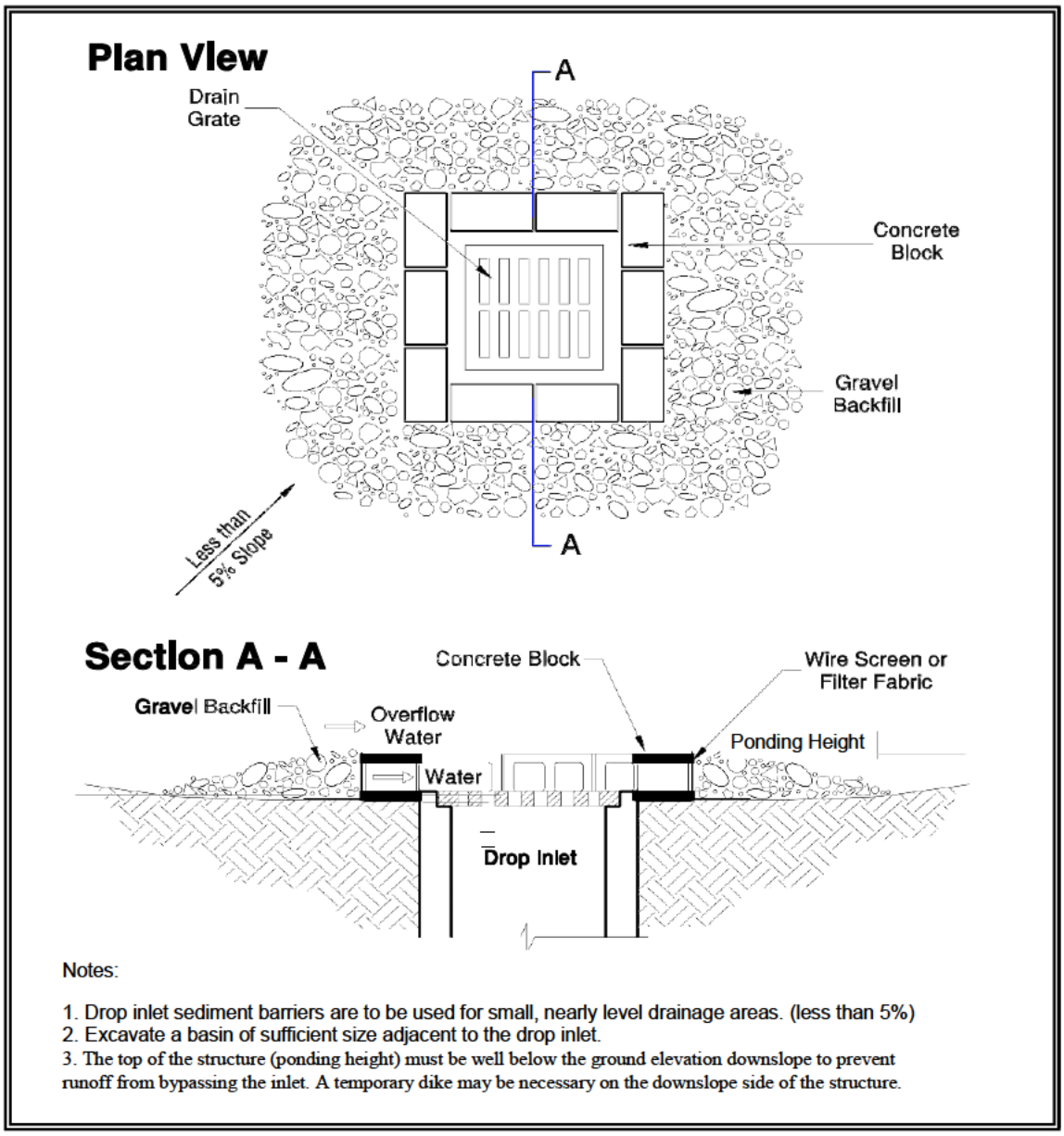


Figure 4.2.8 – Block and Gravel Filter

Gravel and Wire Mesh Filter - A gravel barrier placed over the top of the inlet. This structure does not provide an overflow.

- Use a hardware cloth or comparable wire mesh with ½-inch openings.

- Use coarse aggregate.
- Provide a height 1-foot or more, 18-inches wider than inlet on all sides.
- Place wire mesh over the drop inlet so that the wire extends a minimum of 1-foot beyond each side of the inlet structure.
- Overlap the strips if more than one strip of mesh is necessary.
- Place coarse aggregate over the wire mesh.
- Provide at least a 12-inch depth of gravel over the entire inlet opening and extend at least 18-inches on all sides.

Catchbasin Filters – Use inserts designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements combine a catchbasin filter with another type of inlet protection. This type of inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way.

- Provides 5 cubic feet of storage.
- Requires dewatering provisions.
- Provides a high-flow bypass that will not clog under normal use at a construction site.
- Insert the catchbasin filter in the catchbasin just below the grating.

Curb Inlet Protection with Wooden Weir – Barrier formed around a curb inlet with a wooden frame and gravel.

- Use wire mesh with ½-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against wire/fabric.
- Place weight on frame anchors.

Block and Gravel Curb Inlet Protection – Barrier formed around a curb inlet with concrete blocks and gravel. See Figure 4.2.9.

- Use wire mesh with ½-inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting

the spacer blocks.

- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Curb and Gutter Sediment Barrier – Sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure 4.2.10.

- Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet.
- Construct a horseshoe shaped sedimentation trap on the outside of the berm sized to sediment trap standards for protecting a culvert inlet.

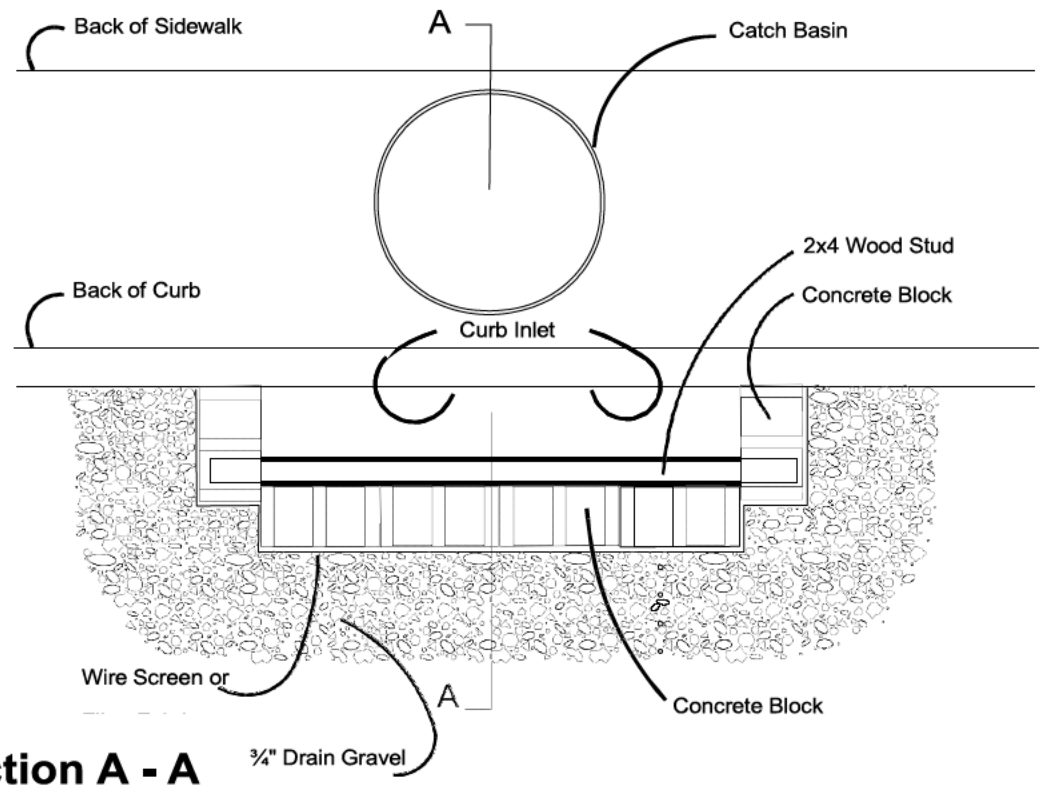
Maintenance Standards

- Inspect catch basin filters frequently, especially after storm events. Clean and replace clogged inserts. For systems with clogged stone filters: pull away the stones from the inlet and clean or replace. An alternative approach would be to use the clogged stone as fill and put fresh stone around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

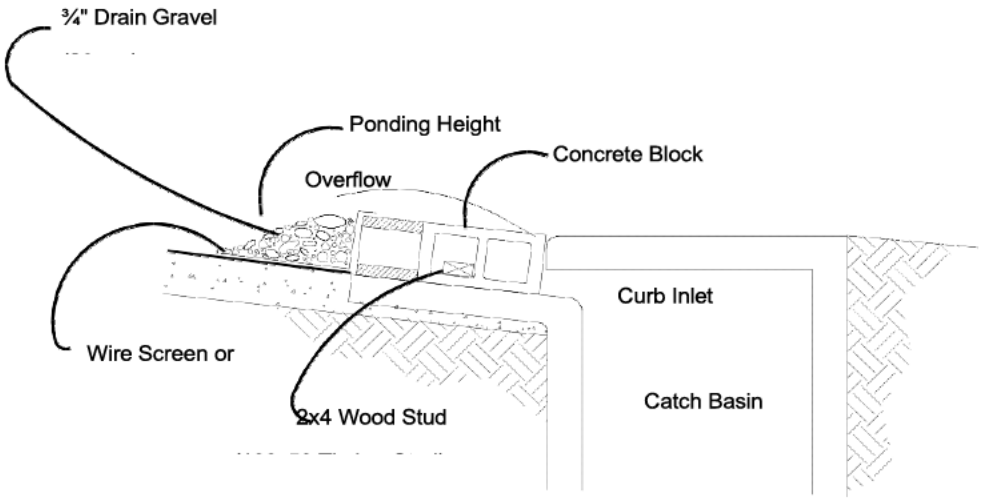
Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C220. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

Plan View



Section A - A



NOTES:

1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed

Figure 4.2.9 – Block and Gravel Curb Inlet Protection

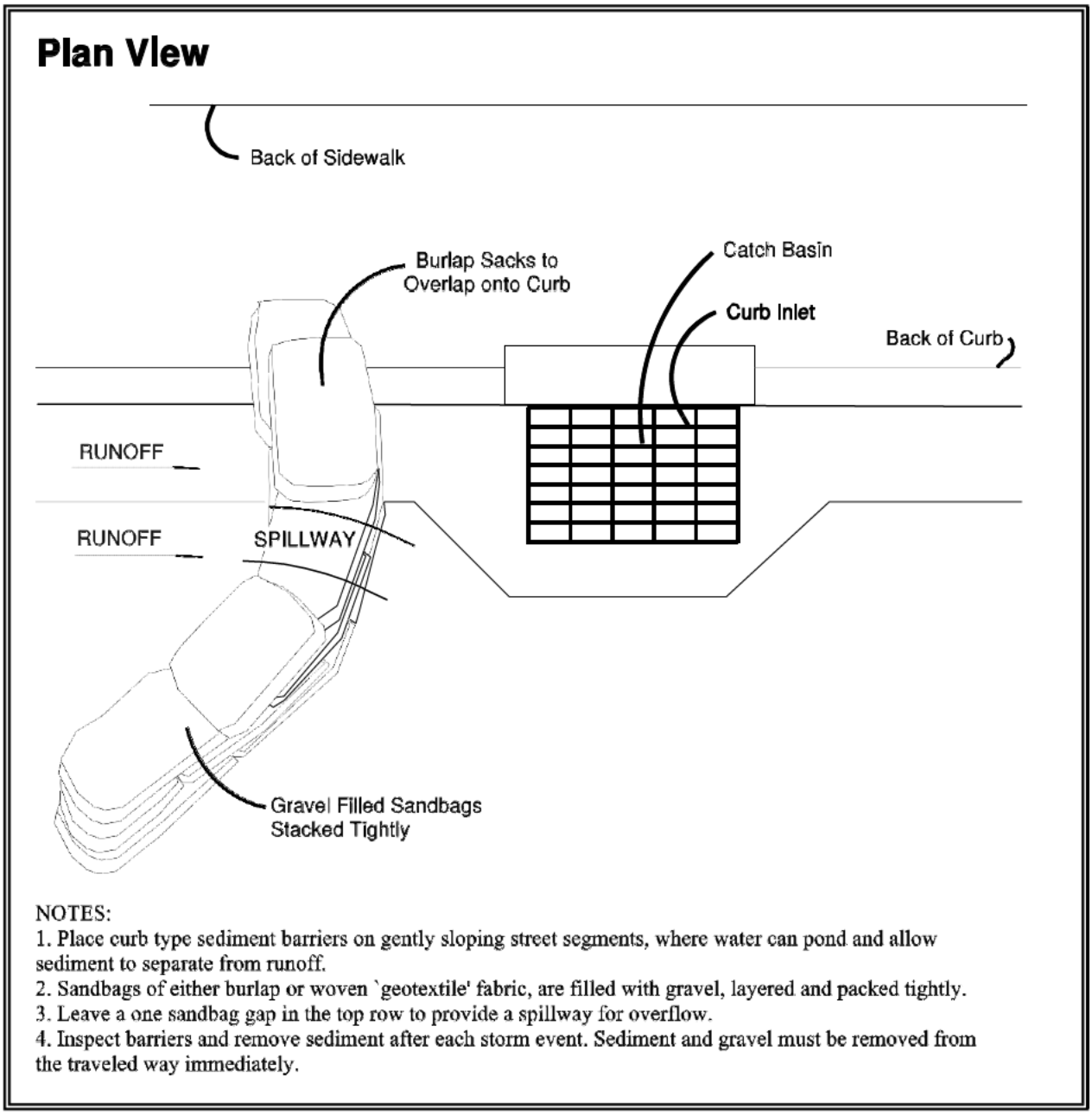


Figure 4.2.10 – Curb and Gutter Barrier

BMP C233: Silt Fence

Purpose

Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow. See Figure 4.2.12 for details on silt fence construction.

Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment pond.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

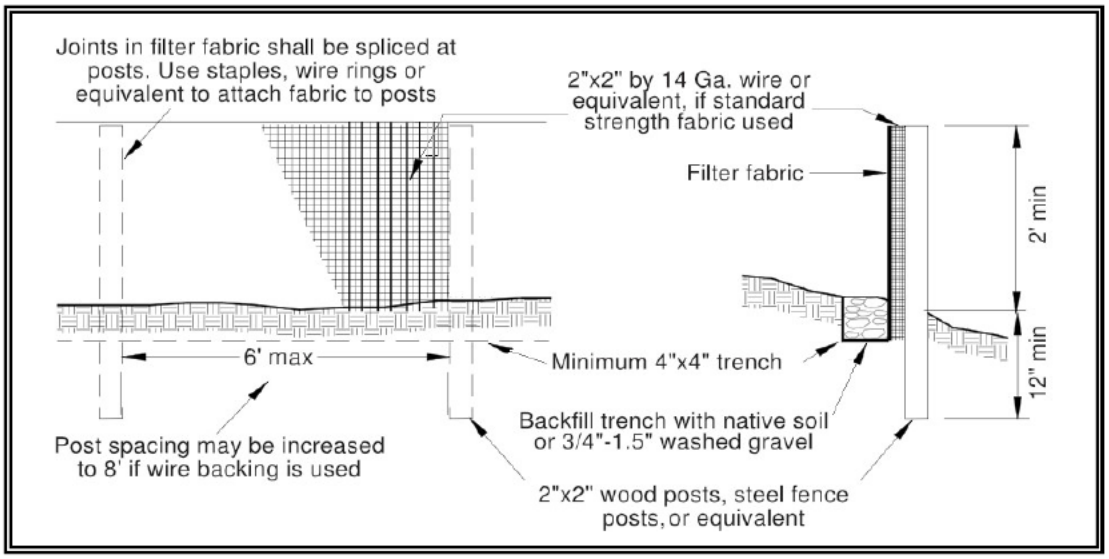


Figure 4.2.12 – Silt Fence

Design and Installation Specifications

- Use in combination with sediment basins or other BMPs.
- Maximum slope steepness (normal (perpendicular) to fence line) 1H:1V.
- Maximum sheet or overland flow path length to the fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- The geotextile used shall meet the following standards. All geotextile properties listed below are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table 4.2.3):

Table 4.2.3 Geotextile Standards	
Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film woven (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs. Minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength fabrics with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the fabric. Silt fence materials are available that have synthetic mesh backing attached.
- Filter fabric material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F. to 120°F.
- One-hundred percent biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by local regulations.
- Refer to Figure 4.2.12 for standard silt fence details. Include the following standard Notes for silt fence on construction plans and specifications:
    - The contractor shall install and maintain temporary silt fences at the locations shown in the Plans.
    - Construct silt fences in areas of clearing, grading, or drainage prior to starting those activities.
    - The silt fence shall have a 2-feet min. and a 2½-feet max. height above the original ground surface.
    - The filter fabric shall be sewn together at the point of manufacture to form filter fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided the Contractor can demonstrate, to the satisfaction of the Engineer, that the overlap is long enough and that the adjacent fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
    - Attach the filter fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the filter fabric to the posts in a manner

that reduces the potential for tearing.

- Support the filter fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the up-slope side of the posts with the filter fabric up-slope of the mesh.
- Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2-inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs. grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the filter fabric it supports.
- Bury the bottom of the filter fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the filter fabric, so that no flow can pass beneath the fence and scouring cannot occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the ground 3-inches min.
- Drive or place the fence posts into the ground 18-inches min. A 12–inch min. depth is allowed if topsoil or other soft subgrade soil is not present and 18-inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.
- Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6-feet. Posts shall consist of either:
    - Wood with dimensions of 2-inches by 2-inches wide min. and a 3-feet min. length. Wood posts shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.
    - Other steel posts having equivalent strength and bending resistance to the post sizes listed above.
- Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.
- If the fence must cross contours, with the exception of the ends of the fence, place gravel check dams perpendicular to the back of the

fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.

- Gravel check dams shall be approximately 1-foot deep at the back of the fence. Gravel check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
- Gravel check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Gravel check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure 4.2.13 for slicing method details. Silt fence installation using the slicing method specifications:
  1. The base of both end posts must be at least 2- to 4-inches above the top of the filter fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
  2. Install posts 3- to 4-feet apart in critical retention areas and 6- to 7-feet apart in standard applications.
  3. Install posts 24-inches deep on the downstream side of the silt fence, and as close as possible to the filter fabric, enabling posts to support the filter fabric from upstream water pressure.
  4. Install posts with the nipples facing away from the filter fabric.
  5. Attach the filter fabric to each post with three ties, all spaced within the top 8-inches of the filter fabric. Attach each tie diagonally 45 degrees through the filter fabric, with each puncture at least 1-inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
  6. Wrap approximately 6-inches of fabric around the end posts and secure with 3 ties.
  7. No more than 24-inches of a 36-inch filter fabric is allowed above ground level.
  8. Compact the soil immediately next to the filter fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck fabric deeper into the ground if necessary.

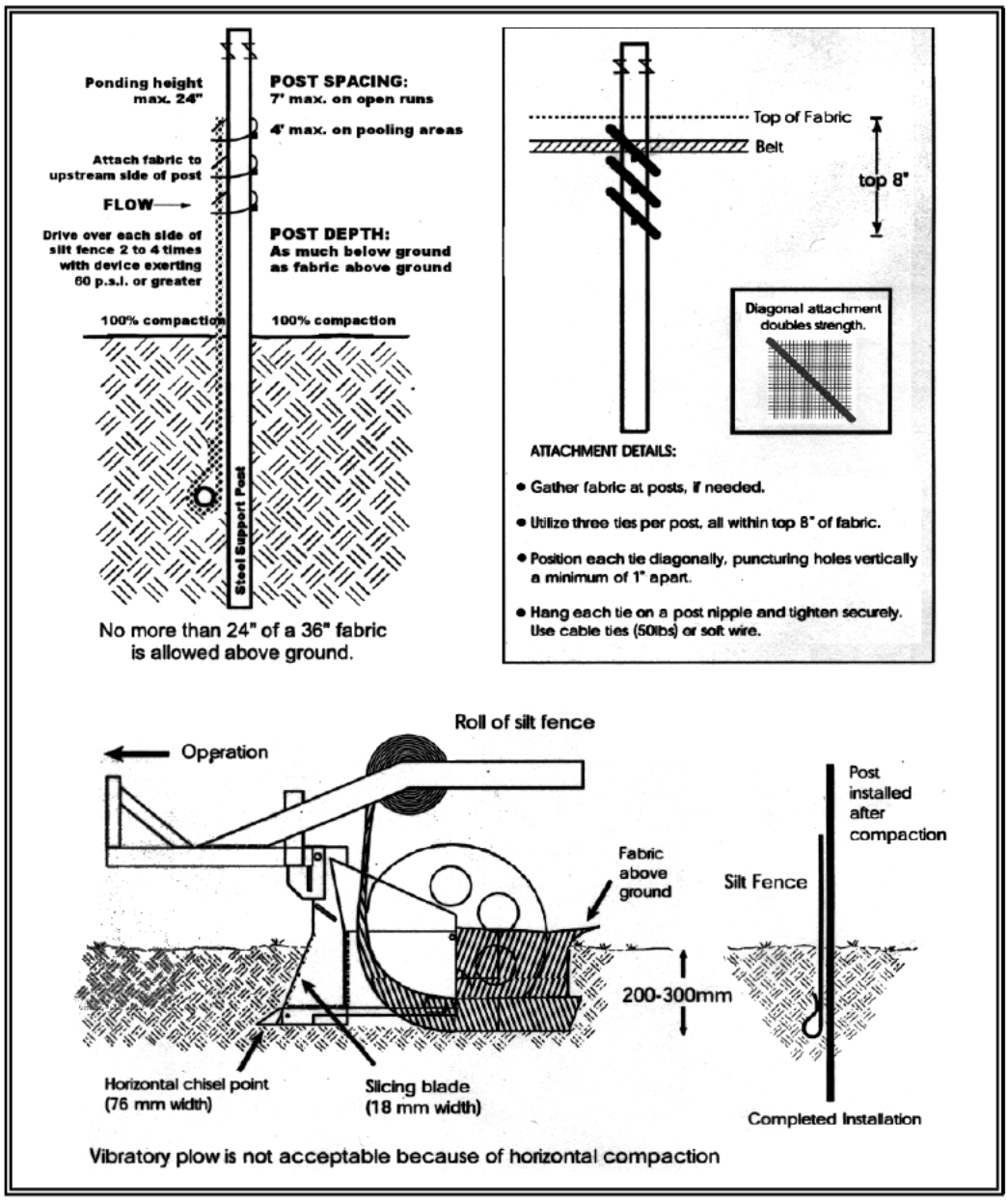


Figure 4.2.13 – Silt Fence Installation by Slicing Method

Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment pond.
- Check the uphill side of the fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence or remove the trapped sediment.
- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace filter fabric that has deteriorated due to ultraviolet breakdown.

BMP C235: Wattles

Purpose

Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment. Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length. Wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes. See Figure 4.2.14 for typical construction details. WSDOT Standard Plan I-30.30-00 also provides information on Wattles (http://www.wsdot.wa.gov/Design/Standards/Plans.htm#SectionI)

Conditions of Use

- Use wattles:
  - In disturbed areas that require immediate erosion protection.
  - On exposed soils during the period of short construction delays, or over winter months.
  - On slopes requiring stabilization until permanent vegetation can be established.
- The material used dictates the effectiveness period of the wattle. Generally, Wattles are typically effective for one to two seasons.
- Prevent rilling beneath wattles by properly entrenching and abutting wattles together to prevent water from passing between them.

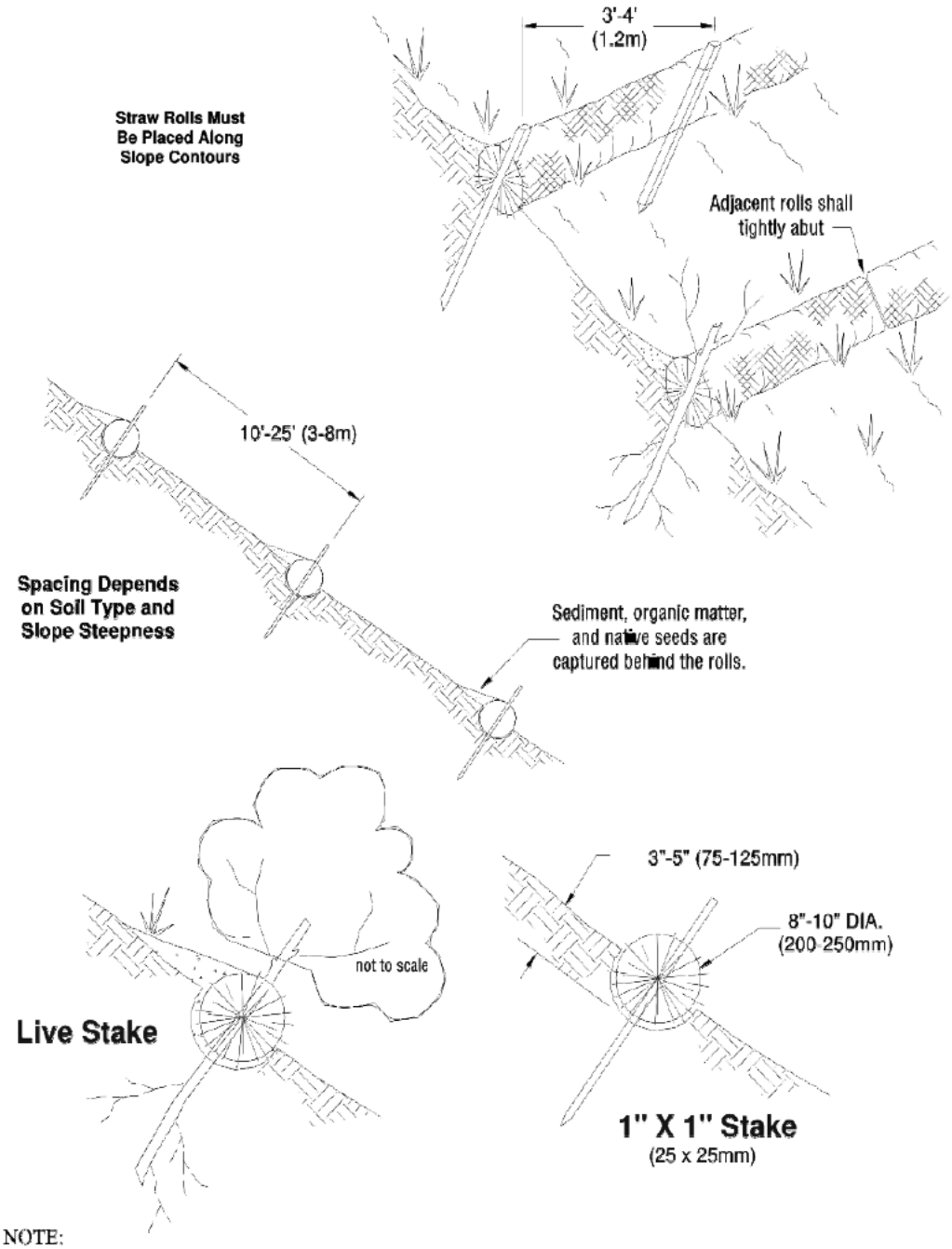
Design Criteria

- Install wattles perpendicular to the flow direction and parallel to the slope contour.
- Narrow trenches should be dug across the slope on contour to a depth of 3- to 5-inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5- to 7- inches, or 1/2 to 2/3 of the thickness of the wattle.
- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compacted using hand tamping or other methods.
- Construct trenches at intervals of 10- to 25-feet depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and abut tightly end to end. Do not overlap the ends.
- Install stakes at each end of the wattle, and at 4-foot centers along entire length of wattle.
- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- Wooden stakes should be approximately 3/4 x 3/4 x 24 inches min. Willow cuttings or 3/8-inch rebar can also be used for stakes.
- Stakes should be driven through the middle of the wattle, leaving 2 to 3

inches of the stake protruding above the wattle.

Maintenance Standards

- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.



NOTE:
1. Straw roll installation requires the placement and secure staking of the roll in a trench, 3"-5" (75-125mm) deep, dug on contour. runoff must not be allowed to run under or around roll.

Figure 4.2.14 – Wattles

- Inspect the slope after significant storms and repair any areas where

wattles are not tightly abutted or water has scoured beneath the wattles.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C235. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C241: Temporary Sediment Pond

Purpose

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, they usually reduce turbidity only slightly.

Conditions of Use

Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or other appropriate sediment removal best management practice.

A sediment pond shall be used where the contributing drainage area is 3 acres or more. Ponds must be used in conjunction with erosion control practices to reduce the amount of sediment flowing into the basin.

Design and Installation Specifications

- Sediment basins must be installed only on sites where failure of the structure would not result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. Also, sediment traps and ponds are attractive to children and can be very dangerous. Compliance with local ordinances regarding health and safety must be addressed. If fencing of the pond is required, the type of fence and its location shall be shown on the ESC plan.
- Structures having a maximum storage capacity at the top of the dam of 10 acre-ft (435,600 ft^3) or more are subject to the Washington Dam Safety Regulations (Chapter 173-175 WAC).
- See Figures 4.2.18, 4.2.19, and 4.2.20 for details.
- If permanent runoff control facilities are part of the project, they should be used for sediment retention. The surface area requirements of the sediment basin must be met. This may require temporarily enlarging the permanent basin to comply with the surface area requirements. The permanent control structure must be temporarily replaced with a control structure that only allows water to leave the pond from the surface or by pumping. The permanent control structure must be installed after the site is fully stabilized. .
- Use of infiltration facilities for sedimentation basins during construction tends to clog the soils and reduce their capacity to infiltrate. If infiltration facilities are to be used, the sides and bottom of the facility must only be rough excavated to a minimum of 2 feet above final grade. Final grading of the infiltration facility shall occur only when all contributing drainage areas are fully stabilized. The infiltration pretreatment facility should be fully constructed and used with the sedimentation basin to help prevent clogging.
- Determining Pond Geometry

Obtain the discharge from the hydrologic calculations of the peak flow for the 2-year runoff event (Q_2). The 10-year peak flow shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection. If no hydrologic analysis is required, the Rational Method may be used.

Determine the required surface area at the top of the riser pipe with the equation:

$SA = 2 \times Q_2/0.00096$ or

2080 square feet per cfs of inflow

See BMP C240 for more information on the derivation of the surface area calculation.

The basic geometry of the pond can now be determined using the following design criteria:

- Required surface area SA (from Step 2 above) at top of riser.
- Minimum 3.5-foot depth from top of riser to bottom of pond.
- Maximum 3H:1V interior side slopes and maximum 2H:1V exterior slopes. The interior slopes can be increased to a maximum of 2H:1V if fencing is provided at or above the maximum water surface.
- One foot of freeboard between the top of the riser and the crest of the emergency spillway.
- Flat bottom.
- Minimum 1-foot deep spillway.
- Length-to-width ratio between 3:1 and 6:1.
- Sizing of Discharge Mechanisms.

The outlet for the basin consists of a combination of principal and emergency spillways. These outlets must pass the peak runoff expected from the contributing drainage area for a 100-year storm. If, due to site conditions and basin geometry, a separate emergency spill- way is not feasible, the principal spillway must pass the entire peak runoff expected from the 100-year storm. However, an attempt to provide a separate emergency spillway should always be made. The runoff calculations should be based on the site conditions during construction. The flow through the dewatering orifice cannot be utilized when calculating the 100-year storm elevation because of its potential to become clogged; therefore, available spillway storage must begin at the principal spillway riser crest.

The principal spillway designed by the procedures contained in this standard will result in some reduction in the peak rate of runoff.

However, the riser outlet design will not adequately control the basin discharge to the predevelopment discharge limitations as stated in Minimum Requirement #7: Flow Control. However, if the basin for a permanent stormwater detention pond is used for a temporary sedimentation basin, the control structure for the permanent pond can be used to maintain predevelopment discharge limitations. The size of the basin, the expected life of the construction project, the anticipated downstream effects and the anticipated weather conditions during construction, should be considered to determine the need of additional discharge control. See Figure 4.2.21 for riser inflow curves.

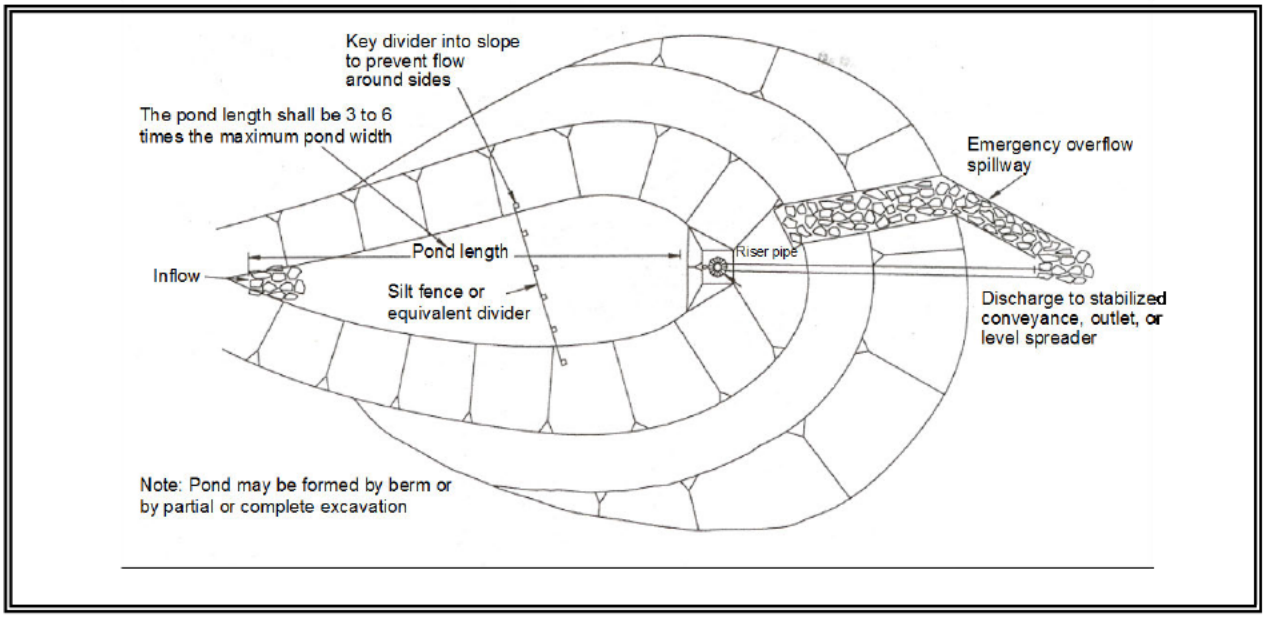


Figure 4.2.18 – Sediment Pond Plan View

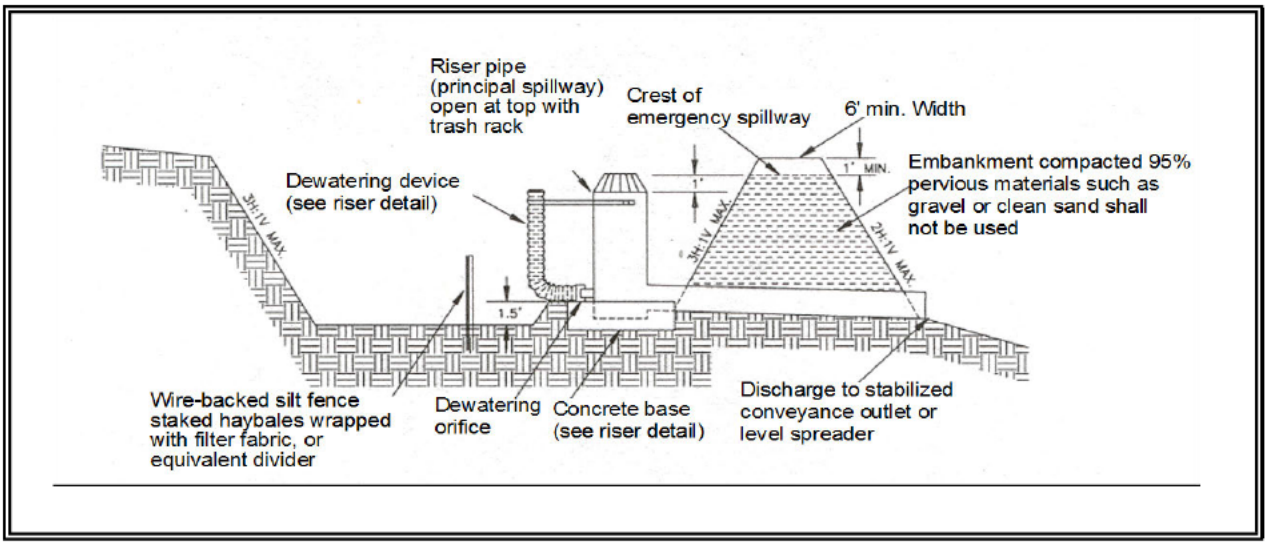


Figure 4.2.19 – Sediment Pond Cross Section

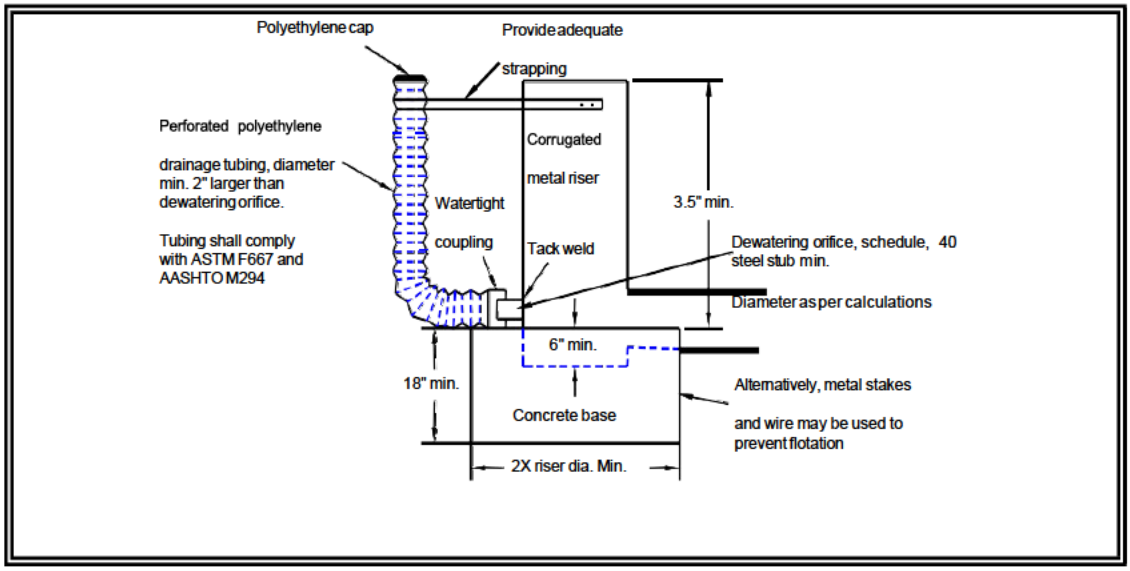


Figure 4.2.20 – Sediment Pond Riser Detail

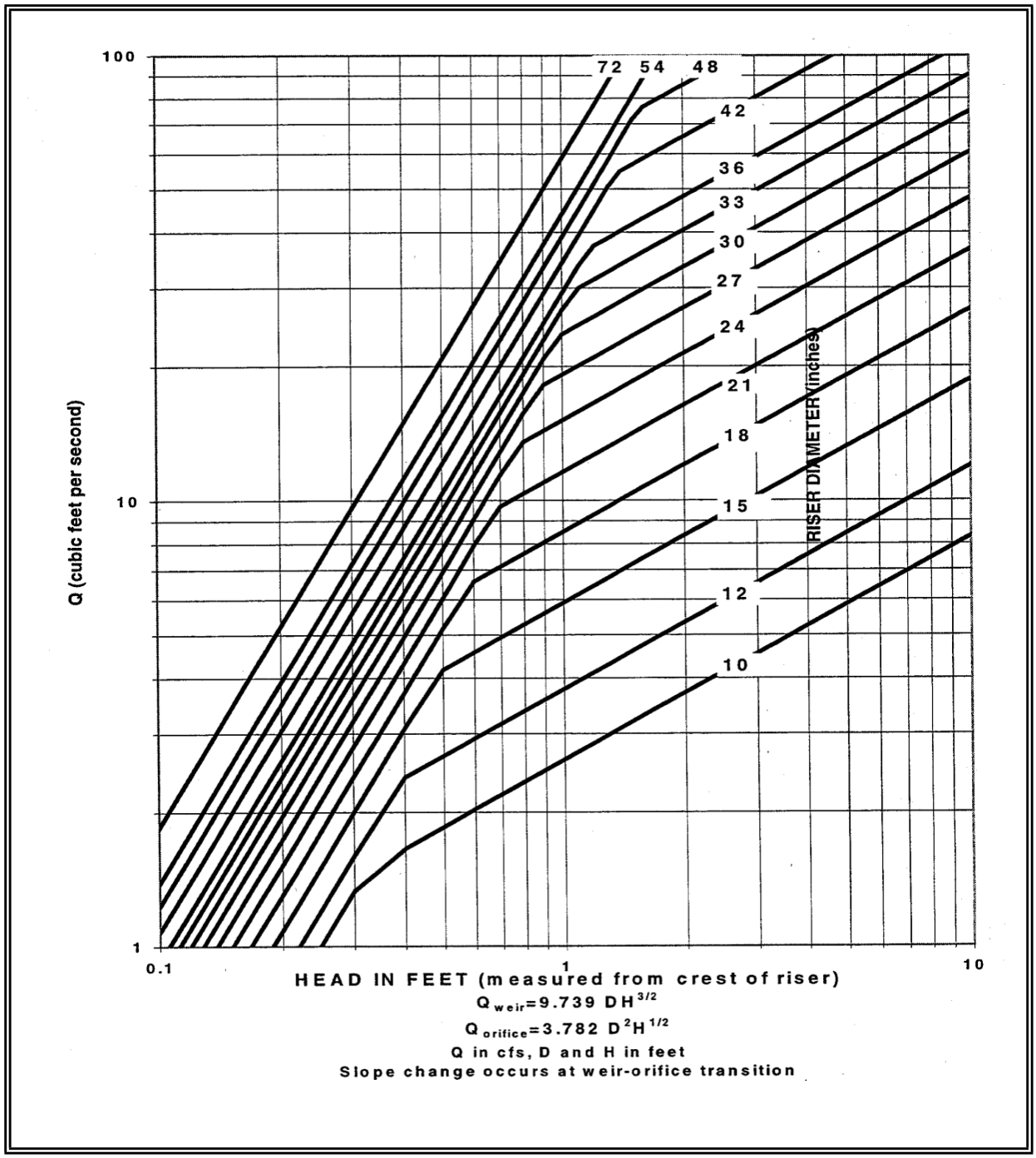


Figure 4.2.21 – Riser Inflow Curves

Principal Spillway: Determine the required diameter for the principal spillway (riser pipe). The diameter shall be the minimum necessary to pass the site's 15-minute, 10-year flowrate. If using the Western Washington Hydrology Model (WWHM), Version 2 or 3, design flow is the 10-year (1 hour) flow for the developed (unmitigated) site, multiplied by a factor of 1.6. Use Figure 4.2.21 to determine this diameter (h = 1-foot). *Note: A permanent control structure may be used instead of a temporary riser.*

Emergency Overflow Spillway: Determine the required size and design of the emergency overflow spillway for the developed 100-year peak flow using the method contained in Volume III.

Dewatering Orifice: Determine the size of the dewatering orifice(s) (minimum 1-inch diameter) using a modified version of the discharge equation for a vertical orifice and a basic equation for the area of a circular orifice. Determine the required area of the orifice with the following equation:

$$A_o = \frac{A_s (2h)^{0.5}}{0.6\text{x}3600Tg^{0.5}}$$

where A_O = orifice area (square feet)
A_S = pond surface area (square feet)
h = head of water above orifice (height of riser in feet)
T = dewatering time (24 hours)
g = acceleration of gravity (32.2 feet/second^2)

Convert the required surface area to the required diameter D of the orifice:

$$D = 24\text{x}\sqrt{\frac{A_o}{\pi}} = 13.54\text{x}\sqrt{A_o}$$

The vertical, perforated tubing connected to the dewatering orifice must be at least 2 inches larger in diameter than the orifice to improve flow characteristics. The size and number of perforations in the tubing should be large enough so that the tubing does not restrict flow. The orifice should control the flow rate.

- Additional Design Specifications

  The pond shall be divided into two roughly equal volume cells by a permeable divider that will reduce turbulence while allowing movement of water between cells. The divider shall be at least one- half the height of the riser and a minimum of one foot below the top of the riser. Wire-backed, 2- to 3-foot high, extra strength filter fabric supported by treated 4"x4"s can be used as a divider. Alternatively, staked straw bales wrapped with filter fabric (geotextile) may be used. If the pond is more than 6 feet deep, a different mechanism must be proposed. A riprap embankment is one acceptable method of separation for deeper ponds. Other designs that satisfy the intent of this provision are allowed as long as the divider is permeable, structurally sound, and designed to prevent

erosion under or around the barrier.

To aid in determining sediment depth, one-foot intervals shall be prominently marked on the riser.

If an embankment of more than 6 feet is proposed, the pond must comply with the criteria contained in Volume III regarding dam safety for detention BMPs.

- The most common structural failure of sedimentation basins is caused by piping. Piping refers to two phenomena: (1) water seeping through fine-grained soil, eroding the soil grain by grain and forming pipes or tunnels; and, (2) water under pressure flowing upward through a granular soil with a head of sufficient magnitude to cause soil grains to lose contact and capability for support.

  The most critical construction sequences to prevent piping will be:

  1. Tight connections between riser and barrel and other pipe connections.
  2. Adequate anchoring of riser.
  3. Proper soil compaction of the embankment and riser footing.
  4. Proper construction of anti-seep devices.

Maintenance Standards

- Sediment shall be removed from the pond when it reaches 1–foot in depth.
- Any damage to the pond embankments or slopes shall be repaired.

BMP C250: Construction Stormwater Chemical Treatment

Purpose

This BMP applies when using stormwater chemicals in batch treatment or flow-through treatment.

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. Sedimentation ponds are effective at removing larger particulate matter by gravity settling, but are ineffective at removing smaller particulates such as clay and fine silt.

Traditional erosion and sediment control BMPs may not be adequate to ensure compliance with the water quality standards for turbidity in receiving water.

Chemical treatment can reliably provide exceptional reductions of turbidity and associated pollutants. Chemical treatment may be required to meet turbidity stormwater discharge requirements, especially when construction is to proceed through the wet season.

Conditions of Use

Formal written approval from Ecology is required for the use of chemical treatment regardless of site size. The Local Permitting Authority may also require review and approval. When approved, the chemical treatment systems must be included in the Construction Stormwater Pollution Prevention Plan (SWPPP).

Design and Installation Specifications

See Appendix II-B for background information on chemical treatment.

Criteria for Chemical Treatment Product Use: Chemically treated stormwater discharged from construction sites must be nontoxic to aquatic organisms. The Chemical Technology Assessment Protocol (CTAPE) must be used to evaluate chemicals proposed for stormwater treatment.

Only chemicals approved by Ecology under the CTAPE may be used for stormwater treatment. The approved chemicals, their allowable application techniques (batch treatment or flow-through treatment), allowable application rates, and conditions of use can be found at the Department of Ecology Emerging Technologies website: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/technologies.html.

Treatment System Design Considerations: The design and operation of a chemical treatment system should take into consideration the factors that determine optimum, cost-effective performance. It is important to recognize the following:

- Only Ecology approved chemicals may be used and must follow approved dose rate.
- The pH of the stormwater must be in the proper range for the polymers to be effective, which is typically 6.5 to 8.5
- The coagulant must be mixed rapidly into the water to ensure proper dispersion.
- A flocculation step is important to increase the rate of settling, to

produce the lowest turbidity, and to keep the dosage rate as low as possible.

- Too little energy input into the water during the flocculation phase results in flocs that are too small and/or insufficiently dense. Too much energy can rapidly destroy floc as it is formed.
- Care must be taken in the design of the withdrawal system to minimize outflow velocities and to prevent floc discharge. Discharge from a batch treatment system should be directed through a physical filter such as a vegetated swale that would catch any unintended floc discharge. Currently, flow-through systems always discharge through the chemically enhanced sand filtration system.
- System discharge rates must take into account downstream conveyance integrity.

Polymer Batch Treatment Process Description:

A batch chemical treatment system consists of the stormwater collection system (either temporary diversion or the permanent site drainage system), a storage pond, pumps, a chemical feed system, treatment cells, and interconnecting piping.

The batch treatment system shall use a minimum of two lined treatment cells in addition to an untreated stormwater storage pond. Multiple treatment cells allow for clarification of treated water while other cells are being filled or emptied. Treatment cells may be ponds or tanks. Ponds with constructed earthen embankments greater than six feet high or which impound more than 10 acre-feet require special engineering analyses. The Ecology Dam Safety Section has specific design criteria for dams in Washington State (see http://www.ecy.wa.gov/programs/wr/dams/GuidanceDocs.html).

Stormwater is collected at interception point(s) on the site and is diverted by gravity or by pumping to an untreated stormwater storage pond or other untreated stormwater holding area. The stormwater is stored until treatment occurs. It is important that the holding pond be large enough to provide adequate storage.

The first step in the treatment sequence is to check the pH of the stormwater in the untreated stormwater storage pond. The pH is adjusted by the application of carbon dioxide or a base until the stormwater in the storage pond is within the desired pH range, 6.5 to 8.5. When used, carbon dioxide is added immediately downstream of the transfer pump. Typically sodium bicarbonate (baking soda) is used as a base, although other bases may be used. When needed, base is added directly to the untreated stormwater storage pond. The stormwater is recirculated with the treatment pump to provide mixing in the storage pond. Initial pH adjustments should be based on daily bench tests. Further pH adjustments can be made at any point in the process.

Once the stormwater is within the desired pH range (dependant on polymer being used), the stormwater is pumped from the untreated stormwater

storage pond to a treatment cell as polymer is added. The polymer is added upstream of the pump to facilitate rapid mixing.

After polymer addition, the water is kept in a lined treatment cell for clarification of the sediment-floc. In a batch mode process, clarification typically takes from 30 minutes to several hours. Prior to discharge samples are withdrawn for analysis of pH, flocculent chemical concentration, and turbidity. If both are acceptable, the treated water is discharged.

Several configurations have been developed to withdraw treated water from the treatment cell. The original configuration is a device that withdraws the treated water from just beneath the water surface using a float with adjustable struts that prevent the float from settling on the cell bottom. This reduces the possibility of picking up sediment-floc from the bottom of the pond. The struts are usually set at a minimum clearance of about 12 inches; that is, the float will come within 12 inches of the bottom of the cell. Other systems have used vertical guides or cables which constrain the float, allowing it to drift up and down with the water level.

More recent designs have an H-shaped array of pipes, set on the horizontal.

This scheme provides for withdrawal from four points rather than one. This configuration reduces the likelihood of sucking settled solids from the bottom. It also reduces the tendency for a vortex to form. Inlet diffusers, a long floating or fixed pipe with many small holes in it, are also an option.

Safety is a primary concern. Design should consider the hazards associated with operations, such as sampling. Facilities should be designed to reduce slip hazards and drowning. Tanks and ponds should have life rings, ladders, or steps extending from the bottom to the top.

Polymer Batch Treatment Process Description:

At a minimum, a flow-through chemical treatment system consists of the stormwater collection system (either temporary diversion or the permanent site drainage system), an untreated stormwater storage pond, and the chemically enhanced sand filtration system.

Stormwater is collected at interception point(s) on the site and is diverted by gravity or by pumping to an untreated stormwater storage pond or other untreated stormwater holding area. The stormwater is stored until treatment occurs. It is important that the holding pond be large enough to provide adequate storage.

Stormwater is then pumped from the untreated stormwater storage pond to the chemically enhanced sand filtration system where polymer is added.

Adjustments to pH may be necessary before chemical addition. The sand filtration system continually monitors the stormwater for turbidity and pH. If the discharge water is ever out of an acceptable range for turbidity or pH, the water is recycled to the untreated stormwater pond where it can be retreated.

For batch treatment and flow-through treatment, the following equipment should be located in a lockable shed:

- The chemical injector.
- Secondary containment for acid, caustic, buffering compound, and treatment chemical.
- Emergency shower and eyewash.
- Monitoring equipment which consists of a pH meter and a turbidimeter

System Sizing:

Certain sites are required to implement flow control for the developed sites. These sites must also control stormwater release rates during construction. Generally, these are sites that discharge stormwater directly, or indirectly, through a conveyance system, into a fresh water. System sizing is dependent on flow control requirements.

Sizing Criteria for Batch Treatment Systems for Flow Control Exempt Water Bodies:

The total volume of the untreated stormwater storage pond and treatment ponds or tanks must be large enough to treat stormwater that is produced during multiple day storm events. It is recommended that at a minimum the untreated stormwater storage pond be sized to hold 1.5 times the runoff volume of the 10-year, 24-hour storm event. Bypass should be provided around the chemical treatment system to accommodate extreme storm events. Runoff volume shall be calculated using the methods presented in Volume 3, Chapter 2. Worst-case land cover conditions (i.e., producing the most runoff) should be used for analyses (in most cases, this would be the land cover conditions just prior to final landscaping).

Primary settling should be encouraged in the untreated stormwater storage pond. A forebay with access for maintenance may be beneficial.

There are two opposing considerations in sizing the treatment cells. A larger cell is able to treat a larger volume of water each time a batch is processed. However, the larger the cell the longer the time required to empty the cell. A larger cell may also be less effective at flocculation and therefore require a longer settling time. The simplest approach to sizing the treatment cell is to multiply the allowable discharge flow rate times the desired drawdown time. A 4-hour drawdown time allows one batch per cell per 8-hour work period, given 1 hour of flocculation followed by two hours of settling.

If the discharge is directly to a flow control exempt receiving water listed in Appendix I-E of Volume I or to an infiltration system, there is no discharge flow limit.

Ponds sized for flow control water bodies must at a minimum meet the sizing criteria for flow control exempt waters.

Sizing Criteria for Flow-Through Treatment Systems for Flow Control Exempt Water Bodies:

When sizing storage ponds or tanks for flow-through systems for flow control exempt water bodies, the treatment system capacity should be a factor. The untreated stormwater storage pond or tank should be sized to hold

1.5 times the runoff volume of the 10-year, 24-hour storm event minus the treatment system flowrate for an 8-hour period. For a chitosan- enhanced sand filtration system, the treatment system flowrate should be sized using a hydraulic loading rate between 6-8 gpm/ft². Other hydraulic loading rates may be more appropriate for other systems. Bypass should be provided around the chemical treatment system to accommodate extreme storms. Runoff volume shall be calculated using the methods presented in Volume 3, Chapter 2. Worst-case land cover conditions (i.e., producing the most runoff) should be used for analyses (in most cases, this would be the land cover conditions just prior to final landscaping).

Sizing Criteria for Flow Control Water Bodies:

Sites that must implement flow control for the developed site condition must also control stormwater release rates during construction.

Construction site stormwater discharges shall not exceed the discharge durations of the pre-developed condition for the range of pre-developed discharge rates from ½ of the 2-year flow through the 10-year flow as predicted by an approved continuous runoff model. The pre-developed condition to be matched shall be the land cover condition immediately prior to the development project. This restriction on release rates can affect the size of the storage pond and treatment cells.

The following is how WWHM can be used to determine the release rates from the chemical treatment systems:

1. Determine the pre-developed flow durations to be matched by entering the existing land use area under the "Pre-developed" scenario in WWHM. The default flow range is from ½ of the 2-year flow through the 10-year flow.
2. Enter the post developed land use area in the "Developed Unmitigated" scenario in WWHM.
3. Copy the land use information from the "Developed Unmitigated" to "Developed Mitigated" scenario.
4. While in the "Developed Mitigated" scenario, add a pond element under the basin element containing the post-developed land use areas. This pond element represents information on the available untreated stormwater storage and discharge from the chemical treatment system. In cases where the discharge from the chemical treatment system is controlled by a pump, a stage/storage/discharge (SSD) table representing the pond must be generated outside WWHM and imported into WWHM. WWHM can route the runoff from the post- developed condition through this SSD table (the pond) and determine compliance with the flow duration standard. This would be an iterative design procedure where if the initial SSD table proved to be inadequate, the designer would have to modify the SSD table outside WWHM and re-import in WWHM and route the runoff through it again. The iteration

will continue until a pond that complies with the flow duration standard is correctly sized.

Notes on SSD table characteristics:

- The pump discharge rate would likely be initially set at just below½ of the 2-year flow from the pre-developed condition. As runoff coming into the untreated stormwater storage pond increases and the available untreated stormwater storage volume gets used up, it would be necessary to increase the pump discharge rate above ½ of the 2-year. The increase(s) above ½ of the 2-year must be such that they provide some relief to the untreated stormwater storage needs but at the same time will not cause violations of the flow duration standard at the higher flows. The final design SSD table will identify the appropriate pumping rates and the corresponding stage and storages.
- When building such a flow control system, the design must ensure that any automatic adjustments to the pumping rates will be as a result of changes to the available storage in accordance with the final design SSD table.

5. It should be noted that the above procedures would be used to meet the flow control requirements. The chemical treatment system must be able to meet the runoff treatment requirements. It is likely that the discharge flow rate of ½ of the 2-year or more may exceed the treatment capacity of the system. If that is the case, the untreated stormwater discharge rate(s) (i.e., influent to the treatment system) must be reduced to allow proper treatment. Any reduction in the flows would likely result in the need for a larger untreated stormwater storage volume.

   If the discharge is to a municipal storm drainage system, the allowable discharge rate may be limited by the capacity of the public system. It may be necessary to clean the municipal storm drainage system prior to the start of the discharge to prevent scouring solids from the drainage system. If the municipal storm drainage system discharges to a water body not on the flow control exempt list, the project site is subject to flow control requirements. Obtain permission from the owner of the collection system before discharging to it.

If system design does not allow you to discharge at the slower rates as described above and if the site has a retention or detention pond that will serve the planned development, the discharge from the treatment system may be directed to the permanent retention/detention pond to comply with the flow control requirement. In this case, the untreated stormwater storage pond and treatment system will be sized according to the sizing criteria for flow-through treatment systems for flow control exempt water bodies described earlier except all discharge (water passing through the treatment system and stormwater bypassing the treatment system) will be directed into the permanent retention/detention pond. If site constraints make locating the untreated stormwater storage pond difficult, the permanent

retention/detention pond may be divided to serve as the untreated stormwater storage pond and the post-treatment flow control pond. A berm or barrier must be used in this case so the untreated water does not mix with the treated water. Both untreated stormwater storage requirements, and adequate post-treatment flow control must be achieved. The post-treatment flow control pond's revised dimensions must be entered into the WWHM and the WWHM must be run to confirm compliance with the flow control requirement.

Maintenance Standards

Monitoring: At a minimum, the following monitoring shall be conducted. Test results shall be recorded on a daily log kept on site. Additional testing may be required by the NPDES permit based on site conditions.

Operational Monitoring:

- Total volume treated and discharged.
- Flow must be continuously monitored and recorded at not greater than 15-minute intervals.
- Type and amount of chemical used for pH adjustment.
- Amount of polymer used for treatment.
- Settling time.

Compliance Monitoring:

- Influent and effluent pH, flocculent chemical concentration, and turbidity must be continuously monitored and recorded at not greater than 15-minute intervals. pH and turbidity of the receiving water.

Biomonitoring:

Treated stormwater must be non-toxic to aquatic organisms. Treated stormwater must be tested for aquatic toxicity or residual chemicals. Frequency of biomonitoring will be determined by Ecology.

Residual chemical tests must be approved by Ecology prior to their use.

If testing treated stormwater for aquatic toxicity, you must test for acute (lethal) toxicity. Bioassays shall be conducted by a laboratory accredited by Ecology, unless otherwise approved by Ecology. Acute toxicity tests shall be conducted per the CTAPE protocol.

Discharge Compliance: Prior to discharge, treated stormwater must be sampled and tested for compliance with pH, flocculent chemical concentration, and turbidity limits. These limits may be established by the Construction Stormwater General Permit or a site-specific discharge permit. Sampling and testing for other pollutants may also be necessary at some sites. pH must be within the range of 6.5 to 8.5 standard units and not cause a change in the pH of the receiving water of more than 0.2 standard units. Treated stormwater samples and measurements shall be taken from the discharge pipe or another location representative of the nature of the treated stormwater discharge. Samples used for determining compliance with the water quality standards in the receiving water shall not be taken from the treatment pond prior to decanting. Compliance with the water quality

standards is determined in the receiving water.

Operator Training: Each contractor who intends to use chemical treatment shall be trained by an experienced contractor. Each site using chemical treatment must have an operator trained and certified by an organization approved by Ecology.

Standard BMPs: Surface stabilization BMPs should be implemented on site to prevent significant erosion. All sites shall use a truck wheel wash to prevent tracking of sediment off site.

Sediment Removal and Disposal:

- Sediment shall be removed from the storage or treatment cells as necessary. Typically, sediment removal is required at least once during a wet season and at the decommissioning of the cells. Sediment remaining in the cells between batches may enhance the settling process and reduce the required chemical dosage.
- Sediment that is known to be non-toxic may be incorporated into the site away from drainages.

BMP C251: Construction Stormwater Filtration

Purpose

Filtration removes sediment from runoff originating from disturbed areas of the site.

Background Information:

Filtration with sand media has been used for over a century to treat water and wastewater. The use of sand filtration for treatment of stormwater has developed recently, generally to treat runoff from streets, parking lots, and residential areas. The application of filtration to construction stormwater treatment is currently under development.

Conditions of Use

Traditional BMPs used to control soil erosion and sediment loss from sites under development may not be adequate to ensure compliance with the water quality standard for turbidity in the receiving water. Filtration may be used in conjunction with gravity settling to remove sediment as small as fine silt (0.5 µm). The reduction in turbidity will be dependent on the particle size distribution of the sediment in the stormwater. In some circumstances, sedimentation and filtration may achieve compliance with the water quality standard for turbidity.

The use of construction stormwater filtration does not require approval from Ecology as long as treatment chemicals are not used. Filtration in conjunction with polymer treatment requires testing under the Chemical Technology Assessment Protocol – Ecology (CTAPE) before it can be initiated. Approval from the appropriate regional Ecology office must be obtained at each site where polymers use is proposed prior to use. For more guidance on stormwater chemical treatment see BMP C250.

Design and Installation Specifications

Two types of filtration systems may be applied to construction stormwater treatment: rapid and slow. Rapid sand filters are the typical system used for water and wastewater treatment. They can achieve relatively high hydraulic flow rates, on the order of 2 to 20 gpm/sf, because they have automatic backwash systems to remove accumulated solids. In contrast, slow sand filters have very low hydraulic rates, on the order of 0.02 gpm/sf, because they do not have backwash systems. Slow sand filtration has generally been used to treat stormwater. Slow sand filtration is mechanically simple in comparison to rapid sand filtration but requires a much larger filter area.

Filtration Equipment. Sand media filters are available with automatic backwashing features that can filter to 50 µm particle size. Screen or bag filters can filter down to 5 µm. Fiber wound filters can remove particles down to 0.5 µm. Filters should be sequenced from the largest to the smallest pore opening. Sediment removal efficiency will be related to particle size distribution in the stormwater.

Treatment Process Description. Stormwater is collected at interception point(s) on the site and is diverted to an untreated stormwater sediment pond or tank for removal of large sediment and storage of the stormwater before it is treated by the filtration system. The untreated stormwater is pumped from the trap, pond, or tank through the filtration system in a rapid sand filtration system. Slow sand filtration systems are designed as flow through systems

using gravity.

Maintenance Standards

Rapid sand filters typically have automatic backwash systems that are triggered by a pre-set pressure drop across the filter. If the backwash water volume is not large or substantially more turbid than the untreated stormwater stored in the holding pond or tank, backwash return to the untreated stormwater pond or tank may be appropriate. However, other means of treatment and disposal may be necessary.

- Screen, bag, and fiber filters must be cleaned and/or replaced when they become clogged.
- Sediment shall be removed from the storage and/or treatment ponds as necessary. Typically, sediment removal is required once or twice during a wet season and at the decommissioning of the ponds.

Sizing Criteria for Flow-Through Treatment Systems for Flow Control Exempt Water Bodies:

When sizing storage ponds or tanks for flow-through systems for flow control exempt water bodies the treatment system capacity should be a factor. The untreated stormwater storage pond or tank should be sized to hold 1.5 times the runoff volume of the 10-year, 24-hour storm event minus the treatment system flowrate for an 8-hour period. For a chitosan-enhanced sand filtration system, the treatment system flowrate should be sized using a hydraulic loading rate between 6-8 gpm/ft². Other hydraulic loading rates may be more appropriate for other systems. Bypass should be provided around the chemical treatment system to accommodate extreme storms. Runoff volume shall be calculated using the methods presented in Volume 3, Chapter 2. Worst-case conditions (i.e., producing the most runoff) should be used for analyses (most likely conditions present prior to final landscaping).

Sizing Criteria for Flow Control Water Bodies:

Sites that must implement flow control for the developed site condition must also control stormwater release rates during construction.

Construction site stormwater discharges shall not exceed the discharge durations of the pre-developed condition for the range of pre-developed discharge rates from 1/2 of the 2-year flow through the 10-year flow as predicted by an approved continuous runoff model. The pre-developed condition to be matched shall be the land cover condition immediately prior to the development project. This restriction on release rates can affect the size of the storage pond, the filtration system, and the flow rate through the filter system.

The following is how WWHM can be used to determine the release rates from the filtration systems:

1. Determine the pre-developed flow durations to be matched by entering the land use area under the “Pre-developed” scenario in WWHM. The default flow range is from ½ of the 2-year flow

through the 10-year flow.

2. Enter the post developed land use area in the "Developed Unmitigated" scenario in WWHM.
3. Copy the land use information from the "Developed Unmitigated" to "Developed Mitigated" scenario.
4. There are two possible ways to model stormwater filtration systems:
    a. The stormwater filtration system uses an untreated stormwater storage pond/tank and the discharge from this pond/tank is pumped to one or more filters. In-line filtration chemicals would be added to the flow right after the pond/tank and before the filter(s). Because the discharge is pumped, WWHM can't generate a stage/storage /discharge (SSD) table for this system. This system is modeled the same way as described in BMP C250 and is as follows:

        While in the "Developed Mitigated" scenario, add a pond element under the basin element containing the post-developed land use areas. This pond element represents information on the available untreated stormwater storage and discharge from the filtration system. In cases where the discharge from the filtration system is controlled by a pump, a stage/storage/discharge (SSD) table representing the pond must be generated outside WWHM and imported into WWHM. WWHM can route the runoff from the post-developed condition through this SSD table (the pond) and determine compliance with the flow duration standard. This would be an iterative design procedure where if the initial SSD table proved to be out of compliance, the designer would have to modify the SSD table outside WWHM and re-import in WWHM and route the runoff through it again. The iteration will continue until a pond that enables compliance with the flow duration standard is designed.

        Notes on SSD table characteristics:

        - The pump discharge rate would likely be initially set at just below ½ if the 2-year flow from the pre-developed condition. As runoff coming into the untreated stormwater storage pond increases and the available untreated stormwater storage volume gets used up, it would be necessary to increase the pump discharge rate above ½ of the 2-year. The increase(s) above ½ of the 2-year must be such that they provide some relief to the untreated stormwater storage needs but at the same time they will not cause violations of the flow duration standard at the higher flows. The final design SSD table will identify the appropriate pumping rates and the corresponding stage and storages.
        - When building such a flow control system, the design must

ensure that any automatic adjustments to the pumping rates will be as a result of changes to the available storage in accordance with the final design SSD table.

b. The stormwater filtration system uses a storage pond/tank and the discharge from this pond/tank gravity flows to the filter. This is usually a slow sand filter system and it is possible to model it in WWHM as a Filter element or as a combination of Pond and Filter element placed in series. The stage/storage/discharge table(s) may then be generated within WWHM as follows:

   i. While in the "Developed Mitigated" scenario, add a Filter element under the basin element containing the post-developed land use areas. The length and width of this filter element would have to be the same as the bottom length and width of the upstream untreated stormwater storage pond/tank.

   ii. In cases where the length and width of the filter is not the same as those for the bottom of the upstream untreated stormwater storage tank/pond, the treatment system may be modeled as a Pond element followed by a Filter element. By having these two elements, WWHM would then generate a SSD table for the storage pond which then gravity flows to the Filter element. The Filter element downstream of the untreated stormwater storage pond would have a storage component through the media, and an overflow component for when the filtration capacity is exceeded.

   WWHM can route the runoff from the post-developed condition through the treatment systems in 4b and determine compliance with the flow duration standard. This would be an iterative design procedure where if the initial sizing estimates for the treatment system proved to be inadequate, the designer would have to modify the system and route the runoff through it again. The iteration would continue until compliance with the flow duration standard is achieved.

5. It should be noted that the above procedures would be used to meet the flow control requirements. The filtration system must be able to meet the runoff treatment requirements. It is likely that the discharge flow rate of ½ of the 2-year or more may exceed the treatment capacity of the system. If that is the case, the untreated stormwater discharge rate(s) (i.e., influent to the treatment system) must be reduced to allow proper treatment. Any reduction in the flows would likely result in the need for a larger untreated stormwater storage volume.

If system design does not allow you to discharge at the slower rates as described above and if the site has a retention or detention pond that will serve the planned development, the discharge from the treatment system may be directed to the permanent retention/detention pond to comply with

the flow control requirements. In this case, the untreated stormwater storage pond and treatment system will be sized according to the sizing criteria for flow- through treatment systems for flow control exempt waterbodies described earlier except all discharges (water passing through the treatment system and stormwater bypassing the treatment system) will be directed into the permanent retention/detention pond. If site constraints make locating the untreated stormwater storage pond difficult, the permanent retention/detention pond may be divided to serve as the untreated stormwater discharge pond and the post-treatment flow control pond. A berm or barrier must be used in this case so the untreated water does not mix with the treated water. Both untreated stormwater storage requirements, and adequate post- treatment flow control must be achieved. The post-treatment flow control pond's revised dimensions must be entered into the WWHM and the WWHM must be run to confirm compliance with the flow control requirement.

BMP C253: pH Control for High pH Water

Purpose

When pH levels in stormwater rise above 8.5 it is necessary to lower the pH levels to the acceptable range of 6.5 to 8.5, this process is called pH neutralization. Stormwater with pH levels exceeding water quality standards may be treated by infiltration, dispersion in vegetation or compost, pumping to a sanitary sewer, disposal at a permitted concrete batch plant with pH neutralization capabilities, or carbon dioxide sparging. BMP C252 gives guidelines for carbon dioxide sparging.

Reason for pH Neutralization:

A pH level range of 6.5 to 8.5 is typical for most natural watercourses, and this pH range is required for the survival of aquatic organisms. Should the pH rise or drop out of this range, fish and other aquatic organisms may become stressed and may die.

Conditions of Use

Causes of High pH:

High pH levels at construction sites are most commonly caused by the contact of stormwater with poured or recycled concrete, cement, mortars, and other Portland cement or lime containing construction materials. (See BMP C151: Concrete Handling for more information on concrete handling procedures). The principal caustic agent in cement is calcium hydroxide (free lime).

Design and Installation Specifications

Disposal Methods:

Infiltration

- Infiltration is only allowed if soil type allows all water to infiltrate (no surface runoff) without causing or contributing to a violation of surface or ground water quality standards.
- Infiltration techniques should be consistent with Volume V, Chapter 7

Dispersion

Use BMP T5.30 Full Dispersion

Sanitary Sewer Disposal

- Local sewer authority approval is required prior to disposal via the sanitary sewer.

Concrete Batch Plant Disposal

- Only permitted facilities may accept high pH water.
- Facility should be contacted before treatment to ensure they can accept the high pH water.

Stormwater Discharge

Any pH treatment options that generate treated water that must be discharged off site are subject to flow control requirements. Sites that must implement flow control for the developed site must also control stormwater release rates

during construction. All treated stormwater must go through a flow control facility before being released to surface waters which require flow control.

Appendix I
Example of General Permit

Issuance Date: December 1, 2010
Effective Date: January 1, 2011
Expiration Date: December 31, 2015

CONSTRUCTION STORMWATER GENERAL PERMIT

National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Construction Activity

State of Washington
Department of Ecology
Olympia, Washington 98504

In compliance with the provisions of
Chapter 90.48 Revised Code of Washington
(State of Washington Water Pollution Control Act)
and
Title 33 United States Code, Section 1251 et seq.
The Federal Water Pollution Control Act (The Clean Water Act)

Until this permit expires, is modified or revoked, Permittees that have properly obtained coverage under this general permit are authorized to discharge in accordance with the special and general conditions that follow.

Kelly Susewind, P.E., P.G.
Water Quality Program Manager
Washington State Department of Ecology

TABLE OF CONTENTS

LIST OF TABLES 3

SPECIAL CONDITIONS 5

S1. PERMIT COVERAGE 5
S2. APPLICATION REQUIREMENTS 8
S3. COMPLIANCE WITH STANDARDS 11
S4. MONITORING REQUIREMENTS 12
S5. REPORTING AND RECORDKEEPING REQUIREMENTS 19
S6. PERMIT FEES 22
S7. SOLID AND LIQUID WASTE DISPOSAL 22
S8. DISCHARGES TO 303(D) OR TMDL WATER BODIES 22
S9. STORMWATER POLLUTION PREVENTION PLAN 26
S10. NOTICE OF TERMINATION 34

GENERAL CONDITIONS 36

G1. DISCHARGE VIOLATIONS 36
G2. SIGNATORY REQUIREMENTS 36
G3. RIGHT OF INSPECTION AND ENTRY 37
G4. GENERAL PERMIT MODIFICATION AND REVOCATION 37
G5. REVOCATION OF COVERAGE UNDER THE PERMIT 37
G6. REPORTING A CAUSE FOR MODIFICATION 38
G7. COMPLIANCE WITH OTHER LAWS AND STATUTES 38
G8. DUTY TO REAPPLY 38
G9. TRANSFER OF GENERAL PERMIT COVERAGE 39
G10. REMOVED SUBSTANCES 39
G11. DUTY TO PROVIDE INFORMATION 39
G12. OTHER REQUIREMENTS OF 40 CFR 39
G13. ADDITIONAL MONITORING 39
G14. PENALTIES FOR VIOLATING PERMIT CONDITIONS 40
G15. UPSET 40

G16. PROPERTY RIGHTS....40
G17. DUTY TO COMPLY....40
G18. TOXIC POLLUTANTS....41
G19. PENALTIES FOR TAMPERING....41
G20. REPORTING PLANNED CHANGES....41
G21. REPORTING OTHER INFORMATION....42
G22. REPORTING ANTICIPATED NON-COMPLIANCE....42
G23. REQUESTS TO BE EXCLUDED FROM COVERAGE UNDER THE PERMIT....42
G24. APPEALS....42
G25. SEVERABILITY....43
G26. BYPASS PROHIBITED....43
APPENDIX A – DEFINITIONS....46
APPENDIX B – ACRONYMS....54

LIST OF TABLES

Table 1. Summary of Permit Report Submittals....4
Table 2. Summary of Required On-site Documentation....4
Table 3. Summary of Primary Monitoring Requirements....12
Table 4. Monitoring and Reporting Requirements....16
Table 5. Turbidity, Fine Sediment & Phosphorus Sampling and Limits for 303(d)-Listed....24
Table 6. pH Sampling and Limits for 303(d)-Listed Waters....24

SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions within this permit for additional submittal requirements. Appendix A provides a list of definitions. Appendix B provides a list of acronyms.

Table 1. Summary of Permit Report Submittals

Permit Section	Submittal	Frequency	First Submittal Date
S5.A and S8	High Turbidity/Transparency Phone Reporting	As Necessary	Within 24 hours
S5.B	Discharge Monitoring Report	Monthly*	Within 15 days of applicable monitoring period
S5.F and S8	Noncompliance Notification	As necessary	Immediately
S5.F	Noncompliance Notification – Written Report	As necessary	Within 5 Days of non-compliance
G2.	Notice of Change in Authorization	As necessary	
G6.	Permit Application for Substantive Changes to the Discharge	As necessary	
G8.	Application for Permit Renewal	1/permit cycle	No later than 180 days before expiration
G9.	Notice of Permit Transfer	As necessary	
G20.	Notice of Planned Changes	As necessary	
G22.	Reporting Anticipated Non-compliance	As necessary	

SPECIAL NOTE: *Permittees must submit Discharge Monitoring Reports (DMRs) to the Washington State Department of Ecology monthly, regardless of site discharge, for the full duration of permit coverage. Refer to Section S5.B of this General Permit for more specific information regarding DMRs.

Table 2. Summary of Required On-site Documentation

Document Title	Permit Conditions
Permit Coverage Letter	See Conditions S2, S5
Construction Stormwater General Permit	See Conditions S2, S5
Site Log Book	See Conditions S4, S5
Stormwater Pollution Prevention Plan (SWPPP)	See Conditions S9, S5

SPECIAL CONDITIONS

S1. PERMIT COVERAGE

A. Permit Area

This Construction Stormwater General Permit (CSWGP) covers all areas of Washington State, except for federal and Tribal lands as specified in Special Condition S1.E.3.

B. Operators Required to Seek Coverage Under this General Permit:

1. Operators of the following construction activities are required to seek coverage under this CSWGP:

    a. Clearing, grading and/or excavation that results in the disturbance of one or more acres and discharges stormwater to surface waters of the State; and clearing, grading and/or excavation on sites smaller than one acre that are part of a larger common plan of development or sale, if the common plan of development or sale will ultimately disturb one acre or more and discharge stormwater to surface waters of the State.

        i. This includes forest practices (including, but not limited to, class IV conversions) that are part of a construction activity that will result in the disturbance of one or more acres, and discharge to surface waters of the State (that is, forest practices that prepare a site for construction activities); and

    b. Any size construction activity discharging stormwater to waters of the State that the Department of Ecology ("Ecology"):

        i. Determines to be a significant contributor of pollutants to waters of the State of Washington.

        ii. Reasonably expects to cause a violation of any water quality standard.

2. Operators of the following activities are not required to seek coverage under this CSWGP (unless specifically required under Special Condition S1.B.1.b. above):

    a. Construction activities that discharge all stormwater and non-stormwater to ground water, sanitary sewer, or combined sewer, and have no point source discharge to either surface water or a storm sewer system that drains to surface waters of the State.

    b. Construction activities covered under an Erosivity Waiver (Special Condition S2.C).

    c. Routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

C. Authorized Discharges:

1. Stormwater Associated with Construction Activity. Subject to compliance with the terms and conditions of this permit, Permittees are authorized to discharge stormwater associated with construction activity to surface waters of the State or to a storm sewer system that drains to surface waters of the State. (Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.)

2. Stormwater Associated with Construction Support Activity. This permit also authorizes stormwater discharge from support activities related to the permitted construction site (for example, an on-site portable rock crusher, off-site equipment staging yards, material storage areas, borrow areas, etc.) provided:

   a. The support activity relates directly to the permitted construction site that is required to have a NPDES permit; and

   b. The support activity is not a commercial operation serving multiple unrelated construction projects, and does not operate beyond the completion of the construction activity; and

   c. Appropriate controls and measures are identified in the Stormwater Pollution Prevention Plan (SWPPP) for the discharges from the support activity areas.

3. Non-Stormwater Discharges. The categories and sources of non-stormwater discharges identified below are authorized conditionally, provided the discharge is consistent with the terms and conditions of this permit:

   a. Discharges from fire-fighting activities.

   b. Fire hydrant system flushing.

   c. Potable water, including uncontaminated water line flushing.

   d. Pipeline hydrostatic test water.

   e. Uncontaminated air conditioning or compressor condensate.

   f. Uncontaminated ground water or spring water.

   g. Uncontaminated excavation dewatering water (in accordance with S9.D.10).

   h. Uncontaminated discharges from foundation or footing drains.

   i. Water used to control dust. Permittees must minimize the amount of dust control water used.

   j. Routine external building wash down that does not use detergents.

   k. Landscape irrigation water.

   The SWPPP must adequately address all authorized non-stormwater discharges, except for discharges from fire-fighting activities, and must comply with Special

Condition S3. At a minimum, discharges from potable water (including water line flushing), fire hydrant system flushing, and pipeline hydrostatic test water must undergo the following: dechlorination to a concentration of 0.1 parts per million (ppm) or less, and pH adjustment to within 6.5 – 8.5 standard units (su), if necessary.

D. Prohibited Discharges:

The following discharges to waters of the State, including ground water, are prohibited.

1. Concrete wastewater.
2. Wastewater from washout and clean-up of stucco, paint, form release oils, curing compounds and other construction materials.
3. Process wastewater as defined by 40 Code of Federal Regulations (CFR) 122.1 (see Appendix A of this permit).
4. Slurry materials and waste from shaft drilling.
5. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.
6. Soaps or solvents used in vehicle and equipment washing.
7. Wheel wash wastewater, unless discharged according to Special Condition S9.D.9.d.
8. Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, unless managed according to Special Condition S9.D.10.

E. Limits on Coverage

Ecology may require any discharger to apply for and obtain coverage under an individual permit or another more specific general permit. Such alternative coverage will be required when Ecology determines that this CSWGP does not provide adequate assurance that water quality will be protected, or there is a reasonable potential for the project to cause or contribute to a violation of water quality standards.

The following stormwater discharges are not covered by this permit:

1. Post-construction stormwater discharges that originate from the site after completion of construction activities and the site has undergone final stabilization.
2. Non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance, from which there is natural runoff as excluded in 40 CFR Subpart 122.
3. Stormwater from any federal project or project on federal land or land within an Indian Reservation except for the Puyallup Reservation. Within the Puyallup

Reservation, any project that discharges to surface water on land held in trust by the federal government may be covered by this permit.

4. Stormwater from any site covered under an existing NPDES individual permit in which stormwater management and/or treatment requirements are included for all stormwater discharges associated with construction activity.

5. Stormwater from a site where an applicable Total Maximum Daily Load (TMDL) requirement specifically precludes or prohibits discharges from construction activity.

S2. APPLICATION REQUIREMENTS

A. Permit Application Forms

1. Notice of Intent Form/Timeline

a. Operators of new or previously unpermitted construction activities must submit a complete and accurate permit application (Notice of Intent, or NOI) to Ecology.

b. The operator must submit the NOI at least 60 days before discharging stormwater from construction activities and must submit it on or before the date of the first public notice (see Special Condition S2.B below for details). The 30-day public comment period required by WAC 173-226-130(5) begins on the publication date of the second public notice. Unless Ecology responds to the complete application in writing, based on public comments, or any other relevant factors, coverage under the general permit will automatically commence on the thirty-first day following receipt by Ecology of a completed NOI, or the issuance date of this permit, whichever is later, unless Ecology specifies a later date in writing.

c. Applicants who propose to discharge to a storm or sewer system operated by Seattle, King County, Snohomish County, Tacoma, Pierce County, or Clark County must also submit a copy of the NOI to the appropriate jurisdiction.

d. If an applicant intends to use a Best Management Practice (BMP) selected on the basis of Special Condition S9.C.4 (“demonstrably equivalent” BMPs), the applicant must notify Ecology of its selection as part of the NOI. In the event the applicant selects BMPs after submission of the NOI, it must provide notice of the selection of an equivalent BMP to Ecology at least 60 days before intended use of the equivalent BMP.

e. Permittees must notify Ecology regarding any changes to the information provided on the NOI by submitting an updated NOI. Examples of such changes include, but are not limited to,

i. changes to the Permittee’s mailing address,

ii. changes to the on-site contact person information, and

iii. changes to the area/acreage affected by construction activity.

2. Transfer of Coverage Form

The Permittee can transfer current coverage under this permit to one or more new operators, including operators of sites within a Common Plan of Development, provided the Permittee submits a Transfer of Coverage Form in accordance with General Condition G9. Transfers do not require public notice.

B. Public Notice

For new or previously unpermitted construction activities, the applicant must publish a public notice at least one time each week for two consecutive weeks, at least 7 days apart, in a newspaper with general circulation in the county where the construction is to take place. The notice must contain:

1. A statement that "The applicant is seeking coverage under the Washington State Department of Ecology's Construction Stormwater NPDES and State Waste Discharge General Permit."

2. The name, address and location of the construction site.

3. The name and address of the applicant.

4. The type of construction activity that will result in a discharge (for example, residential construction, commercial construction, etc.), and the number of acres to be disturbed.

5. The name of the receiving water(s) (that is, the surface water(s) to which the site will discharge), or, if the discharge is through a storm sewer system, the name of the operator of the system.

6. The statement: "Any persons desiring to present their views to the Washington State Department of Ecology regarding this application, or interested in Ecology's action on this application, may notify Ecology in writing no later than 30 days of the last date of publication of this notice. Ecology reviews public comments and considers whether discharges from this project would cause a measurable change in receiving water quality, and, if so, whether the project is necessary and in the overriding public interest according to Tier II antidegradation requirements under WAC 173-201A-320. Comments can be submitted to: Department of Ecology, P.O. Box 47696, Olympia, WA 98504-7696 Attn: Water Quality Program, Construction Stormwater."

C. Erosivity Waiver

Construction site operators may qualify for an erosivity waiver from the CSWGP if the following conditions are met:

1. The site will result in the disturbance of fewer than 5 acres and the site is not a portion of a common plan of development or sale that will disturb 5 acres or greater.

2. Calculation of Erosivity "R" Factor and Regional Timeframe:

   a. The project's rainfall erosivity factor ("R" Factor) must be less than 5 during the period of construction activity, as calculated using either the Texas A&M University online rainfall erosivity calculator at: http://ei.tamu.edu/ or EPA's calculator at http://cfpub.epa.gov/npdes/stormwater/lew/lewcalculator.cfm. The period of construction activity starts when the land is first disturbed and ends with final stabilization. In addition:

   b. The entire period of construction activity must fall within the following timeframes:

      i. For sites west of the Cascades Crest: June 15 – September 15.

      ii. For sites east of the Cascades Crest, excluding the Central Basin: June 15 – October 15.

      iii. For sites east of the Cascades Crest, within the Central Basin: no additional timeframe restrictions apply. The Central Basin is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches. For a map of the Central Basin (Region 2), refer to http://www.ecy.wa.gov/pubs/ecy070202.pdf.

3. Construction site operators must submit a complete Erosivity Waiver certification form at least one week before disturbing the land. Certification must include statements that the operator will:

   a. Comply with applicable local stormwater requirements; and

   b. Implement appropriate erosion and sediment control BMPs to prevent violations of water quality standards.

4. This waiver is not available for facilities declared significant contributors of pollutants as defined in Special Condition S1.B.1.b.

5. This waiver does not apply to construction activities which include non-stormwater discharges listed in Special Condition S1.C.3.

6. If construction activity extends beyond the certified waiver period for any reason, the operator must either:

   a. Recalculate the rainfall erosivity "R" factor using the original start date and a new projected ending date and, if the "R" factor is still under 5 and the entire

project falls within the applicable regional timeframe in Special Condition S2.C.2.b, complete and submit an amended waiver certification form before the original waiver expires; or

b. Submit a complete permit application to Ecology in accordance with Special Condition S2.A and B before the end of the certified waiver period.

S3. COMPLIANCE WITH STANDARDS

A. Discharges must not cause or contribute to a violation of surface water quality standards (Chapter 173-201A WAC), ground water quality standards (Chapter 173-200 WAC), sediment management standards (Chapter 173-204 WAC), and human health-based criteria in the National Toxics Rule (40 CFR Part 131.36). Discharges not in compliance with these standards are not authorized.

B. Prior to the discharge of stormwater and non-stormwater to waters of the State, the Permittee must apply all known, available, and reasonable methods of prevention, control, and treatment (AKART). This includes the preparation and implementation of an adequate Stormwater Pollution Prevention Plan (SWPPP), with all appropriate BMPs installed and maintained in accordance with the SWPPP and the terms and conditions of this permit.

C. Ecology presumes that a Permittee complies with water quality standards unless discharge monitoring data or other site-specific information demonstrates that a discharge causes or contributes to a violation of water quality standards, when the Permittee complies with the following conditions. The Permittee must fully:

1. Comply with all permit conditions, including planning, sampling, monitoring, reporting, and recordkeeping conditions.

2. Implement stormwater BMPs contained in stormwater management manuals published or approved by Ecology, or BMPs that are demonstrably equivalent to BMPs contained in stormwater technical manuals published or approved by Ecology, including the proper selection, implementation, and maintenance of all applicable and appropriate BMPs for on-site pollution control. (For purposes of this section, the stormwater manuals listed in Appendix 10 of the Phase I Municipal Stormwater Permit are approved by Ecology.)

D. Where construction sites also discharge to ground water, the ground water discharges must also meet the terms and conditions of this CSWGP. Permittees who discharge to ground water through an injection well must also comply with any applicable requirements of the Underground Injection Control (UIC) regulations, Chapter 173-218 WAC.

S4. MONITORING REQUIREMENTS, BENCHMARKS AND REPORTING TRIGGERS

Table 3. Summary of Primary Monitoring Requirements

Size of Soil Disturbance[1]	Weekly Site Inspections	Weekly Sampling w/ Turbidity Meter	Weekly Sampling w/ Transparency Tube	Weekly pH Sampling[2]	Requires CESCL Certification?
Sites that disturb less than 1 acre, but are part of a larger Common Plan of Development	Required	Not Required	Not Required	Not Required	No
Sites that disturb 1 acre or more, but fewer than 5 acres	Required	Sampling Required – either method[3]		Required	Yes
Sites that disturb 5 acres or more	Required	Required	Not Required[4]	Required	Yes

A. Site Log Book

The Permittee must maintain a site log book that contains a record of the implementation of the SWPPP and other permit requirements, including the installation and maintenance of BMPs, site inspections, and stormwater monitoring.

B. Site Inspections

The Permittee's (operator's) site inspections must include all areas disturbed by construction activities, all BMPs, and all stormwater discharge points. (See Special Conditions S4.B.3 and B.4 below for detailed requirements of the Permittee's Certified Erosion and Sediment Control Lead [CESCL]).

[1] Soil disturbance is calculated by adding together all areas affected by construction activity. Construction activity means clearing, grading, excavation, and any other activity that disturbs the surface of the land, including ingress/egress from the site.

[2] If construction activity results in the disturbance of 1 acre or more, and involves significant concrete work (1,000 cubic yards of poured or recycled concrete over the life of a project) or the use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash), and stormwater from the affected area drains to surface waters of the State or to a storm sewer stormwater collection system that drains to other surface waters of the State, the Permittee must conduct pH monitoring sampling in accordance with Special Condition S4.D.

[3] Sites with one or more acres, but fewer than 5 acres of soil disturbance, must conduct turbidity or transparency sampling in accordance with Special Condition S4.C.

[4] Sites equal to or greater than 5 acres of soil disturbance must conduct turbidity sampling using a turbidity meter in accordance with Special Condition S4.C.

Construction sites one acre or larger that discharge stormwater to surface waters of the State must have site inspections conducted by a certified CESCL. Sites less than one acre may have a person without CESCL certification conduct inspections; sampling is not required on sites that disturb less than an acre.

1. The Permittee must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. The Permittee must evaluate the effectiveness of BMPs and determine if it is necessary to install, maintain, or repair BMPs to improve the quality of stormwater discharges.

   Based on the results of the inspection, the Permittee must correct the problems identified by:

   a. Reviewing the SWPPP for compliance with Special Condition S9 and making appropriate revisions within 7 days of the inspection.

   b. Immediately beginning the process of fully implementing and maintaining appropriate source control and/or treatment BMPs as soon as possible, addressing the problems no later than within 10 days of the inspection. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when an extension is requested by a Permittee within the initial 10-day response period.

   c. Documenting BMP implementation and maintenance in the site log book.

2. The Permittee must inspect all areas disturbed by construction activities, all BMPs, and all stormwater discharge points at least once every calendar week and within 24 hours of any discharge from the site. (For purposes of this condition, individual discharge events that last more than one day do not require daily inspections. For example, if a stormwater pond discharges continuously over the course of a week, only one inspection is required that week.) The Permittee may reduce the inspection frequency for temporarily stabilized, inactive sites to once every calendar month.

3. The Permittee must have staff knowledgeable in the principles and practices of erosion and sediment control. The CESCL (sites one acre or more) or inspector (sites less than one acre) must have the skills to assess the:

   a. Site conditions and construction activities that could impact the quality of stormwater, and

   b. Effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

4. The SWPPP must identify the CESCL or inspector, who must be present on site or on-call at all times. The CESCL must obtain this certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology (see BMP C160 in the manual referred to in Special Condition S9.C.1 and 2).

5. The Permittee must summarize the results of each inspection in an inspection report or checklist and enter the report/checklist into, or attach it to, the site log book. At a minimum, each inspection report or checklist must include:

    a. Inspection date and time.

    b. Weather information, the general conditions during inspection and the approximate amount of precipitation since the last inspection, and precipitation within the last 24 hours.

    c. A summary or list of all implemented BMPs, including observations of all erosion/sediment control structures or practices.

    d. A description of the locations:

        i. Of BMPs inspected.

        ii. Of BMPs that need maintenance and why.

        iii. Of BMPs that failed to operate as designed or intended, and

        iv. Where additional or different BMPs are needed, and why.

    e. A description of stormwater discharged from the site. The Permittee must note the presence of suspended sediment, turbidity, discoloration, and oil sheen, as applicable.

    f. Any water quality monitoring performed during inspection.

    g. General comments and notes, including a brief description of any BMP repairs, maintenance or installations made following the inspection.

    h. A summary report and a schedule of implementation of the remedial actions that the Permittee plans to take if the site inspection indicates that the site is out of compliance. The remedial actions taken must meet the requirements of the SWPPP and the permit.

    i. The name, title, and signature of the person conducting the site inspection, a phone number or other reliable method to reach this person, and the following statement: "I certify that this report is true, accurate, and complete to the best of my knowledge and belief."

C. Turbidity/Transparency Sampling Requirements

1. Sampling Methods

    a. If construction activity involves the disturbance of 5 acres or more, the Permittee must conduct turbidity sampling per Special Condition S4.C.

    b. If construction activity involves 1 acre or more but fewer than 5 acres of soil disturbance, the Permittee must conduct either transparency sampling **or** turbidity sampling per Special Condition S4.C.

2. Sampling Frequency

    a. The Permittee must sample all discharge locations at least once every calendar week when stormwater (or authorized non-stormwater) discharges from the site or enters any on-site surface waters of the state (for example, a creek running through a site).

    b. Samples must be representative of the flow and characteristics of the discharge.

    c. Sampling is not required when there is no discharge during a calendar week.

    d. Sampling is not required outside of normal working hours or during unsafe conditions.

    e. If the Permittee is unable to sample during a monitoring period, the Permittee must include a brief explanation in the monthly Discharge Monitoring Report (DMR).

    f. Sampling is not required before construction activity begins.

3. Sampling Locations

    a. Sampling is required at all points where stormwater associated with construction activity (or authorized non-stormwater) is discharged off site, including where it enters any on-site surface waters of the state (for example, a creek running through a site).

    b. The Permittee may discontinue sampling at discharge points that drain areas of the project that are fully stabilized to prevent erosion.

    c. The Permittee must identify all sampling point(s) on the SWPPP site map and clearly mark these points in the field with a flag, tape, stake or other visible marker.

    d. Sampling is not required for discharge that is sent directly to sanitary or combined sewer systems.

4. Sampling and Analysis Methods

    a. The Permittee performs turbidity analysis with a calibrated turbidity meter (turbidimeter) either on site or at an accredited lab. The Permittee must record the results in the site log book in nephelometric turbidity units (NTU).

    b. The Permittee performs transparency analysis on site with a 1¾-inch-diameter, 60-centimeter (cm)-long transparency tube. The Permittee will record the results in the site log book in centimeters (cm). Transparency tubes are available from: http://watermonitoringequip.com/pages/stream.html.

Table 4. Monitoring and Reporting Requirements

Parameter	Unit	Analytical Method	Sampling Frequency	Benchmark Value	Phone Reporting Trigger Value
Turbidity	NTU	SM2130 or EPA 180.1	Weekly, if discharging	25 NTU	250 NTU
Transparency	cm	Manufacturer instructions, or Ecology guidance	Weekly, if discharging	33 cm	6 cm

5. Turbidity/Transparency Benchmark Values and Reporting Triggers

The benchmark value for turbidity is 25 NTU or less. The benchmark value for transparency is 33 centimeters (cm). Note: Benchmark values do not apply to discharges to segments of water bodies on Washington State's 303(d) list (Category 5) for turbidity, fine sediment, or phosphorus; these discharges are subject to a numeric effluent limit for turbidity. Refer to Special Condition S8 for more information.

a. Turbidity 26 – 249 NTU, or Transparency 32 – 7 cm:

If the discharge turbidity is 26 to 249 NTU; or if discharge transparency is less than 33 cm, but equal to or greater than 6 cm, the Permittee must:

i. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.

ii. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.

iii. Document BMP implementation and maintenance in the site log book.

b. Turbidity 250 NTU or greater, or Transparency 6 cm or less:

If a discharge point's turbidity is 250 NTU or greater, or if discharge transparency is less than or equal to 6 cm, the Permittee must complete the reporting and adaptive management process described below.

i. Telephone the applicable Ecology Region's Environmental Report Tracking System (ERTS) number within 24 hours, in accordance with Special Condition S5.F.

- Central Region (Okanogan, Chelan, Douglas, Kittitas, Yakima, Klickitat, Benton): (509) 575-2490

- Eastern Region (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman): (509) 329-3400
- Northwest Region (Kitsap, Snohomish, Island, King, San Juan, Skagit, Whatcom): (425) 649-7000
- Southwest Region (Grays Harbor, Lewis, Mason, Thurston, Pierce, Clark, Cowlitz, Skamania, Wahkiakum, Clallam, Jefferson, Pacific): (360) 407-6300

These numbers are also listed at the following web site: http://www.ecy.wa.gov/programs/wq/stormwater/construction/permit.html

ii. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.

iii. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.

iv. Document BMP implementation and maintenance in the site log book.

v. Continue to sample discharges daily until:

a) Turbidity is 25 NTU (or lower); or

b) Transparency is 33 cm (or greater); or

c) The Permittee has demonstrated compliance with the water quality limit for turbidity:

1) No more than 5 NTU over background turbidity, if background is less than 50 NTU, or

2) No more than 10% over background turbidity, if background is 50 NTU or greater; or

d) The discharge stops or is eliminated.

D. pH Sampling Requirements -- Significant Concrete Work or Engineered Soils

If construction activity results in the disturbance of 1 acre or more, **and** involves significant concrete work (significant concrete work means greater than 1000 cubic yards poured concrete or recycled concrete used over the life of a project) or the use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash), and stormwater from the affected area

drains to surface waters of the State or to a storm sewer system that drains to surface waters of the state, the Permittee must conduct pH monitoring as set forth below. Note: In addition, discharges to segments of water bodies on Washington State's 303(d) list (Category 5) for high pH are subject to a numeric effluent limit for pH; refer to Special Condition S8.

1. For sites with significant concrete work, the Permittee must begin the pH monitoring period when the concrete is first poured and exposed to precipitation, and continue weekly throughout and after the concrete pour and curing period, until stormwater pH is in the range of 6.5 to 8.5 (su).

2. For sites with engineered soils, the Permittee must begin the pH monitoring period when the soil amendments are first exposed to precipitation and must continue until the area of engineered soils is fully stabilized.

3. During the applicable pH monitoring period defined above, the Permittee must obtain a representative sample of stormwater and conduct pH analysis at least once per week.

4. The Permittee must monitor pH in the sediment trap/pond(s) or other locations that receive stormwater runoff from the area of significant concrete work or engineered soils before the stormwater discharges to surface waters.

5. The benchmark value for pH is 8.5 standard units. Anytime sampling indicates that pH is 8.5 or greater, the Permittee must either:

    a. Prevent the high pH water (8.5 or above) from entering storm sewer systems or surface waters; or

    b. If necessary, adjust or neutralize the high pH water until it is in the range of pH 6.5 to 8.5 (su) using an appropriate treatment BMP such as carbon dioxide (CO_2) sparging or dry ice. The Permittee must obtain written approval from Ecology before using any form of chemical treatment other than CO_2 sparging or dry ice.

6. The Permittee must perform pH analysis on site with a calibrated pH meter, pH test kit, or wide range pH indicator paper. The Permittee must record pH monitoring results in the site log book.

S5. REPORTING AND RECORDKEEPING REQUIREMENTS

A. High Turbidity Phone Reporting

Anytime sampling performed in accordance with Special Condition S4.C indicates turbidity has reached the 250 NTU phone reporting level, the Permittee must call Ecology's Regional office by phone within 24 hours of analysis. The web site is http://www.ecy.wa.gov/programs/wq/stormwater/construction/permit.html. Also see phone numbers in Special Condition S4.C.5.b.i.

B. Discharge Monitoring Reports

Permittees required to conduct water quality sampling in accordance with Special Conditions S4.C (Turbidity/Transparency), S4.D (pH), S8 (303[d]/TMDL sampling), and/or G13 (Additional Sampling) must submit the results to Ecology.

Permittees must submit monitoring data using Ecology's WebDMR program. To find out more information and to sign up for WebDMR go to: http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html.

Permittees unable to submit electronically (for example, those who do not have an internet connection) must contact Ecology to request a waiver and obtain instructions on how to obtain a paper copy DMR at:

Mailing Address:
Department of Ecology
Water Quality Program
Attn: Stormwater Compliance Specialist
PO Box 47696
Olympia, WA 98504-7696

Permittees who obtain a waiver not to use WebDMR must use the forms provided to them by Ecology; submittals must be mailed to the address above. Permittees shall submit DMR forms to be received by Ecology within 15 days following the end of each month.

If there was no discharge during a given monitoring period, all Permittees must submit a DMR as required with "no discharge" entered in place of the monitoring results. For more information, contact Ecology staff using information provided at the following web site: http://www.ecy.wa.gov/programs/spills/response/assistancesoil%20map.pdf

C. Records Retention

The Permittee must retain records of all monitoring information (site log book, sampling results, inspection reports/checklists, etc.), Stormwater Pollution Prevention Plan, and any other documentation of compliance with permit requirements for the entire life of the construction project and for a minimum of three years following the termination of permit coverage. Such information must include all calibration and maintenance records, and records of all data used to complete the application for this

permit. This period of retention must be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

D. Recording Results

For each measurement or sample taken, the Permittee must record the following information:

1. Date, place, method, and time of sampling or measurement.
2. The first and last name of the individual who performed the sampling or measurement.
3. The date(s) the analyses were performed.
4. The first and last name of the individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

E. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by this permit using test procedures specified by Special Condition S4 of this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the Permittee's DMR.

F. Noncompliance Notification

In the event the Permittee is unable to comply with any part of the terms and conditions of this permit, and the resulting noncompliance may cause a threat to human health or the environment, the Permittee must:

1. Immediately notify Ecology of the failure to comply by calling the applicable Regional office ERTS phone number (find at http://www.ecy.wa.gov/programs/spills/response/assistancesoil%20map.pdf) or refer to Special Condition S4.C.5.b.i.
2. Immediately take action to prevent the discharge/pollution, or otherwise stop or correct the noncompliance, and, if applicable, repeat sampling and analysis of any noncompliance immediately and submit the results to Ecology within five (5) days of becoming aware of the violation.
3. Submit a detailed written report to Ecology within five (5) days, unless requested earlier by Ecology. The report must contain a description of the noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The Permittee must report any unanticipated bypass and/or upset that exceeds any effluent limit in the permit in accordance with the 24-hour reporting requirement contained in 40 C.F.R. 122.41(l)(6)).

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply. Refer to Section G14 of this permit for specific information regarding non-compliance.

G. Access to Plans and Records

1. The Permittee must retain the following permit documentation (plans and records) on site, or within reasonable access to the site, for use by the operator or for on-site review by Ecology or the local jurisdiction:

   a. General Permit.

   b. Permit Coverage Letter.

   c. Stormwater Pollution Prevention Plan (SWPPP).

   d. Site Log Book.

2. The Permittee must address written requests for plans and records listed above (Special Condition S5.G.1) as follows:

   a. The Permittee must provide a copy of plans and records to Ecology within 14 days of receipt of a written request from Ecology.

   b. The Permittee must provide a copy of plans and records to the public when requested in writing. Upon receiving a written request from the public for the Permittee's plans and records, the Permittee must either:

      i. Provide a copy of the plans and records to the requester within 14 days of a receipt of the written request; or

      ii. Notify the requester within 10 days of receipt of the written request of the location and times within normal business hours when the plans and records may be viewed; and provide access to the plans and records within 14 days of receipt of the written request; or

      Within 14 days of receipt of the written request, the Permittee may submit a copy of the plans and records to Ecology for viewing and/or copying by the requester at an Ecology office, or a mutually agreed location. If plans and records are viewed and/or copied at a location other than at an Ecology office, the Permittee will provide reasonable access to copying services for which a reasonable fee may be charged. The Permittee must notify the requester within 10 days of receipt of the request where the plans and records may be viewed and/or copied.

S6. PERMIT FEES

The Permittee must pay permit fees assessed by Ecology. Fees for stormwater discharges covered under this permit are established by Chapter 173-224 WAC. Ecology continues to assess permit fees until the permit is terminated in accordance with Special Condition S10 or revoked in accordance with General Condition G5.

S7. SOLID AND LIQUID WASTE DISPOSAL

The Permittee must handle and dispose of solid and liquid wastes generated by construction activity, such as demolition debris, construction materials, contaminated materials, and waste materials from maintenance activities, including liquids and solids from cleaning catch basins and other stormwater facilities, in accordance with:

A. Special Condition S3, Compliance with Standards.

B. WAC 173-216-110.

C. Other applicable regulations.

S8. DISCHARGES TO 303(D) OR TMDL WATER BODIES

A. Sampling and Numeric Effluent Limits For Certain Discharges to 303(d)-listed Water Bodies

1. Permittees who discharge to segments of water bodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, high pH, or phosphorus, must conduct water quality sampling according to the requirements of this section, and Special Conditions S4.C.2.b-f and S4.C.3.b-d, and must comply with the applicable numeric effluent limitations in S8.C and S8.D.

2. All references and requirements associated with Section 303(d) of the Clean Water Act mean the most current listing by Ecology of impaired waters (Category 5) that exists on January 1, 2011, or the date when the operator's complete permit application is received by Ecology, whichever is later.

B. Limits on Coverage for New Discharges to TMDL or 303(d)-listed Waters

Operators of construction sites that discharge to a 303(d)-listed water body are not eligible for coverage under this permit *unless* the operator:

1. Prevents exposing stormwater to pollutants for which the water body is impaired, and retains documentation in the SWPPP that details procedures taken to prevent exposure on site; or

2. Documents that the pollutants for which the water body is impaired are not present at the site, and retains documentation of this finding within the SWPPP; or

3. Provides Ecology with data indicating the discharge is not expected to cause or contribute to an exceedance of a water quality standard, and retains such data on site with the SWPPP. The operator must provide data and other technical information to Ecology that sufficiently demonstrate:

    a. For discharges to waters without an EPA-approved or -established TMDL, that the discharge of the pollutant for which the water is impaired will meet in-stream water quality criteria at the point of discharge to the water body; or

    b. For discharges to waters with an EPA-approved or -established TMDL, that there is sufficient remaining wasteload allocation in the TMDL to allow construction stormwater discharge and that existing dischargers to the water body are subject to compliance schedules designed to bring the water body into attainment with water quality standards.

    Operators of construction sites are eligible for coverage under this permit if Ecology issues permit coverage based upon an affirmative determination that the discharge will not cause or contribute to the existing impairment.

C. Sampling and Numeric Effluent Limits for Discharges to Water Bodies on the 303(d) List for Turbidity, Fine Sediment, or Phosphorus

1. Permittees who discharge to segments of water bodies on the 303(d) list (Category 5) for turbidity, fine sediment, or phosphorus must conduct turbidity sampling in accordance with Special Condition S4.C.2 and comply with either of the numeric effluent limits noted in Table 5 below.

2. As an alternative to the 25 NTU effluent limit noted in Table 5 below (applied at the point where stormwater [or authorized non-stormwater] is discharged off-site), permittees may choose to comply with the surface water quality standard for turbidity. The standard is: no more than 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or no more than a 10% increase in turbidity when the background turbidity is more than 50 NTU. In order to use the water quality standard requirement, the sampling must take place at the following locations:

    a. Background turbidity in the 303(d)-listed receiving water immediately upstream (upgradient) or outside the area of influence of the discharge.

    b. Turbidity at the point of discharge into the 303(d)-listed receiving water, inside the area of influence of the discharge**.**

3. Discharges that exceed the numeric effluent limit for turbidity constitute a violation of this permit.

4. Permittees whose discharges exceed the numeric effluent limit shall sample discharges daily until the violation is corrected and comply with the non-compliance notification requirements in Special Condition S5.F.

Table 5. Turbidity, Fine Sediment & Phosphorus Sampling and Limits for 303(d)-Listed Waters

Parameter identified in 303(d) listing	Parameter Sampled	Unit	Analytical Method	Sampling Frequency	Numeric Effluent Limit[1]
• Turbidity • Fine Sediment • Phosphorus	Turbidity	NTU	SM2130 or EPA180.1	Weekly, if discharging	25 NTU, at the point where stormwater is discharged from the site; OR In compliance with the surface water quality standard for turbidity (S8.C.1.a)

[1]Permittees subject to a numeric effluent limit for turbidity may, at their discretion, choose either numeric effluent limitation based on site-specific considerations including, but not limited to, safety, access and convenience.

D. Discharges to Water Bodies on the 303(d) List for High pH

1. Permittees who discharge to segments of water bodies on the 303(d) list (Category 5) for high pH must conduct pH sampling in accordance with the table below, and comply with the numeric effluent limit of pH 6.5 to 8.5 su (Table 6).

Table 6. pH Sampling and Limits for 303(d)-Listed Waters

Parameter identified in 303(d) listing	Parameter Sampled/Units	Analytical Method	Sampling Frequency	Numeric Effluent Limit
High pH	pH /Standard Units	pH meter	Weekly, if discharging	In the range of 6.5 – 8.5

2. At the Permittee's discretion, compliance with the limit shall be assessed at one of the following locations:

   a. Directly in the 303(d)-listed water body segment, inside the immediate area of influence of the discharge; or

   b. Alternatively, the permittee may measure pH at the point where the discharge leaves the construction site, rather than in the receiving water.

3. Discharges that exceed the numeric effluent limit for pH (outside the range of 6.5 – 8.5 su) constitute a violation of this permit.

4. Permittees whose discharges exceed the numeric effluent limit shall sample discharges daily until the violation is corrected and comply with the non-compliance notification requirements in Special Condition S5.F.

E. Sampling and Limits for Sites Discharging to Waters Covered by a TMDL or Another Pollution Control Plan

1. Discharges to a water body that is subject to a Total Maximum Daily Load (TMDL) for turbidity, fine sediment, high pH, or phosphorus must be consistent with the TMDL. Refer to http://www.ecy.wa.gov/programs/wq/tmdl/index.html for more information on TMDLs.

    a. Where an applicable TMDL sets specific waste load allocations or requirements for discharges covered by this permit, discharges must be consistent with any specific waste load allocations or requirements established by the applicable TMDL.

        i. The Permittee must sample discharges weekly or as otherwise specified by the TMDL to evaluate compliance with the specific waste load allocations or requirements.

        ii. Analytical methods used to meet the monitoring requirements must conform to the latest revision of the Guidelines Establishing Test Procedures for the Analysis of Pollutants contained in 40 CFR Part 136. Turbidity and pH methods need not be accredited or registered unless conducted at a laboratory which must otherwise be accredited or registered.

    b. Where an applicable TMDL has established a general waste load allocation for construction stormwater discharges, but has not identified specific requirements, compliance with Special Conditions S4 (Monitoring) and S9 (SWPPPs) will constitute compliance with the approved TMDL.

    c. Where an applicable TMDL has not specified a waste load allocation for construction stormwater discharges, but has not excluded these discharges, compliance with Special Conditions S4 (Monitoring) and S9 (SWPPPs) will constitute compliance with the approved TMDL.

    d. Where an applicable TMDL specifically precludes or prohibits discharges from construction activity, the operator is not eligible for coverage under this permit.

2. Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus that is completed and approved by EPA before January 1, 2011, or before the date the operator's complete permit application is received by Ecology, whichever is later. TMDLs completed after the operator's complete permit application is received by Ecology become applicable to the Permittee only if they are imposed through an administrative order by Ecology, or through a modification of permit coverage.

S9. STORMWATER POLLUTION PREVENTION PLAN

The Permittee must prepare and properly implement an adequate Stormwater Pollution Prevention Plan (SWPPP) for construction activity in accordance with the requirements of this permit beginning with initial soil disturbance and until final stabilization.

A. The Permittee's SWPPP must meet the following objectives:

1. To implement best management practices (BMPs) to prevent erosion and sedimentation, and to identify, reduce, eliminate or prevent stormwater contamination and water pollution from construction activity.

2. To prevent violations of surface water quality, ground water quality, or sediment management standards.

3. To control peak volumetric flow rates and velocities of stormwater discharges.

B. General Requirements

1. The SWPPP must include a narrative and drawings. All BMPs must be clearly referenced in the narrative and marked on the drawings. The SWPPP narrative must include documentation to explain and justify the pollution prevention decisions made for the project. Documentation must include:

   a. Information about existing site conditions (topography, drainage, soils, vegetation, etc.).

   b. Potential erosion problem areas.

   c. The 12 elements of a SWPPP in Special Condition S9.D.1-12, including BMPs used to address each element.

   d. Construction phasing/sequence and general BMP implementation schedule.

   e. The actions to be taken if BMP performance goals are not achieved—for example, a contingency plan for additional treatment and/or storage of stormwater that would violate the water quality standards if discharged.

   f. Engineering calculations for ponds and any other designed structures.

2. The Permittee must modify the SWPPP if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is, or would be, ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The Permittee must then:

   a. Review the SWPPP for compliance with Special Condition S9 and make appropriate revisions within 7 days of the inspection or investigation.

   b. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible, addressing the problems no later than 10 days from the inspection or investigation. If

installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when an extension is requested by a Permittee within the initial 10-day response period,

c. Document BMP implementation and maintenance in the site log book.

The Permittee must modify the SWPPP whenever there is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

C. Stormwater Best Management Practices (BMPs)

BMPs must be consistent with:

1. Stormwater Management Manual for Western Washington (most recent edition), for sites west of the crest of the Cascade Mountains; or

2. Stormwater Management Manual for Eastern Washington (most recent edition), for sites east of the crest of the Cascade Mountains; or

3. Revisions to the manuals listed in Special Condition S9.C.1. & 2., or other stormwater management guidance documents or manuals which provide an equivalent level of pollution prevention, that are approved by Ecology and incorporated into this permit in accordance with the permit modification requirements of WAC 173-226-230; or

4. Documentation in the SWPPP that the BMPs selected provide an equivalent level of pollution prevention, compared to the applicable Stormwater Management Manuals, including:

   a. The technical basis for the selection of all stormwater BMPs (scientific, technical studies, and/or modeling) that support the performance claims for the BMPs being selected.

   b. An assessment of how the selected BMP will satisfy AKART requirements and the applicable federal technology-based treatment requirements under 40 CFR part 125.3.

D. SWPPP – Narrative Contents and Requirements

The Permittee must include each of the 12 elements below in Special Condition S9.D.1-12 in the narrative of the SWPPP and implement them unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the SWPPP.

1. Preserve Vegetation/Mark Clearing Limits

   a. Before beginning land-disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.

b. Retain the duff layer, native top soil, and natural vegetation in an undisturbed state to the maximum degree practicable.

2. Establish Construction Access

   a. Limit construction vehicle access and exit to one route, if possible.

   b. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking sediment onto roads.

   c. Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.

   d. If sediment is tracked off site, clean the affected roadway thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or pickup and transport of the sediment to a controlled sediment disposal area.

   e. Conduct street washing only after sediment removal in accordance with Special Condition S9.D.2.d. Control street wash wastewater by pumping back on site or otherwise preventing it from discharging into systems tributary to waters of the State.

3. Control Flow Rates

   a. Protect properties and waterways downstream of development sites from erosion and the associated discharge of turbid waters due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site, as required by local plan approval authority.

   b. Where necessary to comply with Special Condition S9.D.3.a, construct stormwater retention or detention facilities as one of the first steps in grading. Assure that detention facilities function properly before constructing site improvements (for example, impervious surfaces).

   c. If permanent infiltration ponds are used for flow control during construction, protect these facilities from siltation during the construction phase.

4. Install Sediment Controls

   The Permittee must design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, the Permittee must design, install and maintain such controls to:

   a. Construct sediment control BMPs (sediment ponds, traps, filters, etc.) as one of the first steps in grading. These BMPs must be functional before other land disturbing activities take place.

   b. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of

resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.

c. Direct stormwater runoff from disturbed areas through a sediment pond or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Special Condition S9.D.3.a.

d. Locate BMPs intended to trap sediment on site in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.

e. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.

f. Where feasible, design outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

5. Stabilize Soils

a. The Permittee must stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include, but are not limited to: temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.

b. The Permittee must control stormwater volume and velocity within the site to minimize soil erosion.

c. The Permittee must control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.

d. Depending on the geographic location of the project, the Permittee must not allow soils to remain exposed and unworked for more than the time periods set forth below to prevent erosion:

West of the Cascade Mountains Crest
During the dry season (May 1 - Sept. 30): 7 days
During the wet season (October 1 - April 30): 2 days

East of the Cascade Mountains Crest, except for Central Basin*
During the dry season (July 1 - September 30): 10 days
During the wet season (October 1 - June 30): 5 days

The Central Basin*, East of the Cascade Mountains Crest

During the dry Season (July 1 - September 30): 30 days
During the wet season (October 1 - June 30): 15 days

*Note: The Central Basin is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches.

e. The Permittee must stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.

f. The Permittee must stabilize soil stockpiles from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

g. The Permittee must minimize the amount of soil exposed during construction activity.

h. The Permittee must minimize the disturbance of steep slopes.

i. The Permittee must minimize soil compaction and, unless infeasible, preserve topsoil.

6. Protect Slopes

a. The Permittee must design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces (for example, track walking).

b. The Permittee must divert off-site stormwater (run-on) or ground water away from slopes and disturbed areas with interceptor dikes, pipes, and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.

c. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion.

i. West of the Cascade Mountains Crest: Temporary pipe slope drains must handle the peak 10-minute velocity of flow from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model (WWHM) to predict flows, bare soil areas should be modeled as "landscaped area."

ii. East of the Cascade Mountains Crest: Temporary pipe slope drains must handle the expected peak flow velocity from a 6-month, 3-hour storm for the developed condition, referred to as the short duration storm.

d. Place excavated material on the uphill side of trenches, consistent with safety and space considerations.

e. Place check dams at regular intervals within constructed channels that are cut down a slope.

7. Protect Drain Inlets

a. Protect all storm drain inlets made operable during construction so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

b. Clean or remove and replace inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

8. Stabilize Channels and Outlets

a. Design, construct and stabilize all on-site conveyance channels to prevent erosion from the following expected peak flows:

i. West of the Cascade Mountains Crest: Channels must handle the peak 10-minute velocity of flow from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the WWHM to predict flows, bare soil areas should be modeled as "landscaped area."

ii. East of the Cascade Mountains Crest: Channels must handle the expected peak flow velocity from a 6-month, 3-hour storm for the developed condition, referred to as the short duration storm.

b. Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches at the outlets of all conveyance systems.

9. Control Pollutants

Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. The Permittee must:

a. Handle and dispose of all pollutants, including waste materials and demolition debris that occur on site in a manner that does not cause contamination of stormwater.

b. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.

c. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.

d. Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland land application, or to the sanitary sewer with local sewer district approval.

e. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.

f. Use BMPs to prevent contamination of stormwater runoff by pH-modifying sources. The sources for this contamination include, but are not limited to: bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters. (Also refer to the definition for "concrete wastewater" in Appendix A--Definitions.)

g. Adjust the pH of stormwater if necessary to prevent violations of water quality standards.

h. Assure that washout of concrete trucks is performed offsite or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge to surface waters of the State is prohibited.

i. Obtain written approval from Ecology before using chemical treatment other than CO_2 or dry ice to adjust pH.

10. Control Dewatering

a. Permittees must discharge foundation, vault, and trench dewatering water, which have characteristics similar to stormwater runoff at the site, into a

controlled conveyance system before discharge to a sediment trap or sediment pond.

b. Permittees may discharge clean, non-turbid dewatering water, such as well-point ground water, to systems tributary to, or directly into surface waters of the State, as specified in Special Condition S9.D.8, provided the dewatering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment ponds. Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.

c. Other treatment or disposal options may include:

   i. Infiltration.

   ii. Transport off site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.

   iii. Ecology-approved on-site chemical treatment or other suitable treatment technologies.

   iv. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.

   v. Use of a sedimentation bag with discharge to a ditch or swale for small volumes of localized dewatering.

d. Permittees must handle highly turbid or contaminated dewatering water separately from stormwater.

11. Maintain BMPs

    a. Permittees must maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to assure continued performance of their intended function in accordance with BMP specifications.

    b. Permittees must remove all temporary erosion and sediment control BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed.

12. Manage the Project

    a. Phase development projects to the maximum degree practicable and take into account seasonal work limitations.

    b. Inspection and monitoring -- Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function. Conduct site inspections and monitoring in accordance with Special Condition S4.

    c. Maintaining an updated construction SWPPP -- Maintain, update, and implement the SWPPP in accordance with Special Conditions S3, S4 and S9.

E. SWPPP – Map Contents and Requirements

The Permittee's SWPPP must also include a vicinity map or general location map (for example, a USGS quadrangle map, a portion of a county or city map, or other appropriate map) with enough detail to identify the location of the construction site and receiving waters within one mile of the site.

The SWPPP must also include a legible site map (or maps) showing the entire construction site. The following features must be identified, unless not applicable due to site conditions:

1. The direction of north, property lines, and existing structures and roads.
2. Cut and fill slopes indicating the top and bottom of slope catch lines.
3. Approximate slopes, contours, and direction of stormwater flow before and after major grading activities.
4. Areas of soil disturbance and areas that will not be disturbed.
5. Locations of structural and nonstructural controls (BMPs) identified in the SWPPP.
6. Locations of off-site material, stockpiles, waste storage, borrow areas, and vehicle/equipment storage areas.
7. Locations of all surface water bodies, including wetlands.
8. Locations where stormwater or non-stormwater discharges off-site and/or to a surface water body, including wetlands.
9. Location of water quality sampling station(s), if sampling is required by state or local permitting authority.
10. Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

S10. NOTICE OF TERMINATION

A. The site is eligible for termination of coverage when it has met any of the following conditions:

1. The site has undergone final stabilization, the Permittee has removed all temporary BMPs (except biodegradable BMPs clearly manufactured with the intention for the material to be left in place and not interfere with maintenance or land use), and all stormwater discharges associated with construction activity have been eliminated; or
2. All portions of the site that have not undergone final stabilization per Special Condition S10.A.1 have been sold and/or transferred (per General Condition G9), and the Permittee no longer has operational control of the construction activity; or

3. For residential construction only, the Permittee has completed temporary stabilization and the homeowners have taken possession of the residences.

B. When the site is eligible for termination, the Permittee must submit a complete and accurate Notice of Termination (NOT) form, signed in accordance with General Condition G2, to:

Department of Ecology
Water Quality Program - Construction Stormwater
PO Box 47696
Olympia, Washington 98504-7696

The termination is effective on the date Ecology receives the NOT form, unless Ecology notifies the Permittee within 30 days that termination request is denied because the Permittee has not met the eligibility requirements in Special Condition S10.A.

Permittees transferring the property to a new property owner or operator/permittee are required to complete and submit the Notice of Transfer form to Ecology, but are not required to submit a Notice of Termination form for this type of transaction.

GENERAL CONDITIONS

G1. DISCHARGE VIOLATIONS

All discharges and activities authorized by this general permit must be consistent with the terms and conditions of this general permit. Any discharge of any pollutant more frequent than or at a level in excess of that identified and authorized by the general permit must constitute a violation of the terms and conditions of this permit.

G2. SIGNATORY REQUIREMENTS

A. All permit applications must bear a certification of correctness to be signed:

1. In the case of corporations, by a responsible corporate officer of at least the level of vice president of a corporation;

2. In the case of a partnership, by a general partner of a partnership;

3. In the case of sole proprietorship, by the proprietor; or

4. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

B. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to the Ecology.

2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

C. Changes to authorization. If an authorization under paragraph G2.B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G2.B.2 above must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a document under this section must make the following certification:

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering

information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G3. RIGHT OF INSPECTION AND ENTRY

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

A. To enter upon the premises where a discharge is located or where any records are kept under the terms and conditions of this permit.

B. To have access to and copy – at reasonable times and at reasonable cost -- any records required to be kept under the terms and conditions of this permit.

C. To inspect -- at reasonable times – any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.

D. To sample or monitor – at reasonable times – any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G4. GENERAL PERMIT MODIFICATION AND REVOCATION

This permit may be modified, revoked and reissued, or terminated in accordance with the provisions of Chapter 173-226 WAC. Grounds for modification, revocation and reissuance, or termination include, but are not limited to, the following:

A. When a change occurs in the technology or practices for control or abatement of pollutants applicable to the category of dischargers covered under this permit.

B. When effluent limitation guidelines or standards are promulgated pursuant to the CWA or Chapter 90.48 RCW, for the category of dischargers covered under this permit.

C. When a water quality management plan containing requirements applicable to the category of dischargers covered under this permit is approved, or

D. When information is obtained that indicates cumulative effects on the environment from dischargers covered under this permit are unacceptable.

G5. REVOCATION OF COVERAGE UNDER THE PERMIT

Pursuant to Chapter 43.21B RCW and Chapter 173-226 WAC, the Director may terminate coverage for any discharger under this permit for cause. Cases where coverage may be terminated include, but are not limited to, the following:

A. Violation of any term or condition of this permit.

B. Obtaining coverage under this permit by misrepresentation or failure to disclose fully all relevant facts.

C. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

D. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

E. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations.

F. Nonpayment of permit fees or penalties assessed pursuant to RCW 90.48.465 and Chapter 173-224 WAC.

G. Failure of the Permittee to satisfy the public notice requirements of WAC 173-226-130(5), when applicable.

The Director may require any discharger under this permit to apply for and obtain coverage under an individual permit or another more specific general permit. Permittees who have their coverage revoked for cause according to WAC 173-226-240 may request temporary coverage under this permit during the time an individual permit is being developed, provided the request is made within ninety (90) days from the time of revocation and is submitted along with a complete individual permit application form.

G6. REPORTING A CAUSE FOR MODIFICATION

The Permittee must submit a new application, or a supplement to the previous application, whenever a material change to the construction activity or in the quantity or type of discharge is anticipated which is not specifically authorized by this permit. This application must be submitted at least sixty (60) days prior to any proposed changes. Filing a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not relieve the Permittee of the duty to comply with the existing permit until it is modified or reissued.

G7. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit will be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G8. DUTY TO REAPPLY

The Permittee must apply for permit renewal at least 180 days prior to the specified expiration date of this permit.

G9. TRANSFER OF GENERAL PERMIT COVERAGE

Coverage under this general permit is automatically transferred to a new discharger, including operators of lots/parcels within a common plan of development or sale, **if**:

A. A written agreement (Transfer of Coverage Form) between the current discharger (Permittee) and new discharger, signed by both parties and containing a specific date for transfer of permit responsibility, coverage, and liability is submitted to the Director; and

B. The Director does not notify the current discharger and new discharger of the Director's intent to revoke coverage under the general permit. If this notice is not given, the transfer is effective on the date specified in the written agreement.

When a current discharger (Permittee) transfers a portion of a permitted site, the current discharger must also submit an updated application form (NOI) to the Director indicating the remaining permitted acreage after the transfer.

G10. REMOVED SUBSTANCES

The Permittee must not re-suspend or reintroduce collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of stormwater to the final effluent stream for discharge to state waters.

G11. DUTY TO PROVIDE INFORMATION

The Permittee must submit to Ecology, within a reasonable time, all information that Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology, upon request, copies of records required to be kept by this permit [40 CFR 122.41(h)].

G12. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G13. ADDITIONAL MONITORING

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G14. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G15. UPSET

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that: 1) an upset occurred and that the Permittee can identify the cause(s) of the upset; 2) the permitted facility was being properly operated at the time of the upset; 3) the Permittee submitted notice of the upset as required in Special Condition S5.F, and; 4) the Permittee complied with any remedial measures required under this permit.

In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. DUTY TO COMPLY

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. TOXIC POLLUTANTS

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or imprisonment of not more than four (4) years, or both.

G20. REPORTING PLANNED CHANGES

The Permittee must, as soon as possible, give notice to Ecology of planned physical alterations, modifications or additions to the permitted construction activity. The Permittee should be aware that, depending on the nature and size of the changes to the original permit, a new public notice and other permit process requirements may be required. Changes in activities that require reporting to Ecology include those that will result in:

A. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).

B. A significant change in the nature or an increase in quantity of pollutants discharged, including but not limited to: for sites 5 acres or larger, a 20% or greater increase in acreage disturbed by construction activity.

C. A change in or addition of surface water(s) receiving stormwater or non-stormwater from the construction activity.

D. A change in the construction plans and/or activity that affects the Permittee's monitoring requirements in Special Condition S4.

Following such notice, permit coverage may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G21. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to Ecology, it must promptly submit such facts or information.

G22. REPORTING ANTICIPATED NON-COMPLIANCE

The Permittee must give advance notice to Ecology by submission of a new application or supplement thereto at least forty-five (45) days prior to commencement of such discharges, of any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, must be scheduled during non-critical water quality periods and carried out in a manner approved by Ecology.

G23. REQUESTS TO BE EXCLUDED FROM COVERAGE UNDER THE PERMIT

Any discharger authorized by this permit may request to be excluded from coverage under the general permit by applying for an individual permit. The discharger must submit to the Director an application as described in WAC 173-220-040 or WAC 173-216-070, whichever is applicable, with reasons supporting the request. These reasons will fully document how an individual permit will apply to the applicant in a way that the general permit cannot. Ecology may make specific requests for information to support the request. The Director will either issue an individual permit or deny the request with a statement explaining the reason for the denial. When an individual permit is issued to a discharger otherwise subject to the construction stormwater general permit, the applicability of the construction stormwater general permit to that Permittee is automatically terminated on the effective date of the individual permit.

G24. APPEALS

A. The terms and conditions of this general permit, as they apply to the appropriate class of dischargers, are subject to appeal by any person within 30 days of issuance of this general permit, in accordance with Chapter 43.21B RCW, and Chapter 173-226 WAC.

B. The terms and conditions of this general permit, as they apply to an individual discharger, are appealable in accordance with Chapter 43.21B RCW within 30 days of the effective date of coverage of that discharger. Consideration of an appeal of general permit coverage of an individual discharger is limited to the general permit's applicability or nonapplicability to that individual discharger.

C. The appeal of general permit coverage of an individual discharger does not affect any other dischargers covered under this general permit. If the terms and conditions of this general permit are found to be inapplicable to any individual discharger(s), the matter

shall be remanded to Ecology for consideration of issuance of an individual permit or permits.

G25. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

G26. BYPASS PROHIBITED

A. Bypass Procedures

Bypass, which is the intentional diversion of waste streams from any portion of a treatment facility, is prohibited for stormwater events below the design criteria for stormwater management. Ecology may take enforcement action against a Permittee for bypass unless one of the following circumstances (1, 2, 3 or 4) is applicable.

1. Bypass of stormwater is consistent with the design criteria and part of an approved management practice in the applicable stormwater management manual.

2. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health.

3. Bypass of stormwater is unavoidable, unanticipated, and results in noncompliance of this permit.

   This bypass is permitted only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment facility.

c. Ecology is properly notified of the bypass as required in Special Condition S5.F of this permit.

4. A planned action that would cause bypass of stormwater and has the potential to result in noncompliance of this permit during a storm event.

   The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

   a. a description of the bypass and its cause

   b. an analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.

   c. a cost-effectiveness analysis of alternatives including comparative resource damage assessment.

   d. the minimum and maximum duration of bypass under each alternative.

   e. a recommendation as to the preferred alternative for conducting the bypass.

   f. the projected date of bypass initiation.

   g. a statement of compliance with SEPA.

   h. a request for modification of water quality standards as provided for in WAC 173-201A-110, if an exceedance of any water quality standard is anticipated.

   i. steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

5. For probable construction bypasses, the need to bypass is to be identified as early in the planning process as possible. The analysis required above must be considered during preparation of the Stormwater Pollution Prevention Plan (SWPPP) and must be included to the extent practical. In cases where the probable need to bypass is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the bypass.

   Ecology will consider the following before issuing an administrative order for this type bypass:

   a. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.

   b. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.

   c. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve, conditionally approve, or deny the request. The public must be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by Ecology under RCW 90.48.120.

B. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

APPENDIX A – DEFINITIONS

AKART is an acronym for "all known, available, and reasonable methods of prevention, control, and treatment." AKART represents the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants and controlling pollution associated with a discharge.

Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus, which was completed and approved by EPA before January 1, 2011, or before the date the operator's complete permit application is received by Ecology, whichever is later.

Applicant means an operator seeking coverage under this permit.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: stormwater associated with construction activity, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Buffer means an area designated by a local jurisdiction that is contiguous to and intended to protect a sensitive area.

Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

Calendar Day A period of 24 consecutive hours starting at 12:00 midnight and ending the following 12:00 midnight.

Calendar Week (same as Week) means a period of seven consecutive days starting at 12:01 a.m. (0:01 hours) on Sunday.

Certified Erosion and Sediment Control Lead (CESCL) means a person who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by Ecology (see BMP C160 in the SWMM).

Clean Water Act (CWA) means the Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, and 97-117; USC 1251 et seq.

Combined Sewer means a sewer which has been designed to serve as a sanitary sewer and a storm sewer, and into which inflow is allowed by local ordinance.

Common Plan of Development or Sale means a site where multiple separate and distinct construction activities may be taking place at different times on different schedules and/or by different contractors, but still under a single plan. Examples include: 1) phased projects and projects with multiple filings or lots, even if the separate phases or filings/lots will be constructed under separate contract or by separate owners (e.g., a development where lots are sold to separate builders); 2) a development plan that may be phased over multiple years, but is still under a

consistent plan for long-term development; 3) projects in a contiguous area that may be unrelated but still under the same contract, such as construction of a building extension and a new parking lot at the same facility; and 4) linear projects such as roads, pipelines, or utilities. If the project is part of a common plan of development or sale, the disturbed area of the entire plan must be used in determining permit requirements.

Composite Sample means a mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increases while maintaining a constant time interval between the aliquots.

Concrete wastewater means any water used in the production, pouring and/or clean-up of concrete or concrete products, and any water used to cut, grind, wash, or otherwise modify concrete or concrete products. Examples include water used for or resulting from concrete truck/mixer/pumper/tool/chute rinsing or washing, concrete saw cutting and surfacing (sawing, coring, grinding, roughening, hydro-demolition, bridge and road surfacing). When stormwater comingles with concrete wastewater, the resulting water is considered concrete wastewater and must be managed to prevent discharge to waters of the state, including ground water.

Construction Activity means land disturbing operations including clearing, grading or excavation which disturbs the surface of the land. Such activities may include road construction, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Contaminant means any hazardous substance that does not occur naturally or occurs at greater than natural background levels. See definition of “hazardous substance” and WAC 173-340-200.

Demonstrably Equivalent means that the technical basis for the selection of all stormwater BMPs is documented within a SWPPP, including:

1. The method and reasons for choosing the stormwater BMPs selected.
2. The pollutant removal performance expected from the BMPs selected.
3. The technical basis supporting the performance claims for the BMPs selected, including any available data concerning field performance of the BMPs selected.
4. An assessment of how the selected BMPs will comply with state water quality standards.
5. An assessment of how the selected BMPs will satisfy both applicable federal technology-based treatment requirements and state requirements to use all known, available, and reasonable methods of prevention, control, and treatment (AKART).

Department means the Washington State Department of Ecology.

Detention means the temporary storage of stormwater to improve quality and/or to reduce the mass flow rate of discharge.

Dewatering means the act of pumping ground water or stormwater away from an active construction site.

Director means the Director of the Washington Department of Ecology or his/her authorized representative.

Discharger means an owner or operator of any facility or activity subject to regulation under Chapter 90.48 RCW or the Federal Clean Water Act.

Domestic Wastewater means water carrying human wastes, including kitchen, bath, and laundry wastes from residences, buildings, industrial establishments, or other places, together with such ground water infiltration or surface waters as may be present.

Ecology means the Washington State Department of Ecology.

Engineered Soils means the use of soil amendments including, but not limited, to Portland cement treated base (CTB), cement kiln dust (CKD), or fly ash to achieve certain desirable soil characteristics.

Equivalent BMPs means operational, source control, treatment, or innovative BMPs which result in equal or better quality of stormwater discharge to surface water or to ground water than BMPs selected from the SWMM.

Erosion means the wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

Erosion and Sediment Control BMPs means BMPs intended to prevent erosion and sedimentation, such as preserving natural vegetation, seeding, mulching and matting, plastic covering, filter fences, sediment traps, and ponds. Erosion and sediment control BMPs are synonymous with stabilization and structural BMPs.

Final Stabilization (same as fully stabilized or full stabilization) means the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as riprap, gabions or geotextiles) which prevents erosion.

Ground Water means water in a saturated zone or stratum beneath the land surface or a surface water body.

Hazardous Substance means any dangerous or extremely hazardous waste as defined in RCW 70.105.010 (5) and (6), or any dangerous or extremely dangerous waste as designated by rule under chapter 70.105 RCW; any hazardous sub-stance as defined in RCW 70.105.010(14) or any hazardous substance as defined by rule under chapter 70.105 RCW; any substance that, on the effective date of this section, is a hazardous substance under section 101(14) of the federal cleanup law, 42 U.S.C., Sec. 9601(14); petroleum or petroleum products; and any substance or category of substances, including solid waste decomposition products, determined by the director

by rule to present a threat to human health or the environment if released into the environment. The term hazardous substance does not include any of the following when contained in an underground storage tank from which there is not a release: crude oil or any fraction thereof or petroleum, if the tank is in compliance with all applicable federal, state, and local law.

Injection Well means a well that is used for the subsurface emplacement of fluids. (See Well.)

Jurisdiction means a political unit such as a city, town or county; incorporated for local self-government.

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Federal Clean Water Act, for the discharge of pollutants to surface waters of the State from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington Department of Ecology.

Notice of Intent (NOI) means the application for, or a request for coverage under this general permit pursuant to WAC 173-226-200.

Notice of Termination (NOT) means a request for termination of coverage under this general permit as specified by Special Condition S10 of this permit.

Operator means any party associated with a construction project that meets either of the following two criteria:

- The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
- The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

Permittee means individual or entity that receives notice of coverage under this general permit.

pH means a liquid's measure of acidity or alkalinity. A pH of 7 is defined as neutral. Large variations above or below this value are considered harmful to most aquatic life.

pH monitoring period means the time period in which the pH of stormwater runoff from a site must be tested a minimum of once every seven days to determine if stormwater pH is between 6.5 and 8.5.

Point source means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, and container from which pollutants are or may be discharged to surface waters of the State. This term does not include return flows from irrigated agriculture. (See Fact Sheet for further explanation.)

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, domestic sewage sludge (biosolids), munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste. This term does not include sewage from vessels within the meaning of section 312 of the CWA, nor does it include dredged or fill material discharged in accordance with a permit issued under section 404 of the CWA.

Pollution means contamination or other alteration of the physical, chemical, or biological properties of waters of the State; including change in temperature, taste, color, turbidity, or odor of the waters; or such discharge of any liquid, gaseous, solid, radioactive or other substance into any waters of the State as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety or welfare; or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or to livestock, wild animals, birds, fish or other aquatic life.

Process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product (40 CFR 122.1).

Receiving water means the water body at the point of discharge. If the discharge is to a storm sewer system, either surface or subsurface, the receiving water is the water body to which the storm system discharges. Systems designed primarily for other purposes such as for ground water drainage, redirecting stream natural flows, or for conveyance of irrigation water/return flows that coincidentally convey stormwater are considered the receiving water.

Representative means a stormwater or wastewater sample which represents the flow and characteristics of the discharge. Representative samples may be a grab sample, a time-proportionate composite sample, or a flow proportionate sample. Ecology's Construction Stormwater Monitoring Manual provides guidance on representative sampling.

Sanitary sewer means a sewer which is designed to convey domestic wastewater.

Sediment means the fragmented material that originates from the weathering and erosion of rocks or unconsolidated deposits, and is transported by, suspended in, or deposited by water.

Sedimentation means the depositing or formation of sediment.

Sensitive area means a water body, wetland, stream, aquifer recharge area, or channel migration zone.

SEPA (State Environmental Policy Act) means the Washington State Law, RCW 43.21C.020, intended to prevent or eliminate damage to the environment.

Significant Amount means an amount of a pollutant in a discharge that is amenable to available and reasonable methods of prevention or treatment; or an amount of a pollutant that has a

reasonable potential to cause a violation of surface or ground water quality or sediment management standards.

Significant concrete work means greater than 1000 cubic yards poured concrete or recycled concrete over the life of a project.

Significant Contributor of Pollutants means a facility determined by Ecology to be a contributor of a significant amount(s) of a pollutant(s) to waters of the State of Washington.

Site means the land or water area where any "facility or activity" is physically located or conducted.

Source control BMPs means physical, structural or mechanical devices or facilities that are intended to prevent pollutants from entering stormwater. A few examples of source control BMPs are erosion control practices, maintenance of stormwater facilities, constructing roofs over storage and working areas, and directing wash water and similar discharges to the sanitary sewer or a dead end sump.

Stabilization means the application of appropriate BMPs to prevent the erosion of soils, such as, temporary and permanent seeding, vegetative covers, mulching and matting, plastic covering and sodding. See also the definition of Erosion and Sediment Control BMPs.

Storm drain means any drain which drains directly into a storm sewer system, usually found along roadways or in parking lots.

Storm sewer system means a means a conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains designed or used for collecting or conveying stormwater. This does not include systems which are part of a combined sewer or Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Stormwater means that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Stormwater Management Manual (SWMM) or Manual means the technical Manual published by Ecology for use by local governments that contain descriptions of and design criteria for BMPs to prevent, control, or treat pollutants in stormwater.

Stormwater Pollution Prevention Plan (SWPPP) means a documented plan to implement measures to identify, prevent, and control the contamination of point source discharges of stormwater.

Surface Waters of the State includes lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

Temporary Stabilization means the exposed ground surface has been covered with appropriate materials to provide temporary stabilization of the surface from water or wind erosion. Materials include, but are not limited to, mulch, riprap, erosion control mats or blankets and temporary cover crops. Seeding alone is not considered stabilization. Temporary stabilization is not a substitute for the more permanent "final stabilization."

Total Maximum Daily Load (TMDL) means a calculation of the maximum amount of a pollutant that a water body can receive and still meet state water quality standards. Percentages of the total maximum daily load are allocated to the various pollutant sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The TMDL calculations must include a "margin of safety" to ensure that the water body can be protected in case there are unforeseen events or unknown sources of the pollutant. The calculation must also account for seasonable variation in water quality.

Treatment BMPs means BMPs that are intended to remove pollutants from stormwater. A few examples of treatment BMPs are detention ponds, oil/water separators, biofiltration, and constructed wetlands.

Transparency means a measurement of water clarity in centimeters (cm), using a 60 cm transparency tube. The transparency tube is used to estimate the relative clarity or transparency of water by noting the depth at which a black and white Secchi disc becomes visible when water is released from a value in the bottom of the tube. A transparency tube is sometimes referred to as a "turbidity tube."

Turbidity means the clarity of water expressed as nephelometric turbidity units (NTU) and measured with a calibrated turbidimeter.

Uncontaminated means free from any contaminant, as defined in MTCA cleanup regulations. See definition of "contaminant" and WAC 173-340-200.

Waste Load Allocation (WLA) means the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality based effluent limitation (40 CFR 130.2[h]).

Water quality means the chemical, physical, and biological characteristics of water, usually with respect to its suitability for a particular purpose.

Waters of the State includes those waters as defined as "waters of the United States" in 40 CFR Subpart 122.2 within the geographic boundaries of Washington State and "waters of the State" as defined in Chapter 90.48 RCW, which include lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

Well means a bored, drilled or driven shaft, or dug hole whose depth is greater than the largest surface dimension. (See Injection well.)

Wheel wash wastewater means any water used in, or resulting from the operation of, a tire bath or wheel wash (BMP C106: Wheel Wash), or other structure or practice that uses water to physically remove mud and debris from vehicles leaving a construction site and prevent track-out onto roads. When stormwater comingles with wheel wash wastewater, the resulting water is considered wheel wash wastewater and must be managed according to Special Condition S9.D.9.

APPENDIX B – ACRONYMS

AKART	All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment
BMP	Best Management Practice
CESCL	Certified Erosion and Sediment Control Lead
CFR	Code of Federal Regulations
CKD	Cement Kiln Dust
cm	Centimeters
CTB	Cement-Treated Base
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
FR	Federal Register
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SWMM	Stormwater Management Manual
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
UIC	Underground Injection Control
USC	United States Code
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code
WQ	Water Quality
WWHM	Western Washington Hydrology Model

Construction Stormwater Pollution Prevention Plan

Vancouver Energy
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix J
Alternative BMPs

BMP C101: Preserving Natural Vegetation

Purpose

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50 percent of all rain that falls during a storm. Up to 20-30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

Natural vegetation should be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.

- As required by local governments.
- Phase construction to preserve natural vegetation on the project site for as long as possible during the construction period.

Design and Installation Specifications

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Is the plant worth saving? Consider the location, species, size, age, vigor, and the work involved. Local governments may also have ordinances to save natural vegetation and trees.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

  Plants need protection from three kinds of injuries:

- *Construction Equipment* - This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- *Grade Changes* - Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can typically tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. A tile

system protects a tree from a raised grade. The tile system should be laid out on the original grade leading from a dry well around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2-3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.

- *Excavations* - Protect trees and other plants when excavating for drainfields, power, water, and sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:

  Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24-hours.

  Backfill the trench as soon as possible.

  Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered with a few specific trees are:

- Maple, Dogwood, Red alder, Western hemlock, Western red cedar, and Douglas fir do not readily adjust to changes in environment and special care should be taken to protect these trees.
- The windthrow hazard of Pacific silver fir and madrona is high, while that of Western hemlock is moderate. The danger of windthrow increases where dense stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.
- Thinning operations in pure or mixed stands of Grand fir, Pacific silver fir, Noble fir, Sitka spruce, Western red cedar, Western hemlock, Pacific dogwood, and Red alder can cause serious disease problems.

Maintenance Standards

- Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.
- Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.
- If tree roots have been exposed or injured, “prune” cleanly with an appropriate pruning saw or loppers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities.

Conditions of Use

Natural buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Vegetative buffer zones can be used to protect natural swales and can be incorporated into the natural landscaping of an area.

Critical-areas buffer zones should not be used as sediment treatment areas. These areas shall remain completely undisturbed. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method**.**
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method in protecting sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage from burying and smothering.
- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately.

BMP C122: Nets and Blankets

Purpose

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage ways during high flows. Nets (commonly called matting) are strands of material woven into an open, but high-tensile strength net (for example, coconut fiber matting). Blankets are strands of material that are not tightly woven, but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets, but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Conditions of Use

Erosion control nets and blankets should be used:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Nets and blankets can be used to permanently stabilize channels and may provide a cost- effective, environmentally preferable alternative to riprap. 100 percent synthetic blankets manufactured for use in ditches may be easily reused as temporary ditch liners.

Disadvantages of blankets include:

- Surface preparation required.
- On slopes steeper than 2.5H:1V, blanket installers may need to be roped and harnessed for safety.
- They cost at least $4,000-6,000 per acre installed.

Advantages of blankets include:

- Installation without mobilizing special equipment.
- Installation by anyone with minimal training
- Installation in stages or phases as the project progresses.
- Installers can hand place seed and fertilizer as they progress down the slope.
- Installation in any weather.
- There are numerous types of blankets that can be designed with various parameters in mind. Those parameters include: fiber blend, mesh strength, longevity, biodegradability, cost, and availability.

Design and Installation Specifications

- See Figure 4.1.3 and Figure 4.1.4 for typical orientation and installation of blankets used in channels and as slope protection. Note: these are typical only; all blankets must be installed per manufacturer's installation instructions.
- Installation is critical to the effectiveness of these products. If good ground contact is not achieved, runoff can concentrate under the product, resulting in significant erosion.
- Installation of Blankets on Slopes:
  1. Complete final grade and track walk up and down the slope.
  2. Install hydromulch with seed and fertilizer.
  3. Dig a small trench, approximately 12 inches wide by 6 inches deep along the top of the slope.
  4. Install the leading edge of the blanket into the small trench and staple approximately every 18 inches. NOTE: Staples are metal, "U"-shaped, and a minimum of 6 inches long. Longer staples are used in sandy soils. Biodegradable stakes are also available.
  5. Roll the blanket slowly down the slope as installer walks backwards. NOTE: The blanket rests against the installer's legs. Staples are installed as the blanket is unrolled. It is critical that the proper staple pattern is used for the blanket being installed. The blanket is not to be allowed to roll down the slope on its own as this stretches the blanket making it impossible to maintain soil contact. In addition, no one is allowed to walk on the blanket after it is in place.
  6. If the blanket is not long enough to cover the entire slope length, the trailing edge of the upper blanket should overlap the leading edge of the lower blanket and be stapled. On steeper slopes, this overlap should be installed in a small trench, stapled, and covered with soil.
- With the variety of products available, it is impossible to cover all the details of appropriate use and installation. Therefore, it is critical that the design engineer consult the manufacturer's information and that a site visit takes place in order to ensure that the product specified is appropriate. Information is also available at the following web sites:
  1. WSDOT (Section 3.2.4):

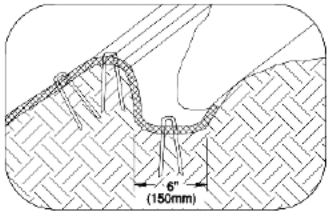
     http://www.wsdot.wa.gov/NR/rdonlyres/3B41E087-FA86-4717-932D-D7A8556CCD57/0/ErosionTrainingManual.pdf
  2. Texas Transportation Institute:

     http://www.txdot.gov/business/doing_business/product_evaluation/erosion_control.htm
- Use jute matting in conjunction with mulch (BMP C121). Excelsior, woven straw blankets and coir (coconut fiber) blankets may be installed without mulch. There are many other types of erosion control nets and blankets on the market that may be appropriate in certain circumstances.
- In general, most nets (e.g., jute matting) require mulch in order to prevent erosion because they have a fairly open structure. Blankets typically do not require mulch because they usually provide complete protection of the surface.

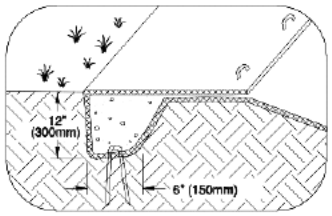
- Extremely steep, unstable, wet, or rocky slopes are often appropriate candidates for use of synthetic blankets, as are riverbanks, beaches and other high-energy environments. If synthetic blankets are used, the soil should be hydromulched first.
- 100-percent biodegradable blankets are available for use in sensitive areas. These organic blankets are usually held together with a paper or fiber mesh and stitching which may last up to a year.
- Most netting used with blankets is photodegradable, meaning they break down under sunlight (not UV stabilized). However, this process can take months or years even under bright sun. Once vegetation is established, sunlight does not reach the mesh. It is not uncommon to find non-degraded netting still in place several years after installation. This can be a problem if maintenance requires the use of mowers or ditch cleaning equipment. In addition, birds and small animals can become trapped in the netting.

Maintenance Standards

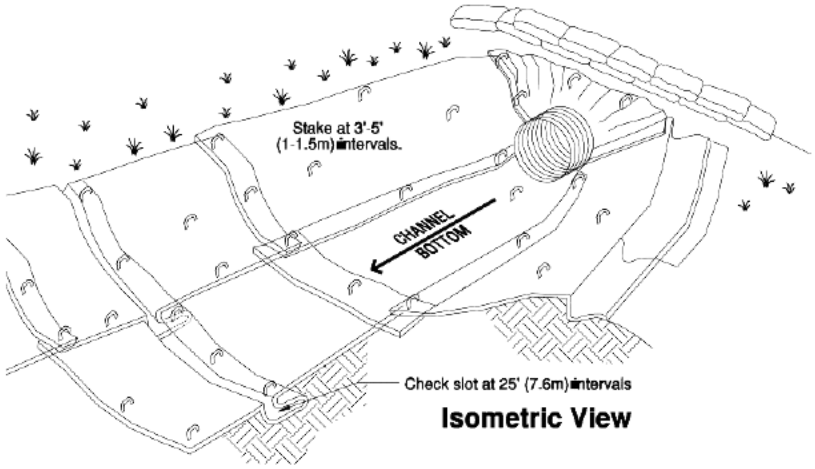
- Maintain good contact with the ground. Erosion must not occur beneath the net or blanket.
- Repair and staple any areas of the net or blanket that are damaged or not in close contact with the ground.
- Fix and protect eroded areas if erosion occurs due to poorly controlled drainage



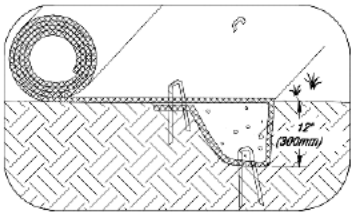
Longitudinal Anchor Trench



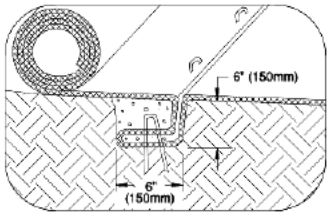
Terminal Slope and Channel Anchor Trench



Isometric View



Initial Channel Anchor Trench



Intermittent Check Slot

NOTES:
1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.

Figure 4.1.3 – Channel Installation

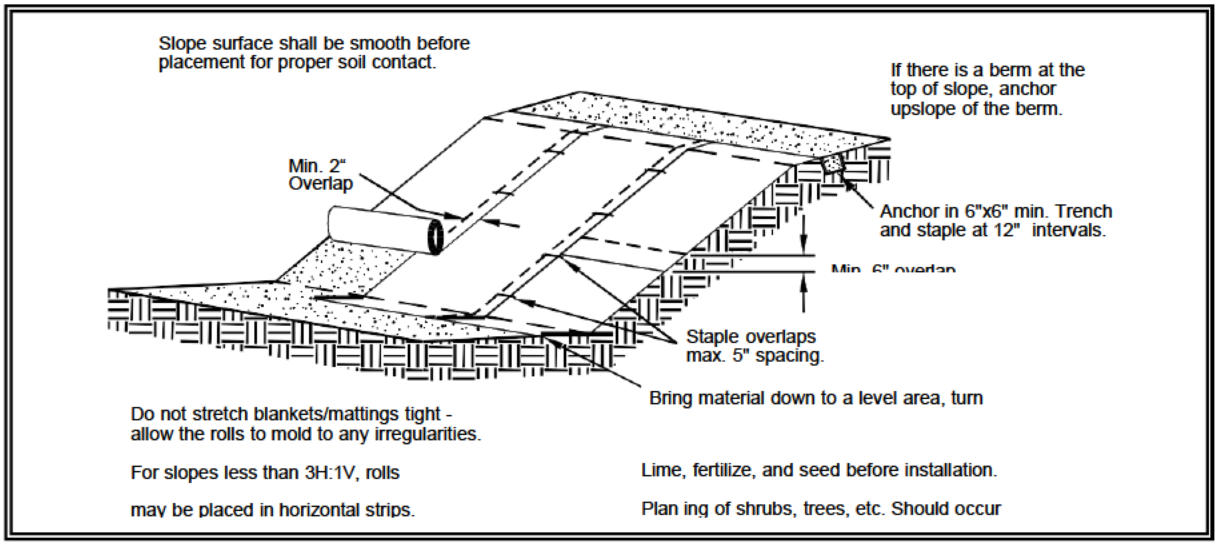


Figure 4.1.4 – Slope Installation

BMP C124: Sodding

Purpose

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage ways where concentrated overland flow will occur.

Conditions of Use

Sodding may be used in the following areas:

- Disturbed areas that require short-term or long-term cover.
- Disturbed areas that require immediate vegetative cover.
- All waterways that require vegetative lining. Waterways may also be seeded rather than sodded, and protected with a net or blanket.

Design and Installation Specifications

Sod shall be free of weeds, of uniform thickness (approximately 1-inch thick), and shall have a dense root mat for mechanical strength.

The following steps are recommended for sod installation:

- Shape and smooth the surface to final grade in accordance with the approved grading plan. The swale needs to be overexcavated 4 to 6 inches below design elevation to allow room for placing soil amendment and sod.
- Amend 4 inches (minimum) of compost into the top 8 inches of the soil if the organic content of the soil is less than ten percent or the permeability is less than 0.6 inches per hour.
  See http://www.ecy.wa.gov/programs/swfa/organics/soil.html for further information.
- Fertilize according to the supplier's recommendations.
- Work lime and fertilizer 1 to 2 inches into the soil, and smooth the surface.
- Lay strips of sod beginning at the lowest area to be sodded and perpendicular to the direction of water flow. Wedge strips securely into place. Square the ends of each strip to provide for a close, tight fit. Stagger joints at least 12 inches. Staple on slopes steeper than 3H:1V. Staple the upstream edge of each sod strip.
- Roll the sodded area and irrigate.
- When sodding is carried out in alternating strips or other patterns, seed the areas between the sod immediately after sodding.

Maintenance Standards

If the grass is unhealthy, the cause shall be determined and appropriate action taken to reestablish a healthy groundcover. If it is impossible to establish a healthy groundcover due to frequent saturation, instability, or some other cause, the sod shall be removed, the area seeded with an appropriate mix, and protected with a net or blanket.

BMP C125: Topsoiling / Composting

Purpose

Topsoiling and composting provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling and composting are an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding. Note that this BMP is functionally the same as BMP T5.13 (see Chapter 5 of Volume V of this manual) which is required for all disturbed areas that will be developed as lawn or landscaped areas at the completed project site.

Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but they also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches including organic debris.

Conditions of Use

- Permanent landscaped areas shall contain healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetal health and vitality, improves hydrologic characteristics, and reduces the need for irrigation.
- Leave native soils and the duff layer undisturbed to the maximum extent practicable. Stripping of existing, properly functioning soil system and vegetation for the purpose of topsoiling during construction is not acceptable. Preserve existing soil systems in undisturbed and uncompacted conditions if functioning properly.
- Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.
- Restore, to the maximum extent practical, native soils disturbed during clearing and grading to a condition equal to or better than the original site condition's moisture-holding capacity. Use on-site native topsoil, incorporate amendments into on-site soil, or import blended topsoil to meet this requirement.
- Topsoiling is a required procedure when establishing vegetation on shallow soils, and soils of critically low pH (high acid) levels.
- Beware of where the topsoil comes from, and what vegetation was on site before disturbance, invasive plant seeds may be included and could cause problems for establishing native plants, landscaped areas, or grasses.
- Topsoil from the site will contain mycorrhizal bacteria that are necessary for healthy root growth and nutrient transfer. These native mycorrhiza are acclimated to the site and will provide optimum conditions for establishing grasses. Use commercially available mycorrhiza products when using off-site topsoil.

Design and Installation Specifications

Meet the following requirements for disturbed areas that will be developed as lawn or landscaped areas at the completed project site:

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium. Topsoil shall have:
- A minimum depth of 8-inches. Scarify subsoils below the topsoil layer at least 4-inches with some incorporation of the upper material to avoid stratified layers, where feasible. Ripping or re- structuring the subgrade may also provide additional benefits regarding the overall infiltration and interflow dynamics of the soil system.
- A minimum organic content of 10% dry weight in planting beds, and 5% organic matter content in turf areas. Incorporate organic amendments to a minimum 8-inch depth except where tree roots or other natural features limit the depth of incorporation.
- A pH between 6.0 and 8.0 or matching the pH of the undisturbed soil.
- If blended topsoil is imported, then fines should be limited to 25 percent passing through a 200 sieve.
- Mulch planting beds with 2 inches of organic material
- Accomplish the required organic content, depth, and pH by returning native topsoil to the site, importing topsoil of sufficient organic content, and/or incorporating organic amendments.

  When using the option of incorporation amendments to meet the organic content requirement, use compost that meets the compost specification for Bioretention (See BMP T7.30 in Chapter 7 of Volume V of this manual), with the exception that the compost may have up to 35% bio solids of manure.

- Sections three through seven of the document entitled, *Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington,* provides useful guidance for implementing whichever option is chosen. It includes guidance for pre-approved default strategies and guidance for custom strategies. Check with your local jurisdiction concerning its acceptance of this guidance. It is available through the organization, Soils for Salmon. As of this printing the document may be found at: http://www.soilsforsalmon.org/pdf/Soil_BMP_Manual.pdf.
- The final composition and construction of the soil system will result in a natural selection or favoring of certain plant species over time. For example, incorporation of topsoil may favor grasses, while layering with mildly acidic, high-carbon amendments may favor more woody vegetation.
- Allow sufficient time in scheduling for topsoil spreading prior to seeding, sodding, or planting.

- Take care when applying top soil to subsoils with contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil layers and causes the topsoil to slough. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method to prevent a lack of bonding is to actually work the topsoil into the layer below for a depth of at least 6 inches.
- Field exploration of the site shall be made to determine if there is surface soil of sufficient quantity and quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, and clay loam). Avoid areas of natural ground water recharge.
- Stripping shall be confined to the immediate construction area. A 4-inch to 6-inch stripping depth is common, but depth may vary depending on the particular soil. All surface runoff control structures shall be in place prior to stripping.
- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.
- In any areas requiring grading remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas. Stockpiled topsoil is to be reapplied to other portions of the site where feasible.
- Locate the topsoil stockpile so that it meets specifications and does not interfere with work on the site. It may be possible to locate more than one pile in proximity to areas where topsoil will be used.

  Stockpiling of topsoil shall occur in the following manner:

  - Side slopes of the stockpile shall not exceed 2H:1V.
  - Between October 1 and April 30:
    - An interceptor dike with gravel outlet and silt fence shall surround all topsoil.
    - Within 2 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
  - Between May 1 and September 30:
    - An interceptor dike with gravel outlet and silt fence shall surround all topsoil if the stockpile will remain in place for a longer period of time than active construction grading.
    - Within 7 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.

- When native topsoil is to be stockpiled and reused the following should apply to ensure that the mycorrhizal bacterial, earthworms, and other beneficial organisms will not be destroyed:
    1. Re-install topsoil within 4 to 6 weeks.
    2. Do not allow the saturation of topsoil with water.
    3. Do not use plastic covering.

Maintenance Standards

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.
- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant and mulch soil after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection

Purpose

Polyacrylamide (PAM) is used on construction sites to prevent soil erosion.

Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration through flocculation and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Conditions of Use

PAM shall not be directly applied to water or allowed to enter a water body.

In areas that drain to a sediment pond, PAM can be applied to bare soil under the following conditions:

- During rough grading operations.
- In Staging areas.
- Balanced cut and fill earthwork.
- Haul roads prior to placement of crushed rock surfacing.
- Compacted soil roadbase.
- Stockpiles.
- After final grade and before paving or final seeding and planting.
- Pit sites.
- Sites having a winter shut down. In the case of winter shut down, or where soil will remain unworked for several months, PAM should be used together with mulch.

Design and Installation Specifications

PAM may be applied with water in dissolved form. The preferred application method is the dissolved form.

PAM is to be applied at a maximum rate of 2/3 pound PAM per 1,000 gallons water (80 mg/L) per 1 acre of bare soil. Table 4.1.9 can be used to determine the PAM and water application rate for a disturbed soil area.
Higher concentrations of PAM **do not** provide any additional effectiveness.

Table 4.1.9
PAM and Water Application Rates

Disturbed Area (ac)	PAM (lbs)	Water (gal)
0.50	0.33	500
1.00	0.66	1,000

1.50	1.00	1,500
2.00	1.32	2,000
2.50	1.65	2,500
3.00	2.00	3,000
3.50	2.33	3,500
4.00	2.65	4,000
4.50	3.00	4,500
5.00	3.33	5,000
4.50	3.00	4,500

The Preferred Method:

- Pre-measure the area where PAM is to be applied and calculate the amount of product and water necessary to provide coverage at the specified application rate (2/3 pound PAM/1000 gallons/acre).
- PAM has infinite solubility in water, but dissolves very slowly. Dissolve pre-measured dry granular PAM with a known quantity of clean water in a bucket several hours or overnight. Mechanical mixing will help dissolve the PAM. Always add PAM to water - not water to PAM.
- Pre-fill the water truck about 1/8 full with water. The water does not have to be potable, but it must have relatively low turbidity – in the range of 20 NTU or less.
- Add PAM /Water mixture to the truck
- Completely fill the water truck to specified volume.
- Spray PAM/Water mixture onto dry soil until the soil surface is uniformly and completely wetted.

An Alternate Method:

PAM may also be applied as a powder at the rate of 5 lbs. per acre. This must be applied on a day that is dry. For areas less than 5-10 acres, a hand- held “organ grinder” fertilizer spreader set to the smallest setting will work. Tractor-mounted spreaders will work for larger areas.

The following shall be used for application of powdered PAM:

- Powered PAM shall be used in conjunction with other BMPs and not in place of other BMPs.
- Do not use PAM on a slope that flows directly into a stream or wetland. The stormwater runoff shall pass through a sediment control BMP prior to discharging to surface waters.
- Do not add PAM to water discharging from site.

- When the total drainage area is greater than or equal to 5 acres, PAM treated areas shall drain to a sediment pond.
- Areas less than 5 acres shall drain to sediment control BMPs, such as a minimum of 3 check dams per acre. The total number of check dams used shall be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam shall be spaced evenly in the drainage channel through which stormwater flows are discharged off-site.
- On all sites, the use of silt fence shall be maximized to limit the discharges of sediment from the site.
- All areas not being actively worked shall be covered and protected from rainfall. PAM shall not be the only cover BMP used.
- PAM can be applied to wet soil, but dry soil is preferred due to less sediment loss.
- PAM will work when applied to saturated soil but is not as effective as applications to dry or damp soil.
- Keep the granular PAM supply out of the sun. Granular PAM loses its effectiveness in three months after exposure to sunlight and air.
- Proper application and re-application plans are necessary to ensure total effectiveness of PAM usage.
- PAM, combined with water, is very slippery and can be a safety hazard. Care must be taken to prevent spills of PAM powder onto paved surfaces. During an application of PAM, prevent over-spray from reaching pavement as pavement will become slippery. If PAM powder gets on skin or clothing, wipe it off with a rough towel rather than washing with water-this only makes cleanup messier and take longer.
- Some PAMs are more toxic and carcinogenic than others. Only the most environmentally safe PAM products should be used.

  The specific PAM copolymer formulation must be anionic. **Cationic PAM shall not be used in any application because of known aquatic toxicity problems.** Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, will be used for soil applications. Recent media attention and high interest in PAM has resulted in some entrepreneurial exploitation of the term "polymer." All PAM are polymers, but not all polymers are PAM, and not all PAM products comply with ANSI/NSF Standard 60. PAM use shall be reviewed and approved by the local permitting authority.

- PAM designated for these uses should be "water soluble" or "linear" or "non-crosslinked". Cross-linked or water absorbent PAM, polymerized in highly acidic (pH<2) conditions, are used to maintain soil moisture content.
- The PAM anionic charge density may vary from 2-30 percent; a value of 18 percent is typical. Studies conducted by the United States Department of Agriculture (USDA)/ARS demonstrated that soil stabilization was optimized by using very high molecular weight (12- 15 mg/mole), highly anionic (>20% hydrolysis) PAM.
- PAM tackifiers are available and being used in place of guar and alpha plantago. Typically, PAM tackifiers should be used at a rate of no more than 0.5-1 lb. per 1000 gallons of water in a hydromulch machine. Some tackifier product instructions say to use at a rate of 3 –5 lbs. per acre, which can be too much. In addition, pump problems can occur at higher rates due to increased viscosity.

Maintenance Standards

- PAM may be reapplied on actively worked areas after a 48-hour period.
- Reapplication is not required unless PAM treated soil is disturbed or unless turbidity levels show the need for an additional application. If PAM treated soil is left undisturbed a reapplication may be necessary after two months. More PAM applications may be required for steep slopes, silty and clayey soils (USDA Classification Type "C" and "D" soils), long grades, and high precipitation areas. When PAM is applied first to bare soil and then covered with straw, a reapplication may not be necessary for several months.
- Loss of sediment and PAM may be a basis for penalties per RCW 90.48.080.

BMP C131: Gradient Terraces

Purpose

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Conditions of Use

- Gradient terraces normally are limited to denuded land having a water erosion problem. They should not be constructed on deep sands or on soils that are too stony, steep, or shallow to permit practical and economical installation and maintenance. Gradient terraces may be used only where suitable outlets are or will be made available. See Figure 4.1.6 for gradient terraces.

Design and Installation Specifications

- The maximum vertical spacing of gradient terraces should be determined by the following method:

$$VI = (0.8)s + y$$

Where: VI = vertical interval in feet

s = land rise per 100 feet, expressed in feet

y = a soil and cover variable with values from 1.0 to 4.0

Values of "y" are influenced by soil erodibility and cover practices. The lower values are applicable to erosive soils where little to no residue is left on the surface. The higher value is applicable only to erosion-resistant soils where a large amount of residue (1½ tons of straw/acre equivalent) is on the surface.

- The minimum constructed cross-section should meet the design dimensions.
- The top of the constructed ridge should not be lower at any point than the design elevation plus the specified overfill for settlement. The opening at the outlet end of the terrace should have a cross section equal to that specified for the terrace channel.
- Channel grades may be either uniform or variable with a maximum grade of 0.6 feet per 100 feet length (0.6%). For short distances, terrace grades may be increased to improve alignment. The channel velocity should not exceed that which is nonerosive for the soil type.
- All gradient terraces should have adequate outlets. Such an outlet may be a grassed waterway, vegetated area, or tile outlet. In all cases the outlet must convey runoff from the terrace or terrace system to a point where the outflow will not cause damage. Vegetative cover should be used in the outlet channel.
- The design elevation of the water surface of the terrace should not be lower than the design elevation of the water surface in the outlet at their junction, when both are operating at design flow.
- Vertical spacing determined by the above methods may be increased as

much as 0.5 feet or 10 percent, whichever is greater, to provide better alignment or location, to avoid obstacles, to adjust for equipment size, or to reach a satisfactory outlet. The drainage area above the terrace should not exceed the area that would be drained by a terrace with normal spacing.

- The terrace should have enough capacity to handle the peak runoff expected from a 2-year, 24-hour design storm without overtopping.
- The terrace cross-section should be proportioned to fit the land slope. The ridge height should include a reasonable settlement factor. The ridge should have a minimum top width of 3 feet at the design height. The minimum cross-sectional area of the terrace channel should be
- 8 square feet for land slopes of 5 percent or less, 7 square feet for slopes from 5 to 8 percent, and 6 square feet for slopes steeper than 8 percent. The terrace can be constructed wide enough to be maintained using a small vehicle.

Maintenance Standards

- Maintenance should be performed as needed. Terraces should be inspected regularly; at least once a year, and after large storm events.

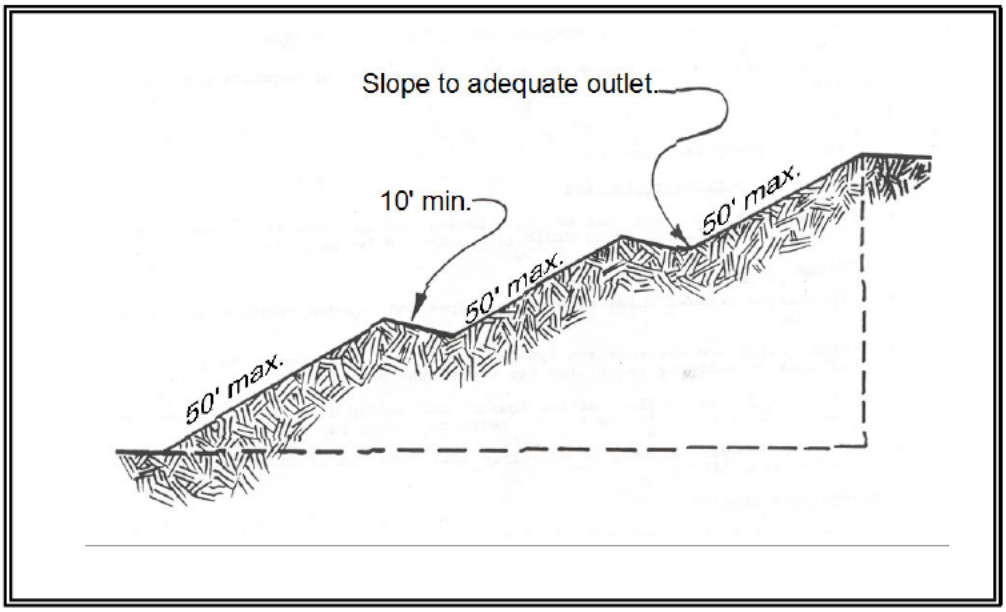


Figure 4.1.6 – Gradient Terraces

BMP C201: Grass-Lined Channels

Purpose

To provide a channel with a vegetative lining for conveyance of runoff. See Figure 4.2.1 for typical grass-lined channels

Conditions of Use

This practice applies to construction sites where concentrated runoff needs to be contained to prevent erosion or flooding.

- When a vegetative lining can provide sufficient stability for the channel cross section and at lower velocities of water (normally dependent on grade). This means that the channel slopes are generally less than 5 percent and space is available for a relatively large cross section.
- Typical uses include roadside ditches, channels at property boundaries, outlets for diversions, and other channels and drainage ditches in low areas.
- Channels that will be vegetated should be installed before major earthwork and hydroseeded with a bonded fiber matrix (BFM). The vegetation should be well established (i.e., 75 percent cover) before water is allowed to flow in the ditch. With channels that will have high flows, erosion control blankets should be installed over the hydroseed. If vegetation cannot be established from seed before water is allowed in the ditch, sod should be installed in the bottom of the ditch in lieu of hydromulch and blankets.

Design and Installation Specifications

Locate the channel where it can conform to the topography and other features such as roads.

- Locate them to use natural drainage systems to the greatest extent possible.
- Avoid sharp changes in alignment or bends and changes in grade.
- Do not reshape the landscape to fit the drainage channel.
- The maximum design velocity shall be based on soil conditions, type of vegetation, and method of revegetation, but at no times shall velocity exceed 5 feet/second. The channel shall not be overtopped by the peak volumetric flow rate calculated using a 10-minute time step from a 10-year, 24-hour storm, assuming a Type 1A rainfall distribution. Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model to determine a flow rate which the channel must contain.
- Where the grass-lined channel will also function as a permanent stormwater conveyance facility, consult the drainage conveyance requirements of the local government with jurisdiction.
- An established grass or vegetated lining is required before the channel can be used to convey stormwater, unless stabilized with nets or blankets.
- If design velocity of a channel to be vegetated by seeding exceeds 2 ft/sec, a temporary channel liner is required. Geotextile or special mulch protection such as fiberglass roving or straw and netting provides stability until the vegetation is fully established. See Figure 4.2.2.

- Check dams shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- If vegetation is established by sodding, the permissible velocity for established vegetation may be used and no temporary liner is needed.
- Do not subject grass-lined channel to sedimentation from disturbed areas. Use sediment-trapping BMPs upstream of the channel.
- V-shaped grass channels generally apply where the quantity of water is small, such as in short reaches along roadsides. The V-shaped cross section is least desirable because it is difficult to stabilize the bottom where velocities may be high.
- Trapezoidal grass channels are used where runoff volumes are large and slope is low so that velocities are nonerosive to vegetated linings. (Note: it is difficult to construct small parabolic shaped channels.)
- Subsurface drainage, or riprap channel bottoms, may be necessary on sites that are subject to prolonged wet conditions due to long duration flows or a high water table.
- Provide outlet protection at culvert ends and at channel intersections.
- Grass channels, at a minimum, should carry peak runoff for temporary construction drainage facilities from the 10-year, 24-hour storm without eroding. Where flood hazard exists, increase the capacity according to the potential damage.
- Grassed channel side slopes generally are constructed 3H:1V or flatter to aid in the establishment of vegetation and for maintenance.
- Construct channels a minimum of 0.2 foot larger around the periphery to allow for soil bulking during seedbed preparations and sod buildup.

Maintenance Standards

During the establishment period, check grass-lined channels after every rainfall.

- After grass is established, periodically check the channel; check it after every heavy rainfall event. Immediately make repairs.
- It is particularly important to check the channel outlet and all road crossings for bank stability and evidence of piping or scour holes.
- Remove all significant sediment accumulations to maintain the designed carrying capacity. Keep the grass in a healthy, vigorous condition at all times, since it is the primary erosion protection for the channel.

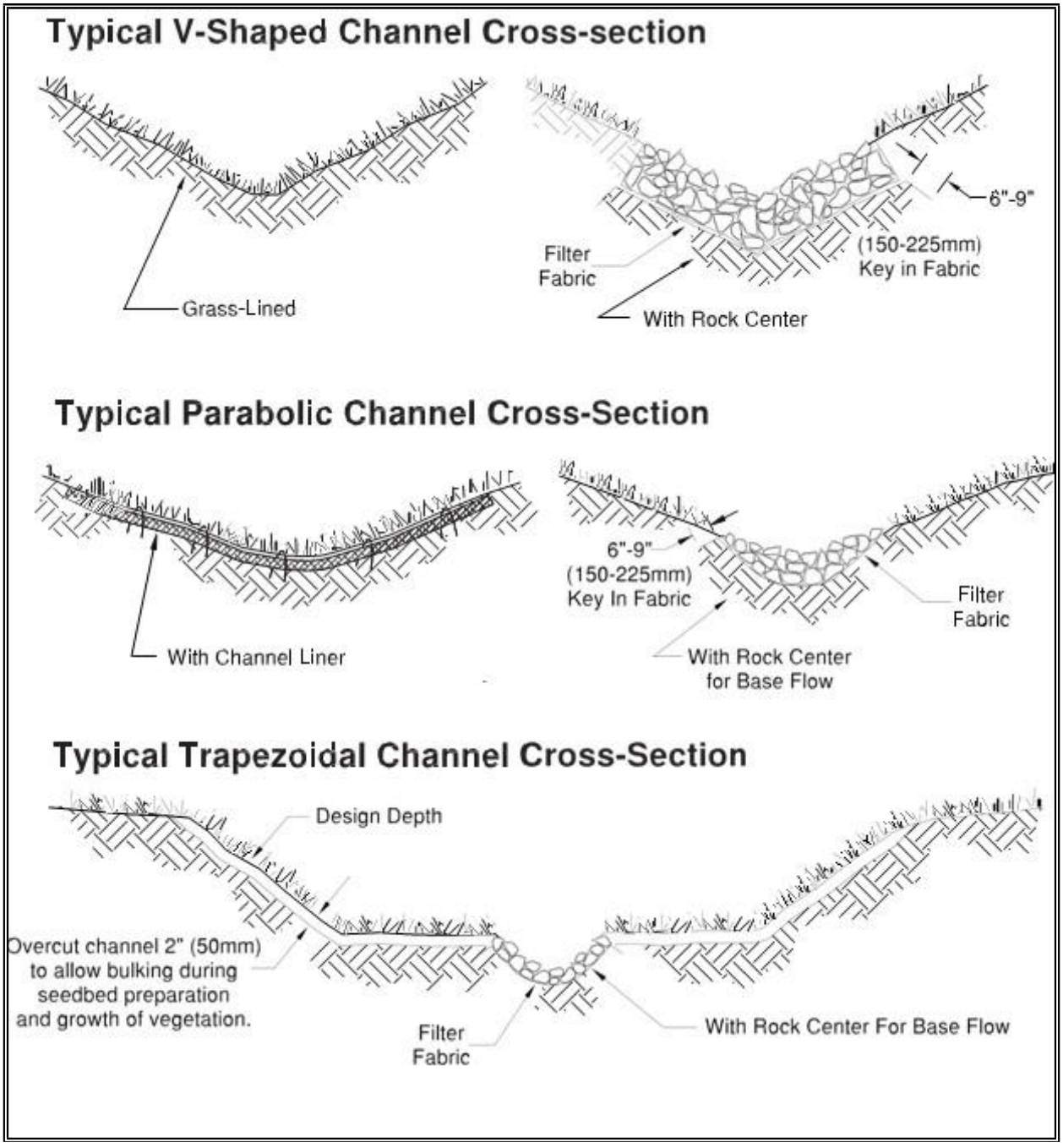
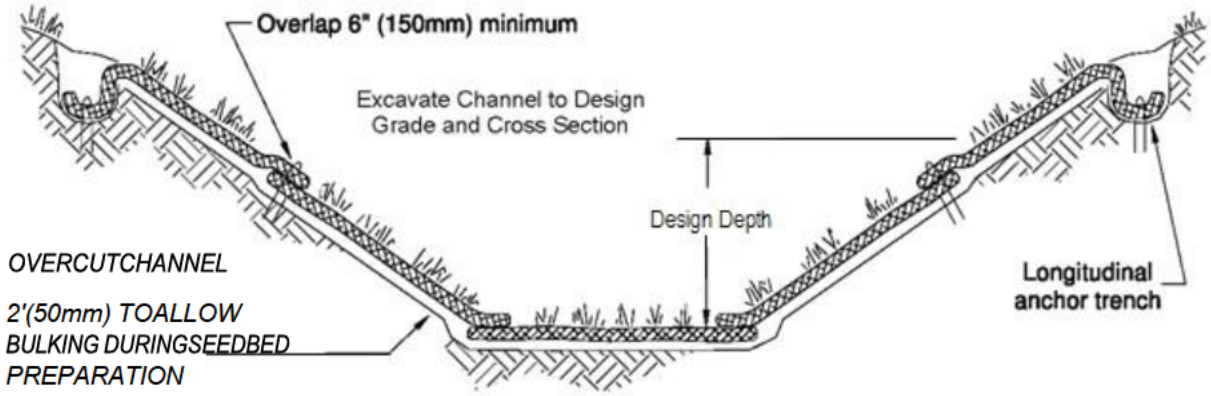
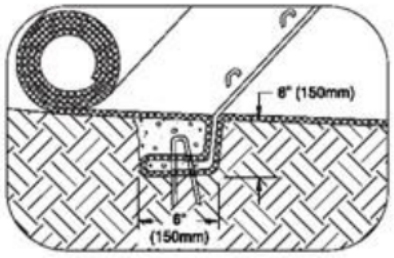
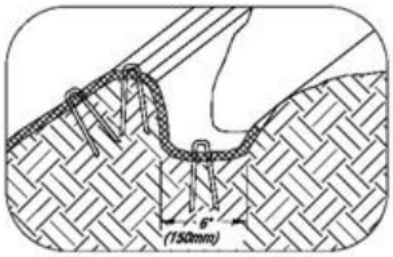


Figure 4.2.1 – Typical Grass-Lined Channels





TYPICAL INSTALLATION WITHEROSIONCONTROL BLANKETSOR TURF REINFORCEMENT MATS

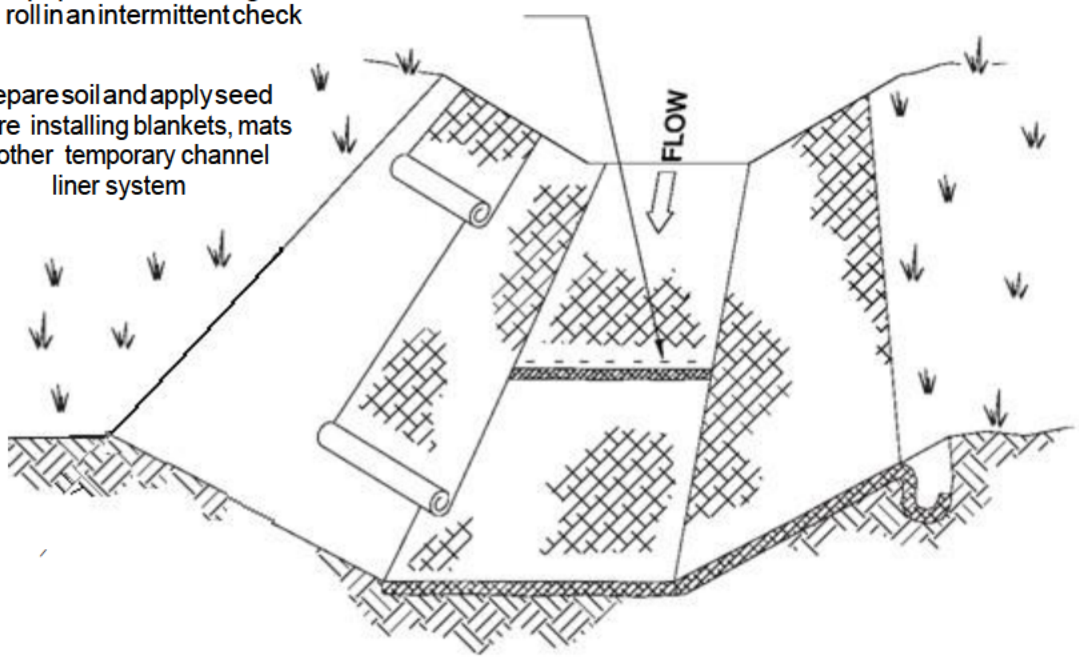


Intermittent Check Slot

Longitudinal Anchor Trench

Shingle-lap spliced ends or begin new roll in an intermittent check slot

Prepare soil and apply seed before installing blankets, mats or other temporary channel liner system



NOTES:

1 Design velocities exceeding 2 ft/sec (0.5m/sec) require temporary blankets, mats or similar liners to protect seed and soil until vegetation becomes established.

2 Grass-lined channels with design velocities exceeding 6 ft/sec (2m/sec) should include turf reinforcement mats.

Figure 4.2 .2 – Temporary Channel Liners

BMP C203: Water Bars

Purpose

A small ditch or ridge of material is constructed diagonally across a road or right-of-way to divert stormwater runoff from the road surface, wheel tracks, or a shallow road ditch. See Figure 4.2.3.

Conditions of use

Clearing right-of-way and construction of access for power lines, pipelines, and other similar installations often require long narrow right-of-ways over sloping terrain. Disturbance and compaction promotes gully formation in these cleared strips by increasing the volume and velocity of runoff. Gully formation may be especially severe in tire tracks and ruts. To prevent gullying, runoff can often be diverted across the width of the right-of-way to undisturbed areas by using small predesigned diversions.

- Give special consideration to each individual outlet area, as well as to the cumulative effect of added diversions. Use gravel to stabilize the diversion where significant vehicular traffic is anticipated.

Design and Installation

Height: 8-inch minimum measured from the channel bottom to the ridge top.

- Side slope of channel: 2H:1V maximum; 3H:1V or flatter when vehicles will cross

Specifications

- Base width of ridge: 6-inch minimum.
- Locate them to use natural drainage systems and to discharge into well vegetated stable areas.
- Guideline for Spacing:

Slope %	Spacing (ft)
< 5	125
5 - 10	100
10 - 20	75
20 - 35	50
> 35	Use rock lined ditch

- Grade of water bar and angle: Select angle that results in ditch slope less than 2 percent.
- Install as soon as the clearing and grading is complete. Reconstruct when construction is complete on a section when utilities are being installed.
- Compact the ridge when installed.
- Stabilize, seed, and mulch the portions that are not subject to traffic. Gravel the areas crossed by vehicles.

Maintenance Standards

Periodically inspect right-of-way diversions for wear and after every heavy rainfall for erosion damage.

- Immediately remove sediment from the flow area and repair the dike.

- Check outlet areas and make timely repairs as needed.
- When permanent road drainage is established and the area above the temporary right-of-way diversion is permanently stabilized, remove the dikes and fill the channel to blend with the natural ground, and appropriately stabilize the disturbed area.

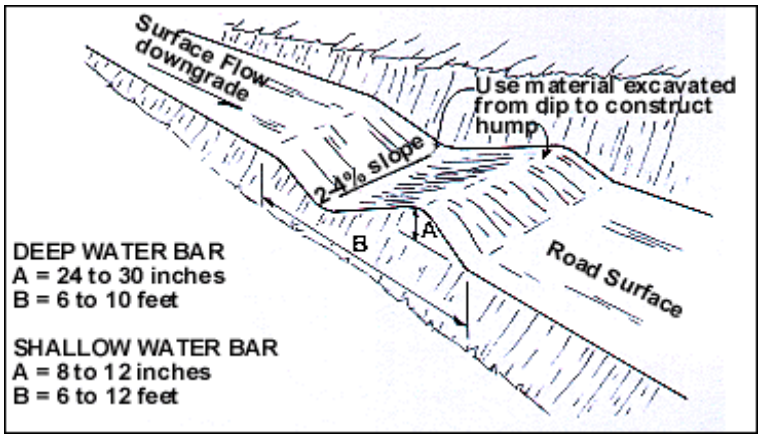


Figure 4.2.3 – Water Bar

BMP C204: Pipe Slope Drains

Purpose

To use a pipe to convey stormwater anytime water needs to be diverted away from or over bare soil to prevent gullies, channel erosion, and saturation of slide-prone soils.

Conditions of Use

Pipe slope drains should be used when a temporary or permanent stormwater conveyance is needed to move the water down a steep slope to avoid erosion (Figure 4.2.4).

On highway projects, pipe slope drains should be used at bridge ends to collect runoff and pipe it to the base of the fill slopes along bridge approaches. These can be designed into a project and included as bid items. Another use on road projects is to collect runoff from pavement and pipe it away from side slopes. These are useful because there is generally a time lag between having the first lift of asphalt installed and the curbs, gutters, and permanent drainage installed. Used in conjunction with sand bags, or other temporary diversion devices, these will prevent massive amounts of sediment from leaving a project.

Water can be collected, channeled with sand bags, Triangular Silt Dikes, berms, or other material, and piped to temporary sediment ponds.

Pipe slope drains can be:

- Connected to new catch basins and used temporarily until all permanent piping is installed;
- Used to drain water collected from aquifers exposed on cut slopes and take it to the base of the slope;
- Used to collect clean runoff from plastic sheeting and direct it away from exposed soil;
- Installed in conjunction with silt fence to drain collected water to a controlled area;
- Used to divert small seasonal streams away from construction. They have been used successfully on culvert replacement and extension jobs. Large flex pipe can be used on larger streams during culvert removal, repair, or replacement; and,
- Connected to existing down spouts and roof drains and used to divert water away from work areas during building renovation, demolition, and construction projects.

There are now several commercially available collectors that are attached to the pipe inlet and help prevent erosion at the inlet.

Design and Installation Specifications

Size the pipe to convey the flow. The capacity for temporary drains shall be sufficient to handle the peak volumetric flow rate calculated using a 10-minute time step from a 10-year, 24-hour storm event, assuming a Type 1A rainfall distribution. Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model.

Consult local drainage requirements for sizing permanent pipe slope drains.

- Use care in clearing vegetated slopes for installation.
- Re-establish cover immediately on areas disturbed by installation.
- Use temporary drains on new cut or fill slopes.
- Use diversion dikes or swales to collect water at the top of the slope.
- Ensure that the entrance area is stable and large enough to direct flow into the pipe.
- Piping of water through the berm at the entrance area is a common failure mode.
- The entrance shall consist of a standard flared end section for culverts 12 inches and larger with a minimum 6-inch metal toe plate to prevent runoff from undercutting the pipe inlet. The slope of the entrance shall be at least 3 percent. Sand bags may also be used at pipe entrances as a temporary measure.
- The soil around and under the pipe and entrance section shall be thoroughly compacted to prevent undercutting.
- The flared inlet section shall be securely connected to the slope drain and have watertight connecting bands.
- Slope drain sections shall be securely fastened together, fused or have gasketed watertight fittings, and shall be securely anchored into the soil.
- Thrust blocks should be installed anytime 90 degree bends are utilized. Depending on size of pipe and flow, these can be constructed with sand bags, straw bales staked in place, "t" posts and wire, or ecology blocks.
- Pipe needs to be secured along its full length to prevent movement. This can be done with steel "t" posts and wire. A post is installed on each side of the pipe and the pipe is wired to them. This should be done every 10-20 feet of pipe length or so, depending on the size of the pipe and quantity of water to divert.
- Interceptor dikes shall be used to direct runoff into a slope drain. The height of the dike shall be at least 1 foot higher at all points than the top of the inlet pipe.
- The area below the outlet must be stabilized with a riprap apron (see BMP C209 Outlet Protection, for the appropriate outlet material).
- If the pipe slope drain is conveying sediment-laden water, direct all flows into the sediment trapping facility.
- Materials specifications for any permanent piped system shall be set by the local government.

Maintenance Standards

Check inlet and outlet points regularly, especially after storms.

The inlet should be free of undercutting, and no water should be going around the point of entry. If there are problems, the headwall should be reinforced with compacted earth or sand bags.

- The outlet point should be free of erosion and installed with appropriate outlet protection.
- For permanent installations, inspect pipe periodically for vandalism and physical distress such as slides and wind-throw.
- Normally the pipe slope is so steep that clogging is not a problem with smooth wall pipe, however, debris may become lodged in the pipe.

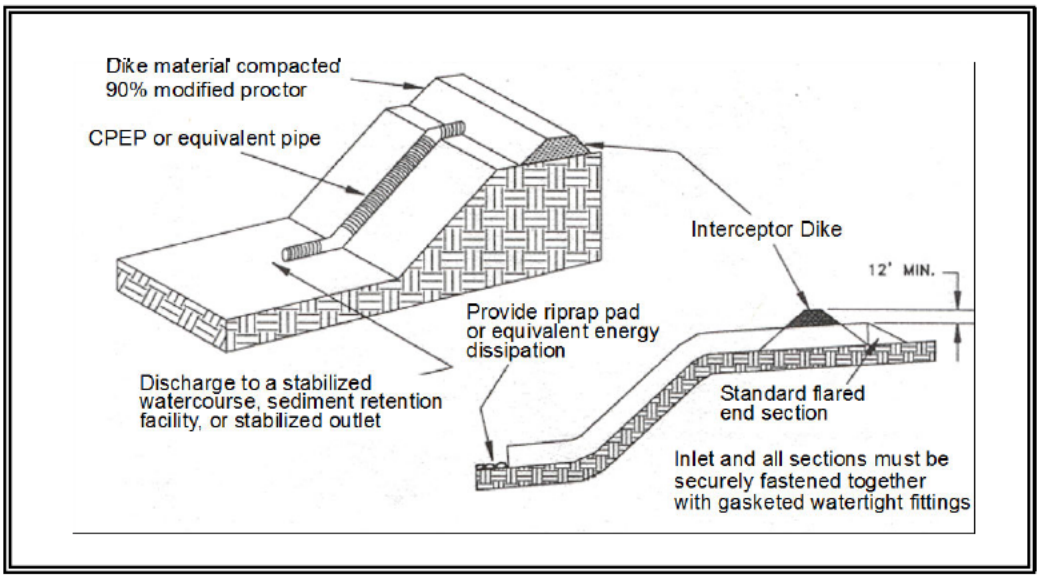


Figure 4.2.4 – Pipe Slope Drain

BMP C205: Subsurface Drains

Purpose

To intercept, collect, and convey ground water to a satisfactory outlet, using a perforated pipe or conduit below the ground surface. Subsurface drains are also known as "french drains." The perforated pipe provides a dewatering mechanism to drain excessively wet soils, provide a stable base for construction, improve stability of structures with shallow foundations, or to reduce hydrostatic pressure to improve slope stability.

Conditions of Use

Use when excessive water must be removed from the soil. The soil permeability, depth to water table and impervious layers are all factors which may govern the use of subsurface drains.

Design and Installation Specifications

Relief drains are used either to lower the water table in large, relatively flat areas, improve the growth of vegetation, or to remove surface water. Relief drains are installed along a slope and drain in the direction of the slope.

They can be installed in a grid pattern, a herringbone pattern, or a random pattern.

- **Interceptor drains** are used to remove excess ground water from a slope, stabilize steep slopes, and lower the water table immediately below a slope to prevent the soil from becoming saturated.

Interceptor drains are installed perpendicular to a slope and drain to the side of the slope.

They usually consist of a single pipe or series of single pipes instead of a patterned layout.

- **Depth and spacing of interceptor drains** --The depth of an interceptor drain is determined primarily by the depth to which the water table is to be lowered or the depth to a confining layer. For practical reasons, the maximum depth is usually limited to 6 feet, with a minimum cover of 2 feet to protect the conduit.
- The soil should have depth and sufficient permeability to permit installation of an effective drainage system at a depth of 2 to 6 feet.
- An adequate outlet for the drainage system must be available either by gravity or by pumping.
- The quantity and quality of discharge needs to be accounted for in the receiving stream (additional detention may be required).
- This standard does not apply to subsurface drains for building foundations or deep excavations.
- The capacity of an interceptor drain is determined by calculating the maximum rate of ground water flow to be intercepted. Therefore, it is good practice to make complete subsurface investigations, including hydraulic conductivity of the soil, before designing a subsurface drainage system.
- **Size of drain**--Size subsurface drains to carry the required capacity without pressure flow. Minimum diameter for a subsurface drain is 4 inches.

- The minimum velocity required to prevent silting is 1.4 ft./sec. The line shall be graded to achieve this velocity at a minimum. The maximum allowable velocity using a sand-gravel filter or envelope is 9 ft/sec.
- Filter material and fabric shall be used around all drains for proper bedding and filtration of fine materials. Envelopes and filters should surround the drain to a minimum of 3-inch thickness.
- The outlet of the subsurface drain shall empty into a sediment pond through a catch basin. If free of sediment, it can then empty into a receiving channel, swale, or stable vegetated area adequately protected from erosion and undermining.
- The trench shall be constructed on a continuous grade with no reverse grades or low spots.
- Soft or yielding soils under the drain shall be stabilized with gravel or other suitable material.
- Backfilling shall be done immediately after placement of the pipe. No sections of pipe shall remain uncovered overnight or during a rainstorm. Backfill material shall be placed in the trench in such a manner that the drain pipe is not displaced or damaged.
- Do not install permanent drains near trees to avoid the tree roots that tend to clog the line. Use solid pipe with watertight connections where it is necessary to pass a subsurface drainage system through a stand of trees.
- **Outlet**--Ensure that the outlet of a drain empties into a channel or other watercourse above the normal water level.
- Secure an animal guard to the outlet end of the pipe to keep out rodents.
- Use outlet pipe of corrugated metal, cast iron, or heavy-duty plastic without perforations and at least 10 feet long. Do not use an envelope or filter material around the outlet pipe, and bury at least two-thirds of the pipe length.
- When outlet velocities exceed those allowable for the receiving stream, outlet protection must be provided.

Maintenance Standards

Subsurface drains shall be checked periodically to ensure that they are free-flowing and not clogged with sediment or roots.

- The outlet shall be kept clean and free of debris.
- Surface inlets shall be kept open and free of sediment and other debris.
- Trees located too close to a subsurface drain often clog the system with their roots. If a drain becomes clogged, relocate the drain or remove the trees as a last resort. Drain placement should be planned to minimize this problem.
- Where drains are crossed by heavy vehicles, the line shall be checked to ensure that it is not crushed.

BMP C206: Level Spreader

Purpose

To provide a temporary outlet for dikes and diversions consisting of an excavated depression constructed at zero grade across a slope. To convert concentrated runoff to sheet flow and release it onto areas stabilized by existing vegetation or an engineered filter strip.

Conditions of Use

Used when a concentrated flow of water needs to be dispersed over a large area with existing stable vegetation.

- Items to consider are:
  1. What is the risk of erosion or damage if the flow may become concentrated?
  2. Is an easement required if discharged to adjoining property?
  3. Most of the flow should be as ground water and not as surface flow.
  4. Is there an unstable area downstream that cannot accept additional ground water?
- Use only where the slopes are gentle, the water volume is relatively low, and the soil will adsorb most of the low flow events.

Design and Installation Specifications

Use above undisturbed areas that are stabilized by existing vegetation.

If the level spreader has any low points, flow will concentrate, create channels and may cause erosion.

- Discharge area below the outlet must be uniform with a slope flatter than 5H:1V.
- Outlet to be constructed level in a stable, undisturbed soil profile (not on fill).
- The runoff shall not re-concentrate after release unless intercepted by another downstream measure.
- The grade of the channel for the last 20 feet of the dike or interceptor entering the level spreader shall be less than or equal to 1 percent. The grade of the level spreader shall be 0 percent to ensure uniform spreading of storm runoff.
- A 6-inch high gravel berm placed across the level lip shall consist of washed crushed rock, 2- to 4-inch or 3/4-inch to 1½-inch size.
- The spreader length shall be determined by estimating the peak flow expected from the 10-year, 24-hour design storm. The length of the spreader shall be a minimum of 15 feet for 0.1 cfs and shall increase by 10 feet for each 0.1 cfs thereafter to a maximum of 0.5 cfs per spreader. Use multiple spreaders for higher flows.
- The width of the spreader should be at least 6 feet.
- The depth of the spreader as measured from the lip should be at least 6 inches and it should be uniform across the entire length.

- Level spreaders shall be setback from the property line unless there is an easement for flow.
- Level spreaders, when installed every so often in grassy swales, keep the flows from concentrating. Materials that can be used include sand bags, lumber, logs, concrete, and pipe. To function properly, the material needs to be installed level and on contour. Figures 4.2.5Figure425 and 4.2.6 provide a cross-section and a detail of a level spreader. A capped perforated pipe could also be used as a spreader.

Maintenance Standards

The spreader should be inspected after every runoff event to ensure that it is functioning correctly.

- The contractor should avoid the placement of any material on the structure and should prevent construction traffic from crossing over the structure.
- If the spreader is damaged by construction traffic, it shall be immediately repaired.

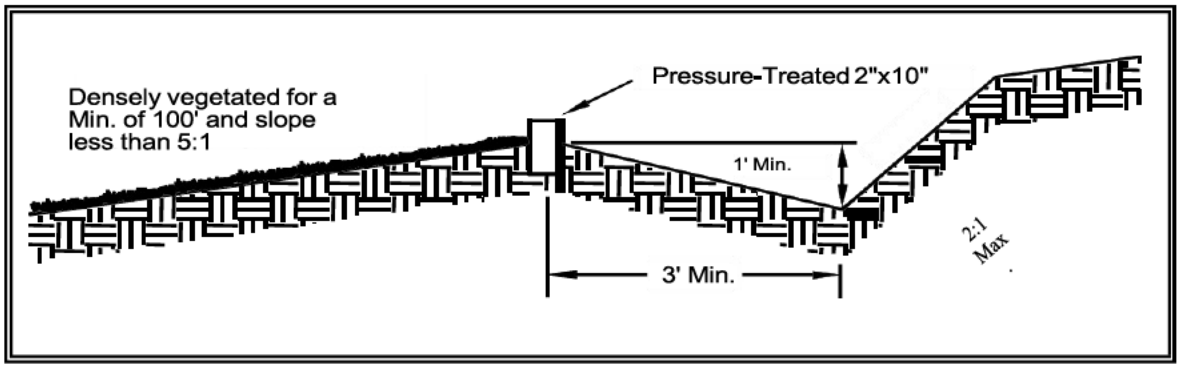


Figure 4.2.5 – Cross Section of Level Spreader

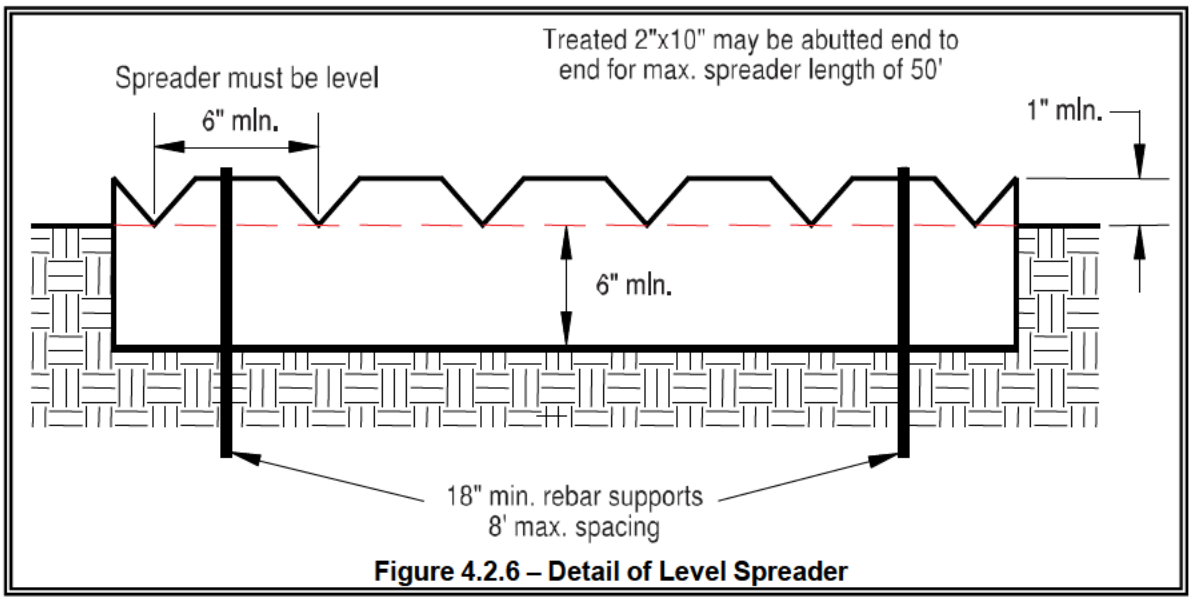


Figure 4.2.6 – Detail of Level Spreader

BMP C208: Triangular Silt Dike (TSD) (Geotextile Encased Check Dam)

Purpose

Triangular silt dikes may be used as check dams, for perimeter protection, for temporary soil stockpile protection, for drop inlet protection, or as a temporary interceptor dike.

Conditions of use

- May be used on soil or pavement with adhesive or staples.
- TSDs have been used to build temporary:
  1. sediment ponds;
  2. diversion ditches;
  3. concrete wash out facilities;
  4. curbing;
  5. water bars;
  6. level spreaders; and, berms

Design and Installation Specifications

Made of urethane foam sewn into a woven geosynthetic fabric.

It is triangular, 10 inches to 14 inches high in the center, with a 20-inch to 28-inch base. A 2–foot apron extends beyond both sides of the triangle along its standard section of 7 feet. A sleeve at one end allows attachment of additional sections as needed.

- Install with ends curved up to prevent water from flowing around the ends.
- The fabric flaps and check dam units are attached to the ground with wire staples. Wire staples should be No. 11 gauge wire and should be 200 mm to 300 mm in length.
- When multiple units are installed, the sleeve of fabric at the end of the unit shall overlap the abutting unit and be stapled.
- Check dams should be located and installed as soon as construction will allow.
- Check dams should be placed perpendicular to the flow of water.
- When used as check dams, the leading edge must be secured with rocks, sandbags, or a small key slot and staples.
- In the case of grass-lined ditches and swales, check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.

Maintenance Standards

- Triangular silt dams shall be inspected for performance and sediment accumulation during and after each runoff producing rainfall.
- Sediment shall be removed when it reaches one half the height of the dam.
- Anticipate submergence and deposition above the triangular silt dam and erosion from high flows around the edges of the dam. Immediately repair any damage or any undercutting of the dam.

BMP C231: Brush Barrier

Purpose

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Brush barriers may be used downslope of all disturbed areas of less than one-quarter acre.
- Brush barriers are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to a sediment pond. The only circumstance in which overland flow can be treated solely by a brush barrier, rather than by a sediment pond, is when the area draining to the barrier is small.
- Brush barriers should only be installed on contours.

Design and Installation Specifications

- Height 2 feet (minimum) to 5 feet (maximum).
- Width 5 feet at base (minimum) to 15 feet (maximum).
- Filter fabric (geotextile) may be anchored over the brush berm to enhance the filtration ability of the barrier. Ten-ounce burlap is an adequate alternative to filter fabric.
- Chipped site vegetation, composted mulch, or wood-based mulch (hog fuel) can be used to construct brush barriers.
- A 100 percent biodegradable installation can be constructed using 10-ounce burlap held in place by wooden stakes. Figure 4.2.11 depicts a typical brush barrier.

Maintenance Standards

- There shall be no signs of erosion or concentrated runoff under or around the barrier. If concentrated flows are bypassing the barrier, it must be expanded or augmented by toed-in filter fabric.
- The dimensions of the barrier must be maintained.

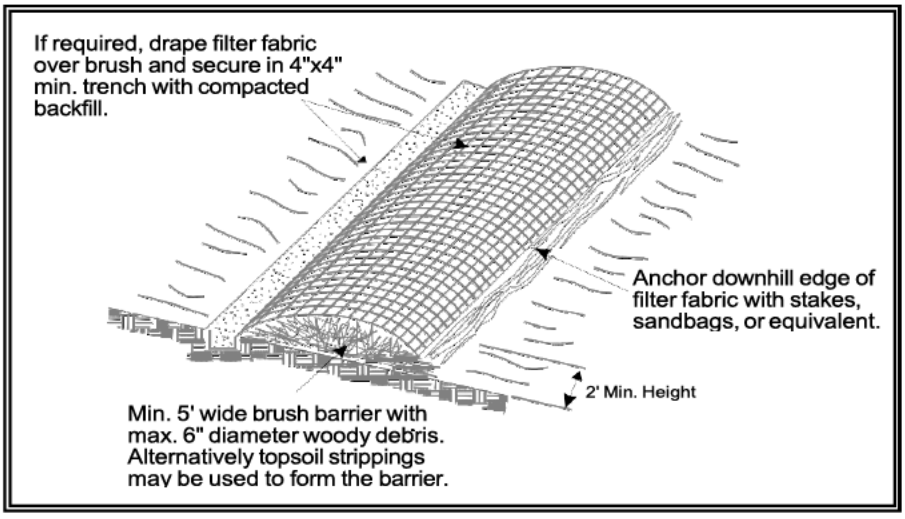


Figure 4.2.11 – Brush Barrier

BMP C232: Gravel Filter Berm

Purpose	A gravel filter berm is constructed on rights-of-way or traffic areas within a construction site to retain sediment by using a filter berm of gravel or crushed rock.
Conditions of Use	Where a temporary measure is needed to retain sediment from rights-of-way or in traffic areas on construction sites.

Design and Installation Specifications	• Berm material shall be ¾ to 3 inches in size, washed well-grade gravel or crushed rock with less than 5 percent fines.
	• Spacing of berms:
	  • Every 300 feet on slopes less than 5 percent
	  • Every 200 feet on slopes between 5 percent and 10 percent
	  • Every 100 feet on slopes greater than 10 percent
	• Berm dimensions:
	  • 1 foot high with 3H:1V side slopes
	  • 8 linear feet per 1 cfs runoff based on the 10-year, 24-hour design storm

Maintenance Standards	• Regular inspection is required. Sediment shall be removed and filter material replaced as needed.

BMP C234: Vegetated Strip

Purpose

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

- Vegetated strips may be used downslope of all disturbed areas.
- Vegetated strips are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to a sediment pond. The only circumstance in which overland flow can be treated solely by a strip, rather than by a sediment pond, is when the following criteria are met (see Table 4.2.4):

Table 4.2.4

Contributing Drainage Area for Vegetated Strips

Average Contributing area Slope	Average Contributing area Percent Slope	Max Contributing area Flowpath Length
1.5H:1V or flatter	67% or flatter	100 feet
2H:1V or flatter	50% or flatter	115 feet
4H:1V or flatter	25% or flatter	150 feet
6H:1V or flatter	16.7% or flatter	200 feet
10H:1V or flatter	10% or flatter	250 feet

Design and Installation Specifications

- The vegetated strip shall consist of a minimum of a 25-foot flowpath length continuous strip of dense vegetation with topsoil. Grass-covered, landscaped areas are generally not adequate because the volume of sediment overwhelms the grass. Ideally, vegetated strips shall consist of undisturbed native growth with a well-developed soil that allows for infiltration of runoff.
- The slope within the strip shall not exceed 4H:1V.
- The uphill boundary of the vegetated strip shall be delineated with clearing limits.

Maintenance Standards

- Any areas damaged by erosion or construction activity shall be seeded immediately and protected by mulch.
- If more than 5 feet of the original vegetated strip width has had vegetation removed or is being eroded, sod must be installed.
- If there are indications that concentrated flows are traveling across the buffer, surface water controls must be installed to reduce the flows entering the buffer, or additional perimeter protection must be installed.

BMP C236: Vegetative Filtration

Purpose

Vegetative Filtration may be used in conjunction with BMP C241 Temporary Sediment Ponds, BMP C206 Level Spreader and a pumping system with surface intake to improve turbidity levels of stormwater discharges by filtering through existing vegetation where undisturbed forest floor duff layer or established lawn with thatch layer are present. Vegetative Filtration can also be used to infiltrate dewatering waste from foundations, vaults, and trenches as long as runoff does not occur.

Conditions of Use

- For every five acre of disturbed soil use one acre of grass field, farm pasture, or wooded area. Reduce or increase this area depending on project size, ground water table height, and other site conditions.
- Wetlands shall not be used for filtration.
- Do not use this BMP in areas with a high ground water table, or in areas that will have a high seasonal ground water table during the use of this BMP.
- This BMP may be less effective on soils that prevent the infiltration of the water, such as hard till.
- Using other effective source control measures throughout a construction site will prevent the generation of additional highly turbid water and may reduce the time period or area need for this BMP.
- Stop distributing water into the vegetated area if standing water or erosion results.

Design Criteria

- Find land adjacent to the project that has a vegetated field, preferably a farm field, or wooded area.
- If the project site does not contain enough vegetated field area consider obtaining permission from adjacent landowners (especially for farm fields).
- Install a pump and downstream distribution manifold depending on the project size. Generally, the main distribution line should reach 100 to 200-feet long (many large projects, or projects on tight soil, will require systems that reach several thousand feet long with numerous branch lines off of the main distribution line).
- The manifold should have several valves, allowing for control over the distribution area in the field.
- Install several branches of 4” schedule 20, swaged-fit common septic tight-lined sewer line, or 6” fire hose, which can convey the turbid water out to various sections of the field. See Figure 4.2.15.
- Determine the branch length based on the field area geography and number of branches. Typically, branches stretch from 200-feet to several thousand feet. Always, lay branches on contour with the slope.
- On uneven ground, sprinklers perform well. Space sprinkler heads so

that spray patterns do not overlap.

- On relatively even surfaces, a level spreader using 4-inch perforated pipe may be used as an alternative option to the sprinkler head setup. Install drain pipe at the highest point on the field and at various lower elevations to ensure full coverage of the filtration area. Pipe should be place with the holes up to allow for a gentle weeping of stormwater evenly out all holes. Leveling the pipe by staking and using sandbags may be required.
- To prevent the over saturation of the field area, rotate the use of branches or spray heads. Do this as needed based on monitoring the spray field.
- Monitor the spray field on a daily basis to ensure that over saturation of any portion of the field doesn't occur at any time. The presence of standing puddles of water or creation of concentrated flows visually signify that over saturation of the field has occurred.
- Since the operator is handling contaminated water, physically monitor the vegetated spray field all the way down to the nearest surface water, or furthest spray area, to ensure that the water has not caused overland or concentrated flows, and has not created erosion around the spray nozzle.
- Monitoring usually needs to take place 3-5 times per day to ensure sheet-flow into state waters. Do not exceed water quality standards for turbidity.
- Ecology strongly recommends that a separate inspection log be developed, maintained and kept with the existing site logbook to aid the operator conducting inspections. This separate "Field Filtration Logbook" can also aid the facility in demonstrating compliance with permit conditions.

Maintenance Standards

- Inspect the spray nozzles daily, at a minimum, for leaks and plugging from sediment particles.
- If erosion, concentrated flows, or over saturation of the field occurs, rotate the use of branches or spray heads or move the branches to a new field location.
- Check all branches and the manifold for unintended leaks.

Flowpath Guidelines for Vegetative Filtration		
Average Slope	Average Area % Slope	Estimated Flowpath Length (ft)
1.5H:1V	67%	250
2H:1V	50%	200
4H:1V	25%	150
6H:1V	16.7%	115
10H:1V	10%	100

Figure 4.2.15 – Manifold and Braches in a wooded, vegetated spray field

BMP C240: Sediment Trap

Purpose

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction. Sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the drainage area.

Conditions of Use

Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or trap or other appropriate sediment removal best management practice. Non-engineered sediment traps may be used on-site prior to an engineered sediment trap or sediment pond to provide additional sediment removal capacity.

It is intended for use on sites where the tributary drainage area is less than 3 acres, with no unusual drainage features, and a projected build-out time of six months or less. The sediment trap is a temporary measure (with a design life of approximately 6 months) and shall be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps and ponds are only effective in removing sediment down to about the medium silt size fraction. Runoff with sediment of finer grades (fine silt and clay) will pass through untreated, emphasizing the need to control erosion to the maximum extent first.

Whenever possible, sediment-laden water shall be discharged into on-site, relatively level, vegetated areas (see BMP C234 – Vegetated Strip). This is the only way to effectively remove fine particles from runoff unless chemical treatment or filtration is used. This can be particularly useful after initial treatment in a sediment trap or pond. The areas of release must be evaluated on a site-by-site basis in order to determine appropriate locations for and methods of releasing runoff. Vegetated wetlands shall not be used for this purpose. Frequently, it may be possible to pump water from the collection point at the downhill end of the site to an upslope vegetated area. Pumping shall only augment the treatment system, not replace it, because of the possibility of pump failure or runoff volume in excess of pump capacity.

All projects that are constructing permanent facilities for runoff quantity control should use the rough-graded or final-graded permanent facilities for traps and ponds. This includes combined facilities and infiltration facilities. When permanent facilities are used as temporary sedimentation facilities, the surface area requirement of a sediment trap or pond must be met. If the surface area requirements are larger than the surface area of the permanent facility, then the trap or pond shall be enlarged to comply with the surface area requirement. The permanent pond shall also be divided into two cells as required for sediment ponds.

Either a permanent control structure or the temporary control structure (described in BMP C241, Temporary Sediment Pond) can be used. If a permanent control structure is used, it may be advisable to partially restrict the lower orifice with gravel to increase residence time while still allowing dewatering of the pond. A shut-off valve may be added to the control structure to allow complete retention of stormwater in emergency situations.

In this case, an emergency overflow weir must be added.

A skimmer may be used for the sediment trap outlet if approved by the Local Permitting Authority.

Design and Installation Specifications

- See Figures 4.2.16 and 4.2.17 for details.
- If permanent runoff control facilities are part of the project, they should be used for sediment retention.
- To determine the sediment trap geometry, first calculate the design surface area (SA) of the trap, measured at the invert of the weir. Use the following equation:

  $SA = FS(Q_2/V_S)$

  where

  Q_2 = Design inflow based on the peak discharge from the developed 2-year runoff event from the contributing drainage area as computed in the hydrologic analysis. The 10-year peak flow shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection. If no hydrologic analysis is required, the Rational Method may be used.

  V_S = The settling velocity of the soil particle of interest. The 0.02 mm (medium silt) particle with an assumed density of 2.65 g/cm^3 has been selected as the particle of interest and has a settling velocity (V_S) of 0.00096 ft/sec.

  FS = A safety factor of 2 to account for non-ideal settling.

  Therefore, the equation for computing surface area becomes: $SA = 2 \times Q_2/0.00096$ or

  2080 square feet per cfs of inflow

  Note: Even if permanent facilities are used, they must still have a surface area that is at least as large as that derived from the above formula. If they do not, the pond must be enlarged.
- To aid in determining sediment depth, all sediment traps shall have a staff gauge with a prominent mark 1-foot above the bottom of the trap.
- Sediment traps may not be feasible on utility projects due to the limited work space or the short-term nature of the work. Portable tanks may be used in place of sediment traps for utility projects.

Maintenance Standards

- Sediment shall be removed from the trap when it reaches 1-foot in depth.
- Any damage to the pond embankments or slopes shall be repaired.

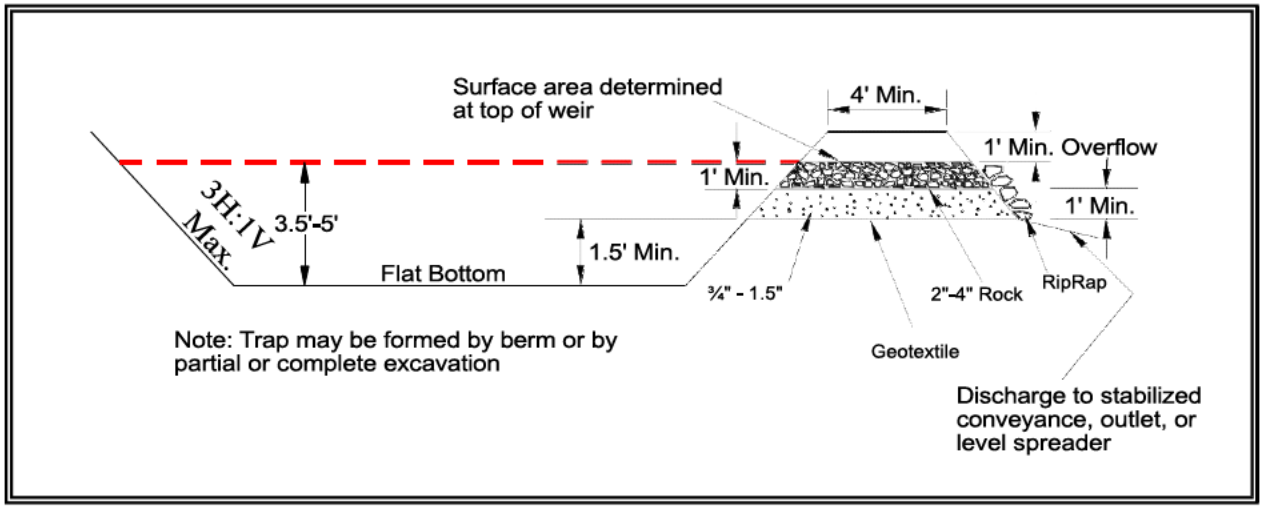


Figure 4.2.16 – Cross Section of Sediment Trap

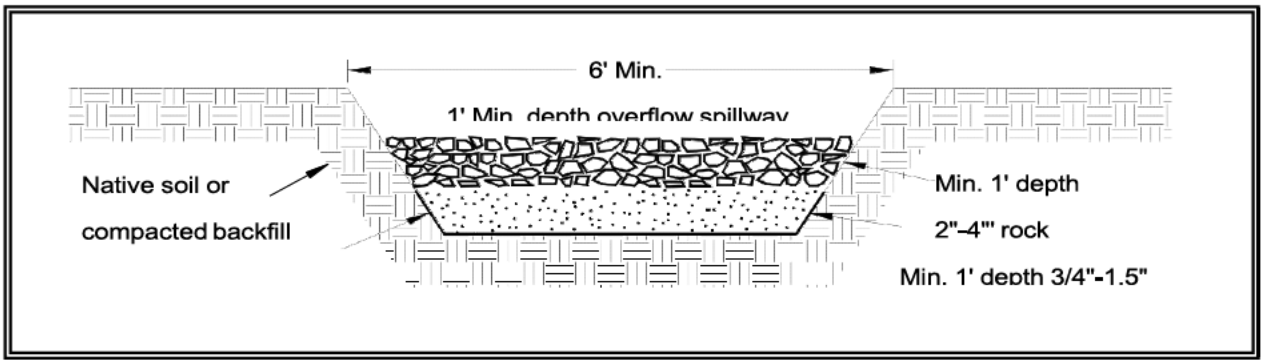


Figure 4.2.17 – Sediment Trap Outlet

BMP C252: High pH Neutralization Using CO_2

Purpose

When pH levels in stormwater rise above 8.5 it is necessary to lower the pH levels to the acceptable range of 6.5 to 8.5, this process is called pH neutralization. pH neutralization involves the use of solid or compressed carbon dioxide gas in water requiring neutralization. Neutralized stormwater may be discharged to surface waters under the General Construction NPDES permit.

Neutralized process water such as concrete truck wash-out, hydro-demolition, or saw-cutting slurry must be managed to prevent discharge to surface waters. Any stormwater contaminated during concrete work is considered process wastewater and must not be discharged to surface waters.

Reason for pH Neutralization:

A pH level range of 6.5 to 8.5 is typical for most natural watercourses, and this neutral pH is required for the survival of aquatic organisms. Should the pH rise or drop out of this range, fish and other aquatic organisms may become stressed and may die.

Calcium hardness can contribute to high pH values and cause toxicity that is associated with high pH conditions. A high level of calcium hardness in waters of the state is not allowed.

The water quality standard for pH in Washington State is in the range of

6.5 to 8.5. Ground water standard for calcium and other dissolved solids in Washington State is less than 500 mg/l.

Conditions of Use

Causes of High pH:

High pH at construction sites is most commonly caused by the contact of stormwater with poured or recycled concrete, cement, mortars, and other Portland cement or lime containing construction materials. (See BMP C151: Concrete Handling for more information on concrete handling procedures). The principal caustic agent in cement is calcium hydroxide (free lime).

Advantages of CO_2 Sparging:

- Rapidly neutralizes high pH water.
- Cost effective and safer to handle than acid compounds.
- CO_2 is self-buffering. It is difficult to overdose and create harmfully low pH levels.
- Material is readily available.

The Chemical Process:

When carbon dioxide (CO_2) is added to water (H_2O), carbonic acid (H_2CO_3) is formed which can further dissociate into a proton (H^+) and a bicarbonate anion (HCO_3^-) as shown below:

$$CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow H^+ + HCO_3^-$$

The free proton is a weak acid that can lower the pH. Water temperature has

an effect on the reaction as well. The colder the water temperature is the slower the reaction occurs and the warmer the water temperature is the quicker the reaction occurs. Most construction applications in Washington State have water temperatures in the 50°F or higher range so the reaction is almost simultaneous.

Design and Installation Specifications

Treatment Process:

High pH water may be treated using continuous treatment, continuous discharge systems. These manufactured systems continuously monitor influent and effluent pH to ensure that pH values are within an acceptable range before being discharged. All systems must have fail safe automatic shut off switches in the event that pH is not within the acceptable discharge range. Only trained operators may operate manufactured systems. System manufacturers often provide trained operators or training on their devices.

The following procedure may be used when not using a continuous discharge system:

1. Prior to treatment, the appropriate jurisdiction should be notified in accordance with the regulations set by the jurisdiction.
2. Every effort should be made to isolate the potential high pH water in order to treat it separately from other stormwater on-site.
3. Water should be stored in an acceptable storage facility, detention pond, or containment cell prior to treatment.
4. Transfer water to be treated to the treatment structure. Ensure that treatment structure size is sufficient to hold the amount of water that is to be treated. Do not fill tank completely, allow at least 2 feet of freeboard.
5. The operator samples the water for pH and notes the clarity of the water. As a rule of thumb, less CO2 is necessary for clearer water. This information should be recorded.
6. In the pH adjustment structure, add CO2 until the pH falls in the range of 6.9-7.1. Remember that pH water quality standards apply so adjusting pH to within 0.2 pH units of receiving water (background pH) is recommended. It is unlikely that pH can be adjusted to within 0.2 pH units using dry ice. Compressed carbon dioxide gas should be introduced to the water using a carbon dioxide diffuser located near the bottom of the tank, this will allow carbon dioxide to bubble up through the water and diffuse more evenly.
7. Slowly discharge the water making sure water does not get stirred up in the process. Release about 80% of the water from the structure leaving any sludge behind.
8. Discharge treated water through a pond or drainage system.
9. Excess sludge needs to be disposed of properly as concrete waste. If several batches of water are undergoing pH treatment, sludge can be left in treatment structure for the next batch treatment. Dispose of sludge when it fills 50% of tank volume.

Sites that must implement flow control for the developed site must also control stormwater release rates during construction. All treated stormwater must go through a flow control facility before being released to surface waters which require flow control.

Maintenance Standards

Safety and Materials Handling:

- All equipment should be handled in accordance with OSHA rules and regulations.
- Follow manufacturer guidelines for materials handling.

Operator Records:

Each operator should provide:

- A diagram of the monitoring and treatment equipment.
- A description of the pumping rates and capacity the treatment equipment is capable of treating.

Each operator should keep a written record of the following:

- Client name and phone number.
- Date of treatment.
- Weather conditions.
- Project name and location.
- Volume of water treated.
- pH of untreated water.
- Amount of CO_2 needed to adjust water to a pH range of 6.9-7.1.
- pH of treated water.
- Discharge point location and description.

A copy of this record should be given to the client/contractor who should retain the record for three years.

Construction Stormwater Pollution Prevention Plan

Vancouver Energy
EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix K
Historical Water Sampling Data

18 March 2013

Technical Memorandum

To: Matt Graves, Port of Vancouver

From: Alan Flemming

Subject: Terminal 4 Pond Particle Size Distribution and Sample Analysis
Port of Vancouver Decant Facility
K/J 1092004*00

This technical memorandum summarizes the sampling and particle size distribution (PSD) analyses completed for the Terminal 4 stormwater pond, and presents a discussion of initial indications of the data. Four locations near the pond were sampled on 28 January 2013 and on 28 February 2013; one at the outlet (T4M) and three at the inlets (M1, 1D, 1A). In October 2012, three locations were sampled and optical/microscopic particle size distribution analyses were completed for locations T4M, M001, and 1D001. These data and the particle size distribution histograms are presented in the following pages and discussed below. The approximate sample locations and areas draining to each location are shown on Figure 1.

Table 1: Sample Points

Sample Location - Description	Approx. Drainage Area
T4M – Pond Outlet	250 acres
M1 (1M, M001) – East Side of Pond; maintenance shop, Terminal 3	120 acres
1D (1D001) – Parcel 1D; West side of pond, parking lot/laydown area	75 acres
1A – Parcel 1A; North side of Pond, Farwest Steel, new construction	55 acres

Table 2: Sample Data

Sample Point	T4M		M1		1D		1A	
Sample Date (2013)	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb
Turbidity (NTU)	25.5	24.5	68.6	61.8	81.3	422.0	196.1	500.0
TSS (mg/L)	< 5.0	< 5.0	31.0	45	24.0	55	34.0	270
pH	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Conductivity (umhos/cm)	74.1	52	18.1	63	16.8	60	67.0	63
total Cu (µg/L)	44.7	33	123.0	120	13.3	78	27.3	57
dissolved Cu (µg/L)	18.3	14	20.7	33	3.43	6.2	3.48	4.5
% dissolved Cu	41%	42%	17%	28%	26%	8%	13%	8%
total Zn (µg/L)	87.9	54	109.0	170	47.2	320	64.6	170
dissolved Zn (µg/L)	71.1	30	62.0	110	24.8	13	< 4.0	< 4.0
% dissolved Zn	81%	56%	57%	65%	53%	4%	0%	0%
mean particle size (µm)	0.969	0.975	2.008	1.033	2.137	2.059	11.04	2.357
median part. size (µm)	0.677	0.693	1.664	0.656	1.646	0.744	2.240	1.146

Notes:

1 - Red values would exceed ISGP benchmarks.

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Abbreviations:

µg/L = micrograms per liter
µm = micron/micrometer
umhos/cm = micromho per centimeter
Mg/L = milligrams per liter
NTU = nephelometric turbidity unit
TSS = total suspended solids
Cu = copper
Zn = zinc

Turbidity and copper are the only parameters that exceeded the Industrial Stormwater General Permit (ISGP) benchmarks at the Pond outlet for these sampling events. Turbidity exceeded the benchmark by a very small amount, and that parameter may improve as the pond continues to age and construction completion reduces influent solids concentrations. Sample point M1 appears to be a significant source of copper, particularly in the dissolved fraction, which is assumed to originate from copper concentrate handling in that drainage basin.

Parcel 1A appears to be a significant source of turbidity, which is presumed to originate from construction activity. Turbidity at sample location 1A is more than twice the level at the other locations for the January sample, but Total Suspended Solids (TSS) is not significantly higher. This sample also has a higher percentage of larger particles with high surface area and high conductivity. A similar high turbidity and low TSS occurs at sample location 1D for the February sample. In any case, the pond appears to be effective at reducing both turbidity and TSS to near benchmark levels. As construction activity is reduced, turbidity in the pond effluent is anticipated to continue to improve.

The laser PSDs presented in the figures on the following pages show that the inlet and outlet samples have a high percentage of particles near the 0.5 micron (µm) size (except for sample point 1A, which has a high percentage at 0.2 µm) and near the 2.0 µm size. These particular particle size distributions may be due to coagulation and preferential settling of other size ranges, but this cannot be confirmed with the current data. Additional analysis would be required to characterize the settling behavior. It should also be noted that these particle sizes are at the bottom of the size range of settleable airborne dust which may never settle in a turbulent atmosphere unless washed out by rain. Additional characterization of airborne particulate matter at the port may be helpful in understanding contamination in the stormwater if it confirms high copper concentrations in airborne dust.

Sample point M1 has both a high total copper level and a high dissolved copper level. The other inlet samples have low dissolved copper levels and relatively low total copper levels. This sample data appears to confirm the source of copper in the pond is through sample point M1 and its watershed east of the pond. The high dissolved copper level measured at sample point M1 appears to pass through the pond with little removal, and the observed reduction in dissolved copper level at the pond outlet may be due only to dilution.

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Based on the analytical methods used in sample preparation before analysis, metals associated with particles smaller than 0.45 µm may be reported as dissolved metals because they may pass through the filter used to separate particulate from the dissolved fraction. Based on review of particle size on a volume percent (%) basis (data not presented here) for the January T4M sample, 13% of the particles by volume were less than 0.452 µm, and for the February T4M sample, 1.8% of the particles by volume were less than 0.452 µm. Approximately 40% of the copper and 70% of the zinc are reported as dissolved in these same samples. This difference between the percent of particles that are less than 0.45 µm and the percentages of dissolved metals suggests that metals reported as dissolved may be truly dissolved, and not associated with particles less than 0.45 µm.

Comparisons of the particle size distributions obtained through optical methods data generally show similar PSDs in October and January. This suggests that the particle size distributions were similar for these two sampling events. However, the optical analyses generally show much larger particle sizes than the laser analyses. For the optical analysis, the sample is shaken by hand, and then observed under a microscope. For the laser particle size distribution, the sample is circulated during the analysis by a pump operating at 1865 revolutions per minute (rpm). The larger particles observed in the optical analysis are likely to be coagulated particles that are broken apart by the pump during the laser PSD analysis. This supposition is supported by the descriptions in the Chemoptix reports. For example, the T4M sample from October includes the following description: “This particle assemblage contained large fractions of soft amalgamates with ~ 1 µm particle inclusions. Despite their poor consolidation, the amalgamates remained intact despite brisk hand-agitation. The data presented here represent the amalgamates…” Similar descriptions were included for all the October samples and most of the January samples.

Review of the laser PSD data suggests that the pond effectively removes particles larger than approximately 5 µm. This may be occurring through settling of naturally coagulated particles. However, as discussed above, the optical analyses show much larger particle amalgamates in both the pond inlets and outlet. It may be that amalgamates containing larger particles have sufficient density to settle in the pond, while those containing only finer particles do not. It also appears that no particles larger than ~ 8 µm are reaching the inlets at sample points M1 and 1D in January. This may be due to removal of larger particles by sweeping or removal in catch basin sumps or inserts. A size distribution analysis of sweeper truck waste might help confirm this last supposition. The high turbidity and high total zinc measured at sample point 1D in February may be related to the larger particles (10-20 µm) seen in this sample and may be the result of the area not having been swept recently.

On a length basis, the optical analyses of samples from locations 1D and 1A appear to be very similar in January; however, on an area basis (data not presented here), the sample from location 1A appears to have larger particles. On a length basis, the optical analysis at 1D also shows smaller particles in October. As noted above in the discussion on turbidity and TSS, and

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as indicated by its higher conductivity, the January sample from location 1A is likely to have different types of particles from the other two locations and samples.

We recommend that the port consider collecting at least one additional sample at these same locations and request the same analyses, to characterize the potential variability in stormwater influent and effluent at the Terminal 4 Pond. We also recommend the port consider characterization of the airborne dust at the port, and its copper concentration. Kennedy/Jenks Consultants (Kennedy/Jenks) can assist with developing a specific sampling plan to determine the contribution of airborne pollutants to the port's stormwater runoff if the port chooses to pursue this option.

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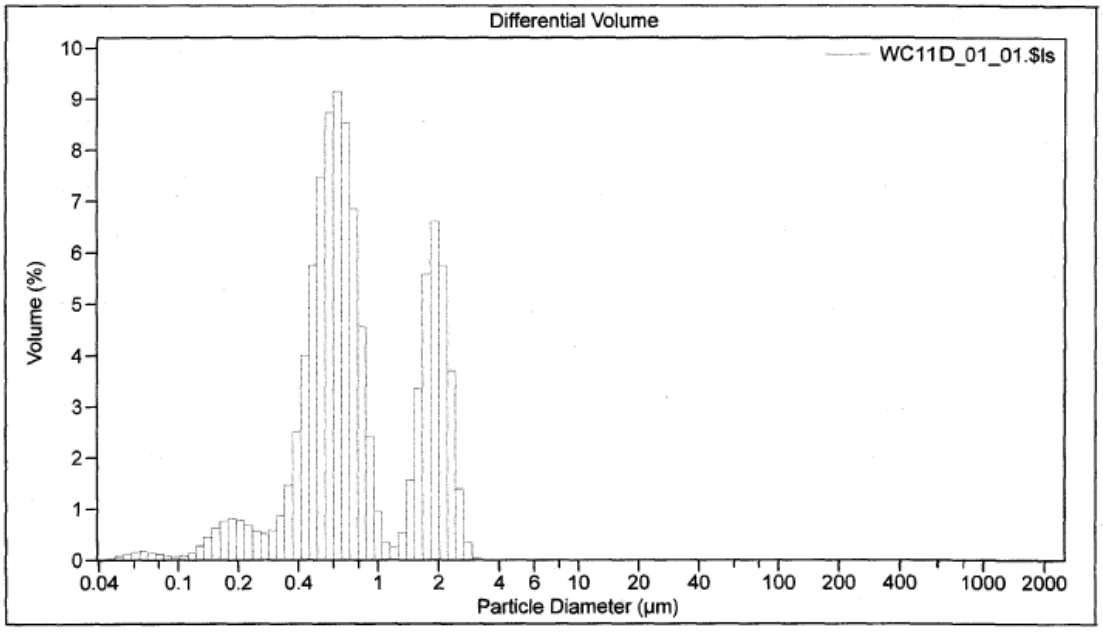
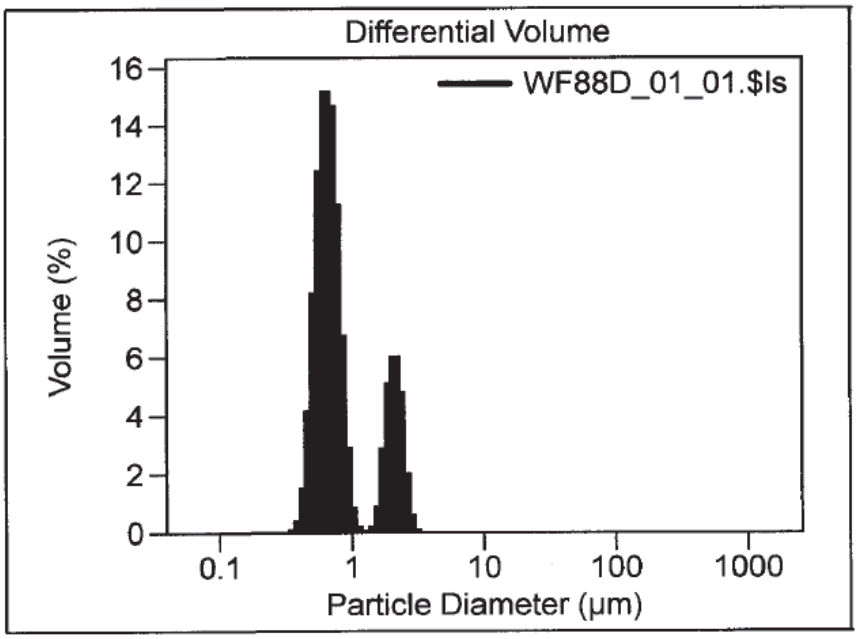
Technical Memorandum

Matt Graves, Port of Vancouver
18 March 2013
1092004*00

T4M – Pond Outlet
28 January 2013 top figure, 28 February 13 bottom figure, (same analysis, presentation differs)
- very similar results for two samples, bimodal at ~0.5 and ~ 2.0 µm, all < ~5.0 µm





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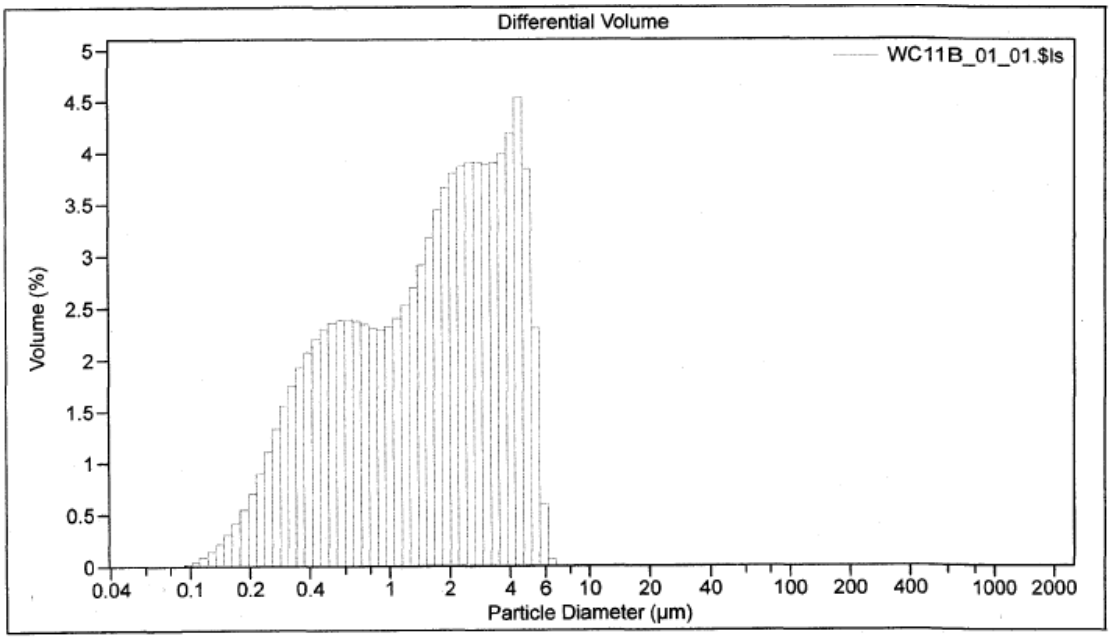
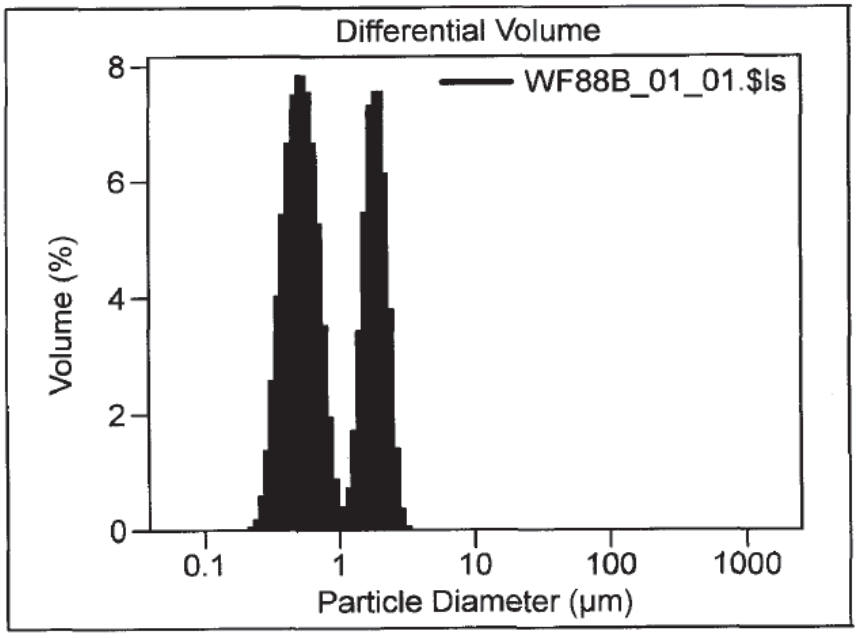
M1 – East Side of Pond; maintenance shop, Terminal 2

28 January 2013 top figure, 28 February 13 bottom figure, (same analysis, presentation differs) - similar bimodal samples at ~0.4 and ~ 3.0 µm, all < ~6.0 µm, variability unexplained





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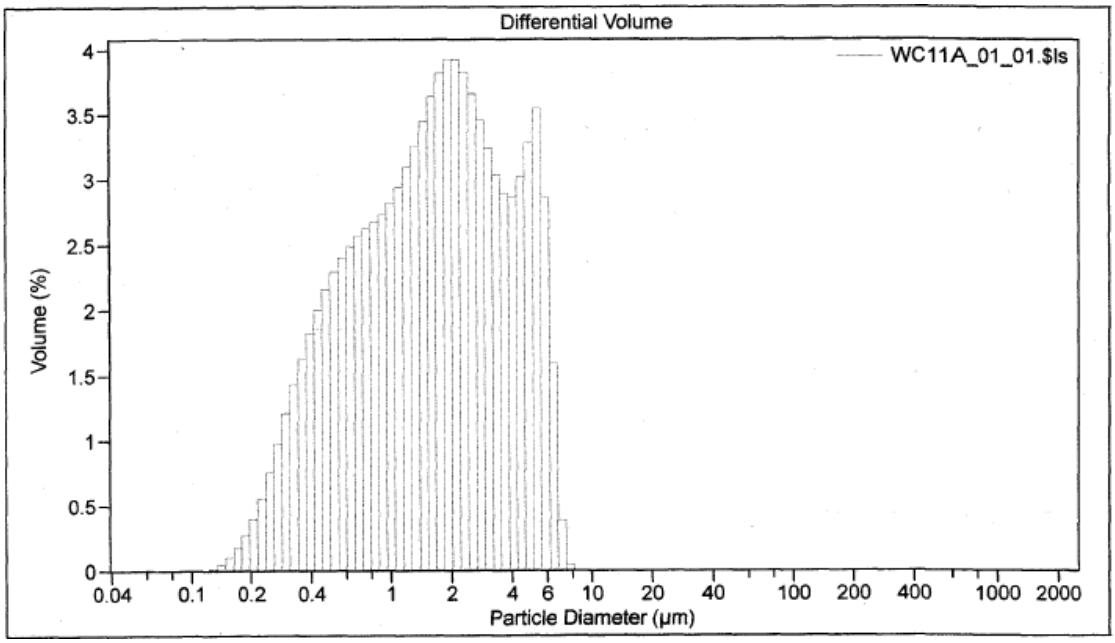
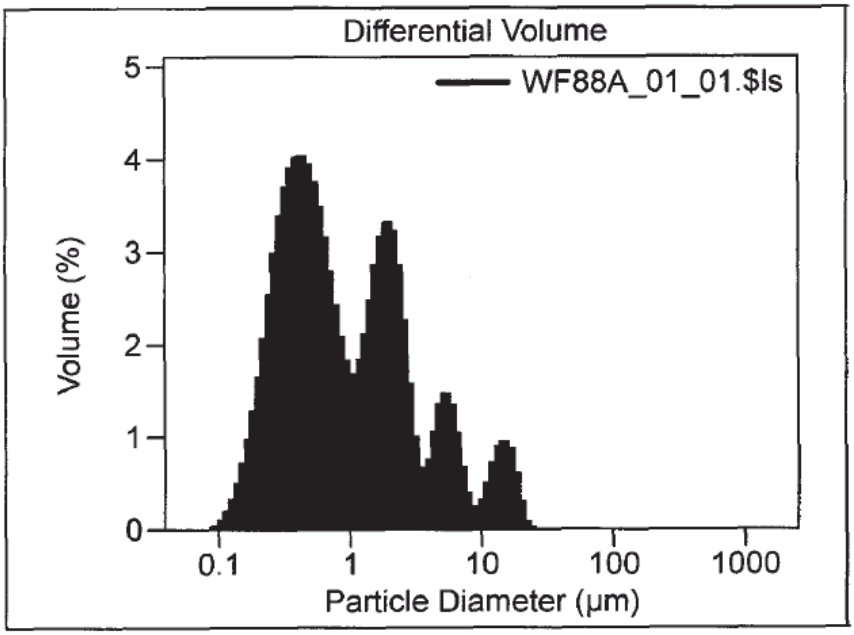
Technical Memorandum

1D – Parcel 1D; West side of pond, parking lot/laydown area

28 January 2013 top figure, 28 February 13 bottom figure, (same analysis, presentation differs) - samples variable, may be due to timing of sweeping?,





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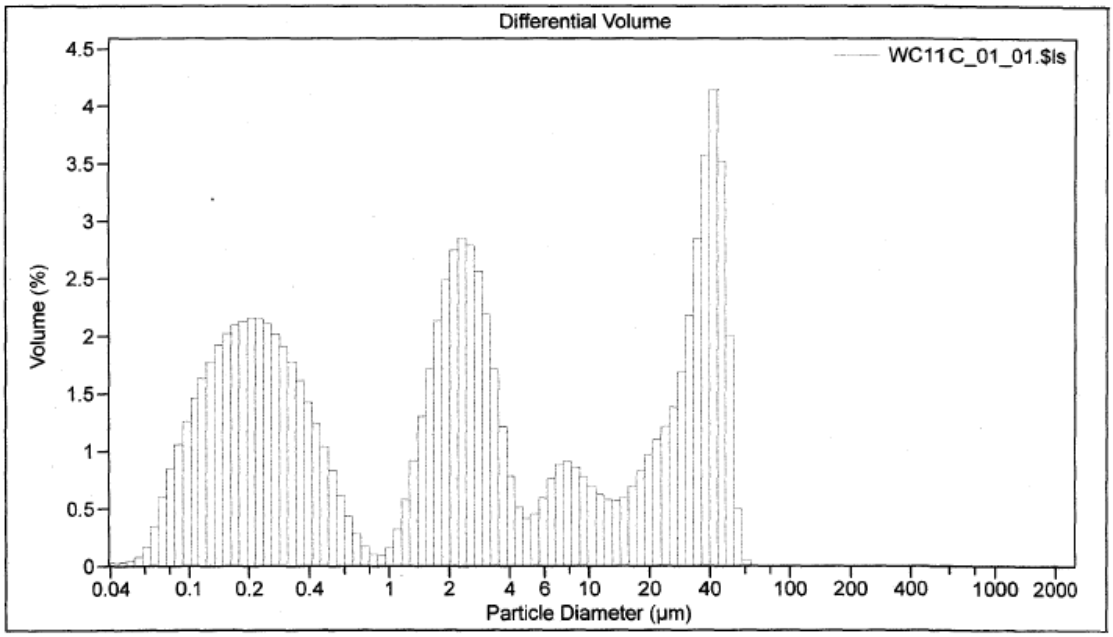
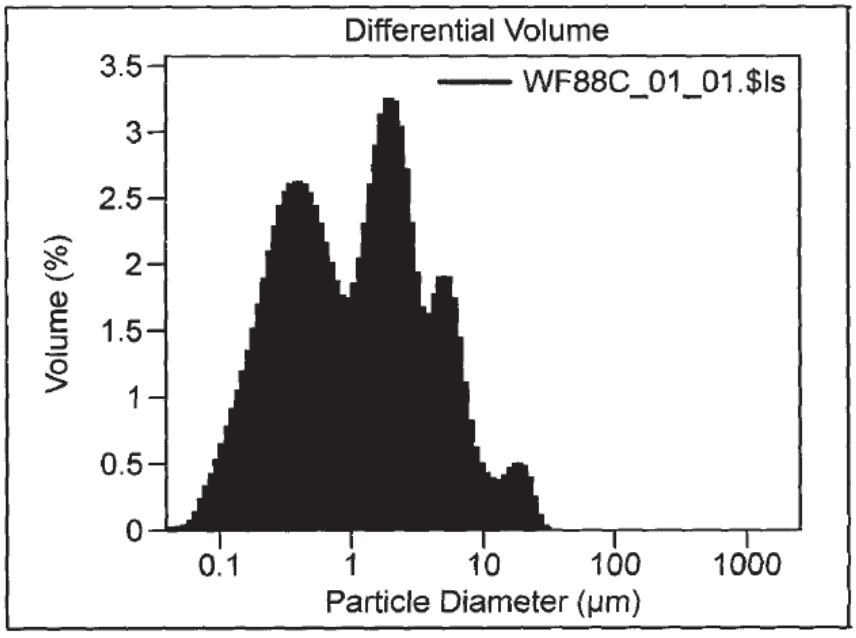
Technical Memorandum

Matt Graves, Port of Vancouver
18 March 2013
1092004*00

1A – Parcel 1A; North side of Pond, Farwest Steel, new construction

28 January 2013 top figure, 28 February 13 bottom figure, (same analysis, presentation differs)
- similar distributions below ~ 20 µm , ~ 40 µm particles in January may be due to construction





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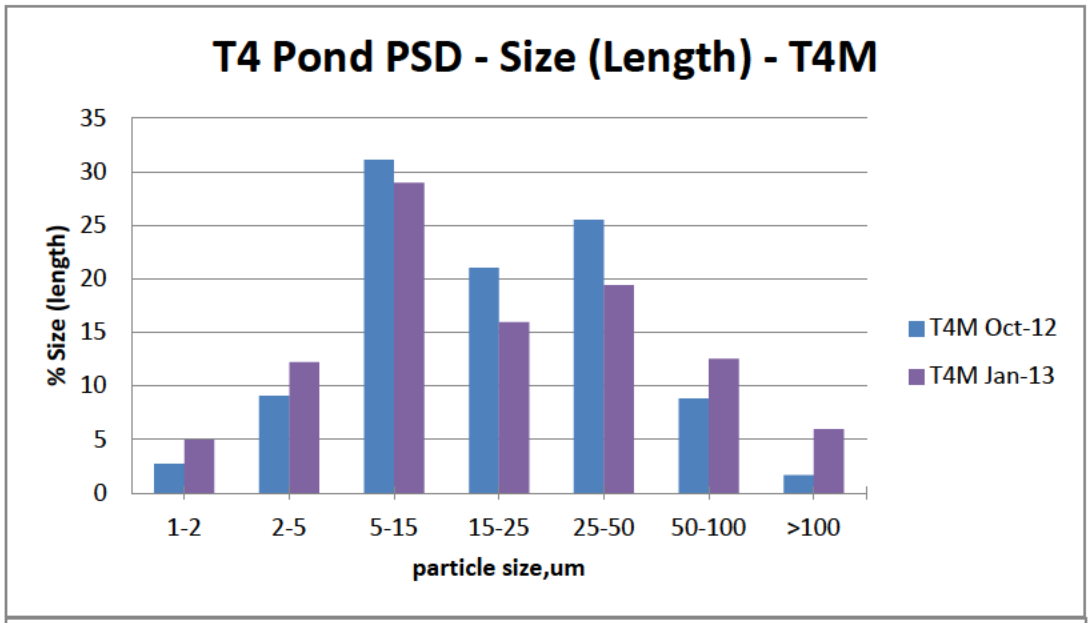
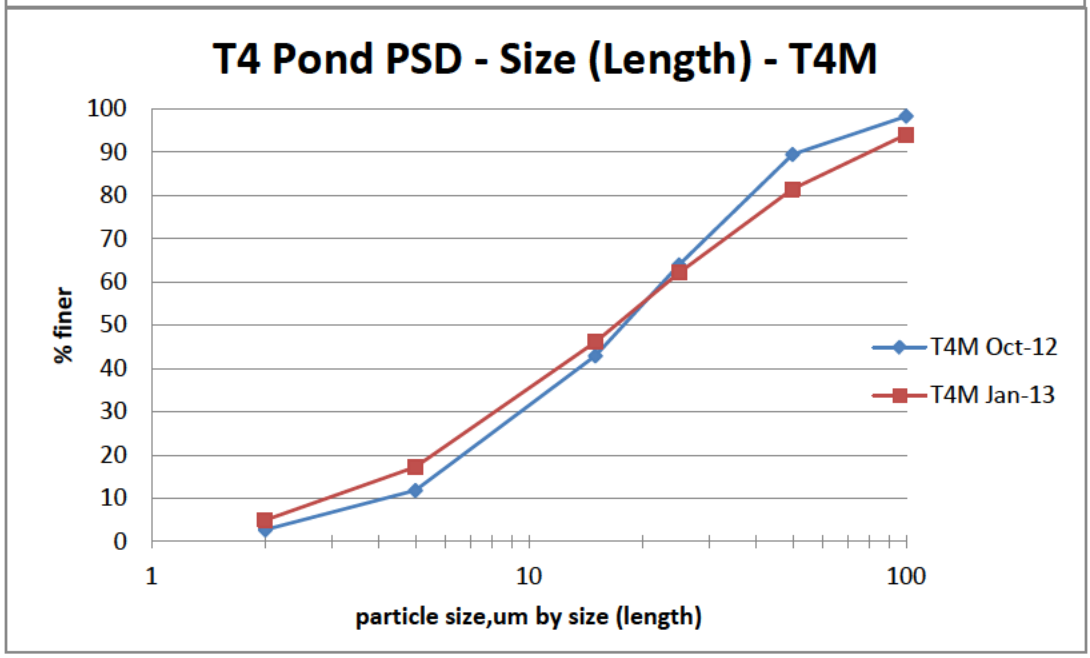
18 March 2013
1092004*00

OPTICAL DATA

T4M





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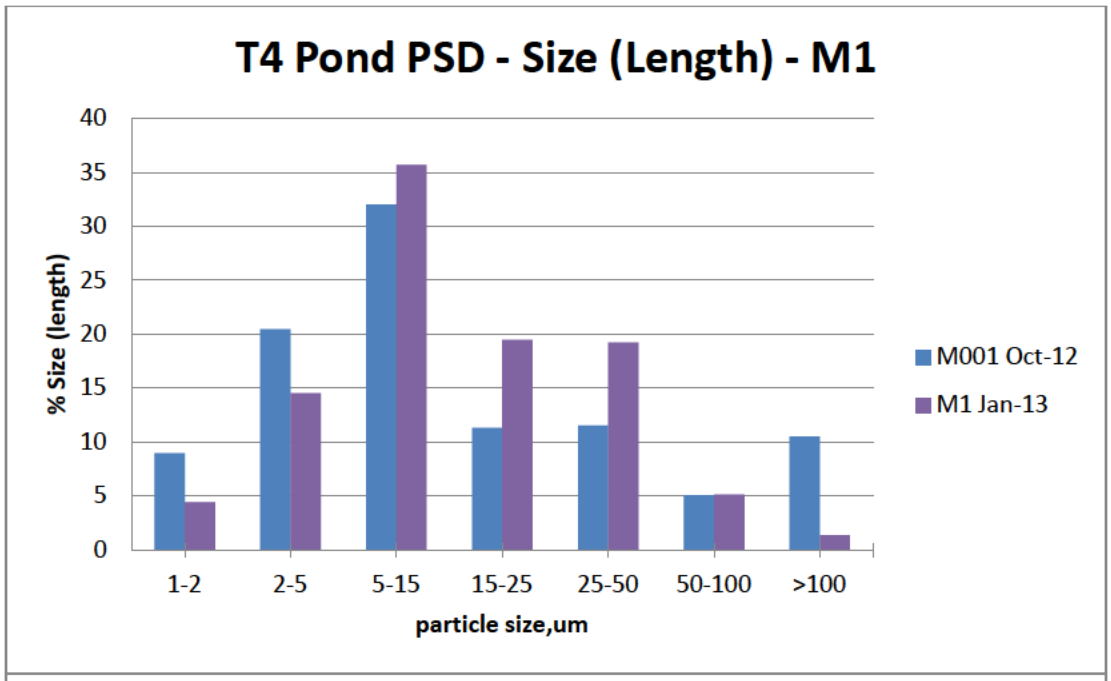
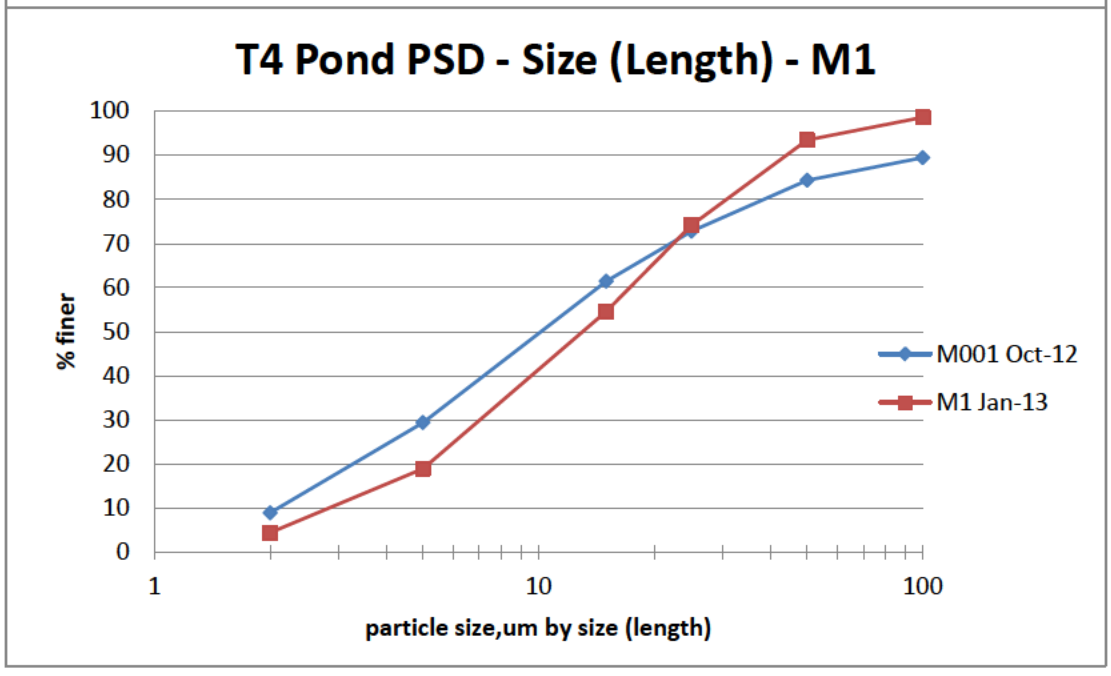
1092004*00

M1





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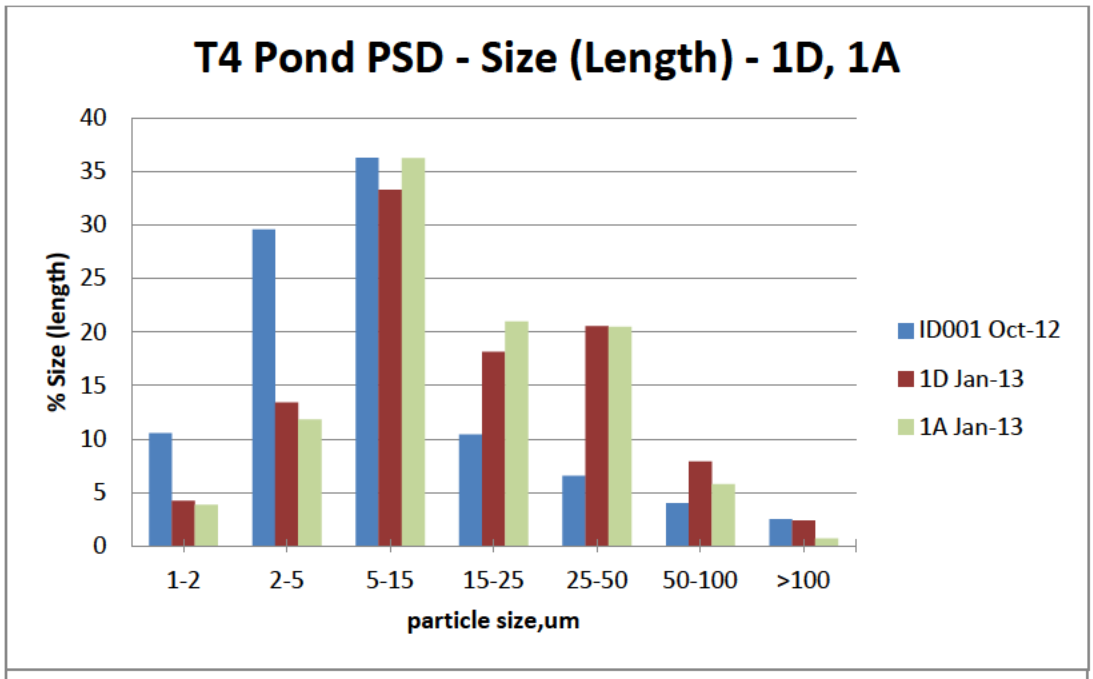
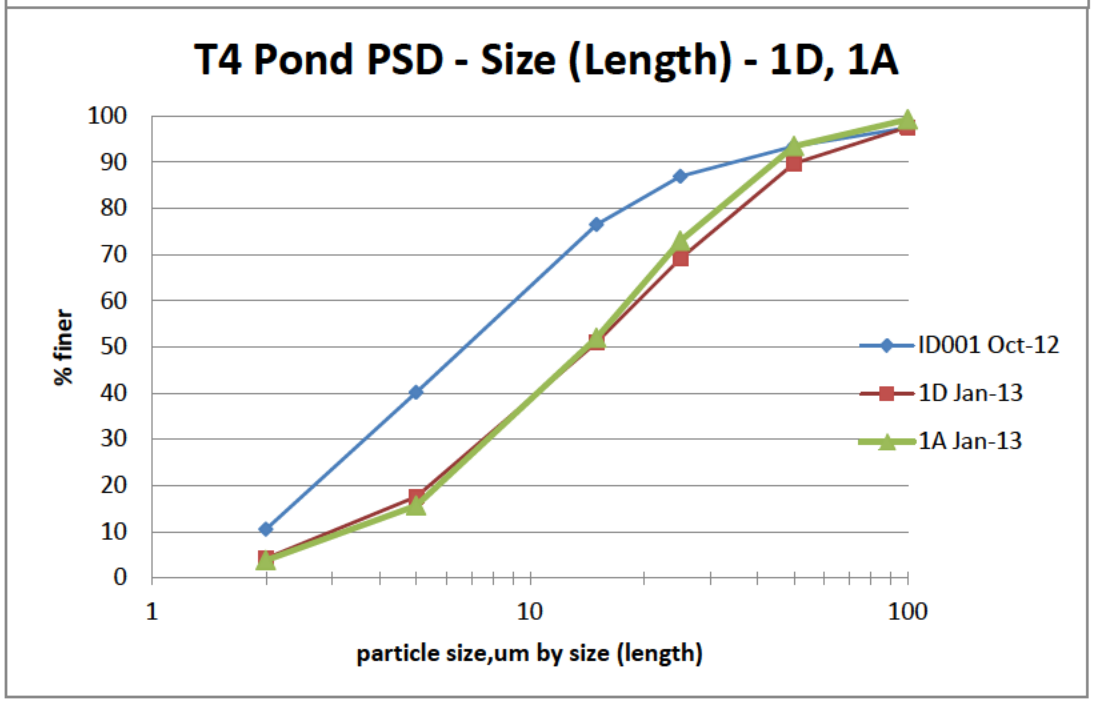
18 March 2013
1092004*00

1D & 1A





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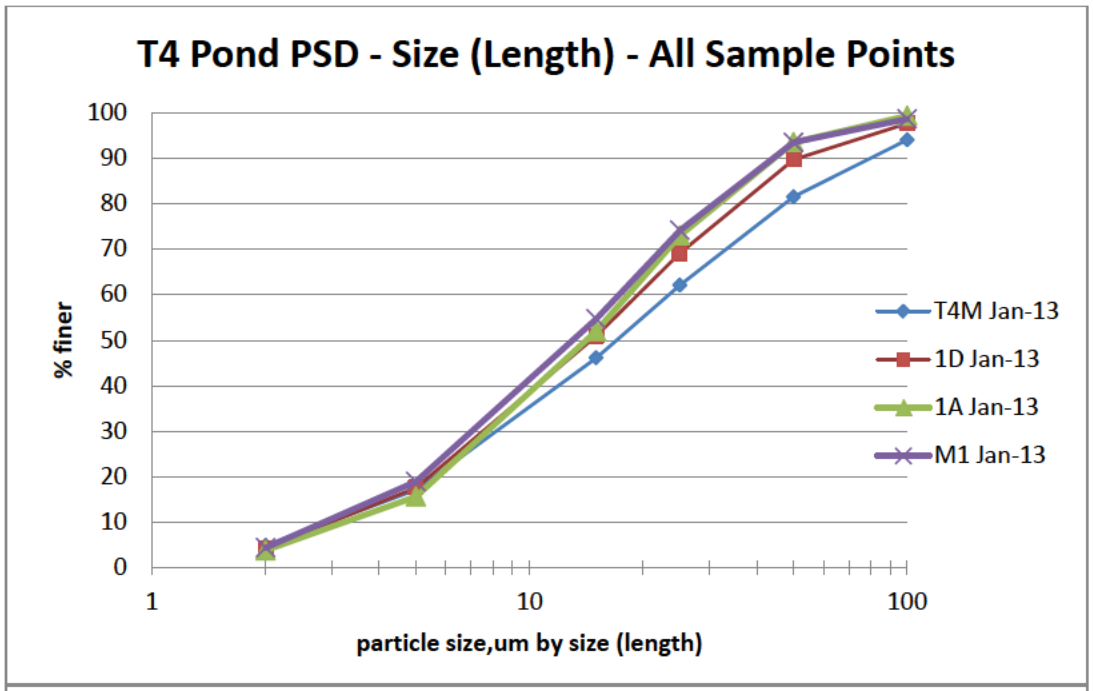
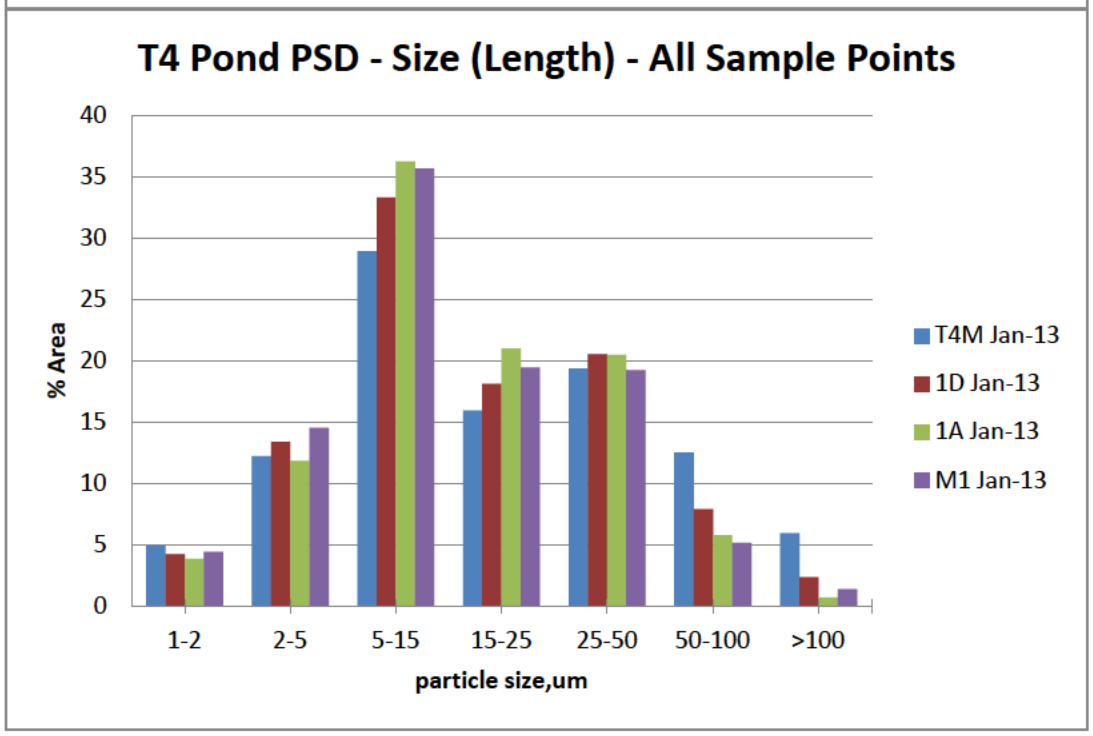
18 March 2013
1092004*00

Jan 13 – All Samples





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Approximate location of sample point

Approximate subbasin boundary

Kennedy/Jenks Consultants

TERMINAL 4 POND SAMPLING LOCATIOINS AND DRAINAGE BASINS
FIGURE 1

Appendix L
Site Inspection Forms

Site Inspection Form

General Information			
Project Name:			
Inspector Name:		**Title:** **CESCL # :**	
Date:		**Time:**	
Inspection Type:	□ After a rain event □ Weekly □ Turbidity/transparency benchmark exceedance □ Other		
Weather			
Precipitation	Since last inspection	In last 24 hours	
Description of General Site Conditions:			

Inspection of BMPs
Element 1: Mark Clearing Limits
BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 2: Establish Construction Access

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 3: Control Flow Rates

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 4: Install Sediment Controls

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 5: Stabilize Soils

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 6: Protect Slopes

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 7: Protect Drain Inlets

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 8: Stabilize Channels and Outlets

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 9: Control Pollutants										
BMP:										
Location	Inspected				Functioning					Problem/Corrective Action
	Y	N			Y	N	NIP			
BMP:										
Location	Inspected				Functioning					Problem/Corrective Action
	Y	N			Y	N	NIP			
Element 10: Control Dewatering										
BMP:										
Location	Inspected				Functioning					Problem/Corrective Action
	Y	N			Y	N	NIP			
BMP:										
Location	Inspected				Functioning					Problem/Corrective Action
	Y	N			Y	N	NIP			
BMP:										
Location	Inspected				Functioning					Problem/Corrective Action
	Y	N			Y	N	NIP			

Stormwater Discharges From the Site			
	Observed? Y	N	Problem/Corrective Action
Location			
Turbidity			
Discoloration			
Sheen			
Location			
Turbidity			
Discoloration			
Sheen			

Water Quality Monitoring		
Was any water quality monitoring conducted?	☐ Yes	☐ No
If water quality monitoring was conducted, record results here:		
If water quality monitoring indicated turbidity 250 NTU or greater; or transparency 6 cm or less, was Ecology notified by phone within 24 hrs?	☐ Yes	☐ No
If Ecology was notified, indicate the date, time, contact name and phone number below:		
Date:		
Time:		
Contact Name:		
Phone #:		
General Comments and Notes		
Include BMP repairs, maintenance, or installations made as a result of the inspection.		
Were Photos Taken?	☐ Yes	☐ No
If photos taken, describe photos below:		

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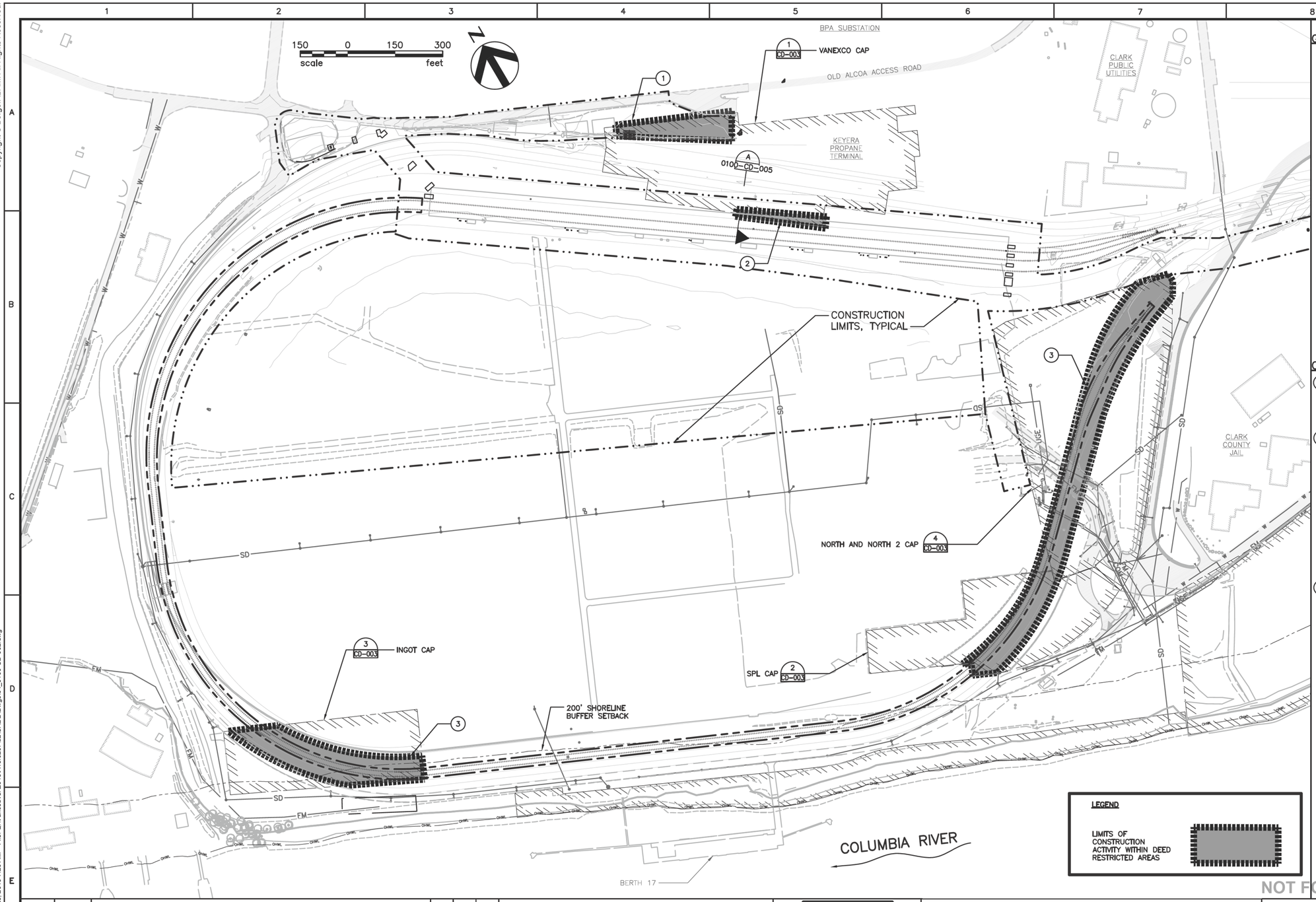

GENERAL NOTES:

1. CONTRACTOR'S ACTIVITY SHALL STRICTLY COMPLY WITH ALL PERMITTED CONDITIONS OF APPROVAL.
2. EXCAVATIONS AND GROUND DISTURBING ACTIVITIES WITHIN DEED RESTRICTED AREAS REQUIRES NOTIFICATION TO THE WASHINGTON STATE ENERGY FACILITY SITE EVALUATION COUNCIL (EFSEC) AND COMPLIANCE WITH THE APPROVED CONTAMINATED MEDIA MANAGEMENT PLAN, APPLICABLE PORT PROTOCOLS AND ADDITIONAL REQUIREMENTS PROVIDED BY EFSEC.
3. SPECIFIC LIMITS FOR THE EAST LANDFILL LIMITS ARE PROVIDED BASED UPON PRIOR SURVEY'S CONDUCTED BY HDJ DESIGN GROUP. WORK LIMIT SHALL ENCROACH UPON THE BOUNDARY OF THE EAST LANDFILL.
4. WHERE KNOWN, ADDITIONAL AREAS OF CONCERN AND POSSIBLE CONTAMINATED MEDIA LOCATIONS HAVE BEEN GENERALLY DEPICTED. CONTRACTOR SHALL COORDINATE FULLY WITH PORT OF VANCOUVER ENVIRONMENTAL STAFF AND INSPECTORS FOR MONITORING AND TESTING OF EXCAVATED MEDIA FOR POSSIBLE CONTAMINATES. PORTIONS OF AREA 200 AND AREA 500 ARE SPECIFICALLY IDENTIFIED WHERE CONTAMINATION IS LIKELY TO BE ENCOUNTERED DURING EXCAVATIONS.
5. IF MEDIA INCLUDING SOILS, OR GROUNDWATER ARE ENCOUNTERED THAT INDICATE POSSIBLE CONTAMINATION, CONTRACTOR SHALL NOTIFY VANCOUVER ENERGY SITE MANAGER, PORT OF VANCOUVER AND EFSEC IMMEDIATELY PRIOR TO PROCEEDING. SIGNS OF CONTAMINATION INCLUDE UNUSUALLY DARK SOIL AND ODORS.
6. IN AREAS OF CONCERN EXCAVATED MATERIAL SHALL BE PLACED IN SEALED WATER-TIGHT CONTAINERS OR LINED STAGING AREAS IMMEDIATELY ADJACENT TO THE WORK AREA FOR TESTING AND CLASSIFICATION OF MATERIAL PRIOR TO HAUL OFF.

CONTAMINATED MEDIA NOTES:

(1) CONSTRUCTION ACTIVITIES WITHIN THIS PORTION OF THE VANEXCO CAP WILL BE LIMITED TO GROUND DISTURBANCES ABOVE THE EXISTING CONCRETE CAP. SOME MINOR EXPOSURE OF THE CONCRETE SURFACE MAY OCCUR IN LOCALIZED AREAS. NO WORK WITHIN THIS AREA WILL REMOVE OR PENETRATE PORTIONS OF THE CAP.

(2) CONSTRUCTION ACTIVITIES WITHIN THIS PORTION OF THE VANEXCO CAP WILL RESULT IN MODIFICATION OF THE UNDERDRAIN SYSTEM AND HDPE LINER. DISCHARGES FROM THE UNDERDRAIN SYSTEM WILL BE RE-ROUTED TO AVOID CONFLICTS WITH THE PROPOSED RAIL UNLOADING BUILDING FOUNDATIONS AND CONTAINMENT TRENCHES, SEE DWG 0100-CD-006 FOR LINER PENETRATION DETAIL, AND SHEET 0100-CD-007 FOR NEW STORMWATER DETAILS. LINER WILL BE EXTENDED TO AND TIED INTO THE GRADE BEAMS OF THE RAIL UNLOADING BUILDING FOUNDATION SEE DWG 0100-CD-006 FOR DETAILS. FOUNDATIONS OF THE RAIL UNLOADING BUILDING WITHIN THE EXISTING CAP AREA WILL BE LIMITED TO SHALLOW SPREAD FOOTINGS TO LIMIT EXCAVATION ACTIVITIES. CONSTRUCTION OF RAIL UNLOADING BUILDING CONSISTS OF FULLY IMPERVIOUS ROOF WITH CAST-IN-PLACE CONCRETE SURFACING WITH FLOOR DRAINS. ALL RAINWATER WILL BE COLLECTED AND DIVERTED, THEREBY EXCLUDING SURFACE WATER FROM ENTERING CAP AREA.

(3) CONSTRUCTION WITHIN THE INGOT CAP, SPL CAP, AND NORTH AND NORTH 2 CAP AREAS ARE LIMITED TO RAIL IMPROVEMENTS ONLY. RAIL LINES TO BE UNDER TSJV CONTROL ARE PERMITTED UNDER EFSEC APPLICATION. CONSTRUCTION DRAWINGS, DETAILS, AND CONSTRUCTION ADMINISTRATION FOR ADDITIONAL 2 RAIL LOOPS WILL BE COMPLETED BY THE PORT OF VANCOUVER AS DISCUSSED IN THE LEASE AGREEMENT.

LEGEND

LIMITS OF CONSTRUCTION ACTIVITY WITHIN DEED RESTRICTED AREAS

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: CONTAMINATED MEDIA LOCATIONS – 1

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100-CD-002 | SHEET: 1/1 | REV.:

Last Saved by: Tony pritchett on: Feb 25, 2015 7:20 AM File: Q:\Vancouver\2013\A13.026702\02\CADD\Dwgs\04_0100-CD-002.dwg

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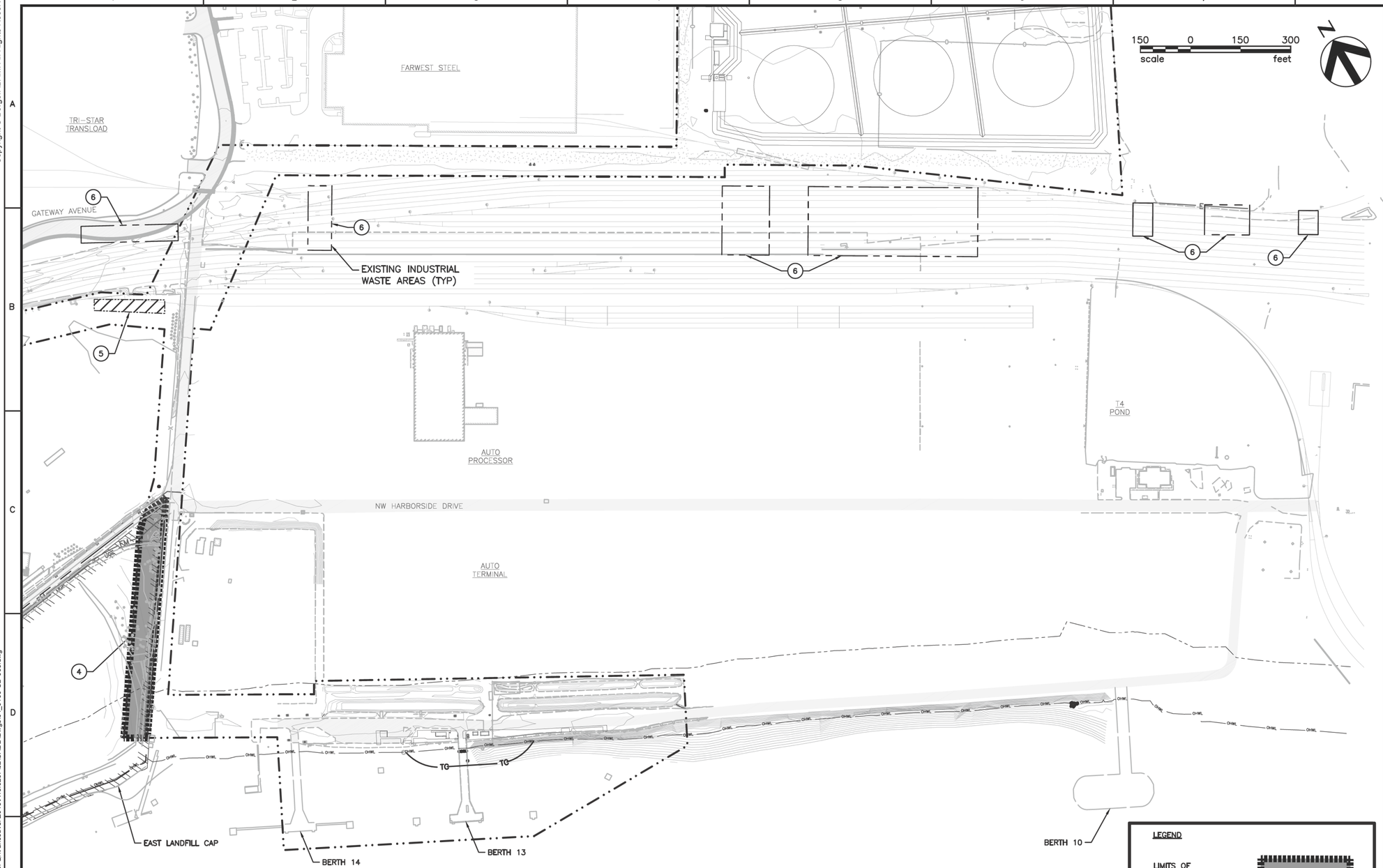

GENERAL NOTES:

1. CONTRACTOR'S ACTIVITY SHALL STRICTLY COMPLY WITH ALL PERMITTED CONDITIONS OF APPROVAL.
2. EXCAVATIONS AND GROUND DISTURBING ACTIVITIES WITHIN DEED RESTRICTED AREAS REQUIRES NOTIFICATION TO THE WASHINGTON STATE ENERGY FACILITY SITE EVALUATION COUNCIL (EFSEC) AND COMPLIANCE WITH THE APPROVED CONTAMINATED MEDIA MANAGEMENT PLAN, APPLICABLE PORT PROTOCOLS AND ADDITIONAL REQUIREMENTS PROVIDED BY EFSEC.
3. SPECIFIC LIMITS FOR THE EAST LANDFILL LIMITS ARE PROVIDED BASED UPON PRIOR SURVEY'S CONDUCTED BY HDJ DESIGN GROUP. WORK LIMIT SHALL ENCROACH UPON THE BOUNDARY OF THE EAST LANDFILL.
4. WHERE KNOWN, ADDITIONAL AREAS OF CONCERN AND POSSIBLE CONTAMINATED MEDIA LOCATIONS HAVE BEEN GENERALLY DEPICTED. CONTRACTOR SHALL COORDINATE FULLY WITH PORT OF VANCOUVER ENVIRONMENTAL STAFF AND INSPECTORS FOR MONITORING AND TESTING OF EXCAVATED MEDIA FOR POSSIBLE CONTAMINATES. PORTIONS OF AREA 200 AND AREA 500 ARE SPECIFICALLY IDENTIFIED WHERE CONTAMINATION IS LIKELY TO BE ENCOUNTERED DURING EXCAVATIONS.
5. IF MEDIA INCLUDING SOILS, OR GROUNDWATER ARE ENCOUNTERED THAT INDICATE POSSIBLE CONTAMINATION, CONTRACTOR SHALL NOTIFY VANCOUVER ENERGY SITE MANAGER, PORT OF VANCOUVER AND EFSEC IMMEDIATELY PRIOR TO PROCEEDING. SIGNS OF CONTAMINATION INCLUDE UNUSUALLY DARK SOIL AND ODORS.
6. IN AREAS OF CONCERN EXCAVATED MATERIAL SHALL BE PLACED IN SEALED WATER-TIGHT CONTAINERS OR LINED STAGING AREAS IMMEDIATELY ADJACENT TO THE WORK AREA FOR TESTING AND CLASSIFICATION OF MATERIAL PRIOR TO HAUL OFF.

CONTAMINATED MEDIA NOTES:

(4) CONSTRUCTION WITHIN THE EAST LANDFILL CAP AREA CONSISTS OF GRADING A SUITABLE LEVEL BENCH WITHIN THE DEED RESTRICTED AREA TO CONSTRUCT FOUNDATIONS FOR THE CRUDE OIL PIPELINE. CONSTRUCTION ACTIVITIES SHALL NOT ENCROACH UPON THE LANDFILL AREA ITSELF AND SHALL REMAIN EAST OF THE HIGH VISIBILITY FENCING DELINEATED ON THE EROSION CONTROL PLANS.

(5) PORT OF VANCOUVER IDENTIFIED POCKETS OF CONTAMINATED GROUNDWATER AND SOIL WITHIN THIS AREA. CONTRACTOR SHALL BE ADVISED THAT WORK ADJACENT TO THIS AREA WILL REQUIRE TESTING OF EXCAVATED MATERIAL PRIOR TO DISPOSAL.

(6) NO CONSTRUCTION ACTIVITY IS PROPOSED IN THESE AREAS OF INDUSTRIAL WASTE. PORT HAS COMPLETED CLEANUP OF THESE SITES DURING RAIL CONSTRUCTION WHERE FEASIBLE.

LEGEND

LIMITS OF CONSTRUCTION ACTIVITY WITHIN DEED RESTRICTED AREAS

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: CONTAMINATED MEDIA LOCATIONS – 2

DESIGN:	DRS	START DATE:	2/25/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/25/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100-CD-003 | SHEET: 1/1 | REV.

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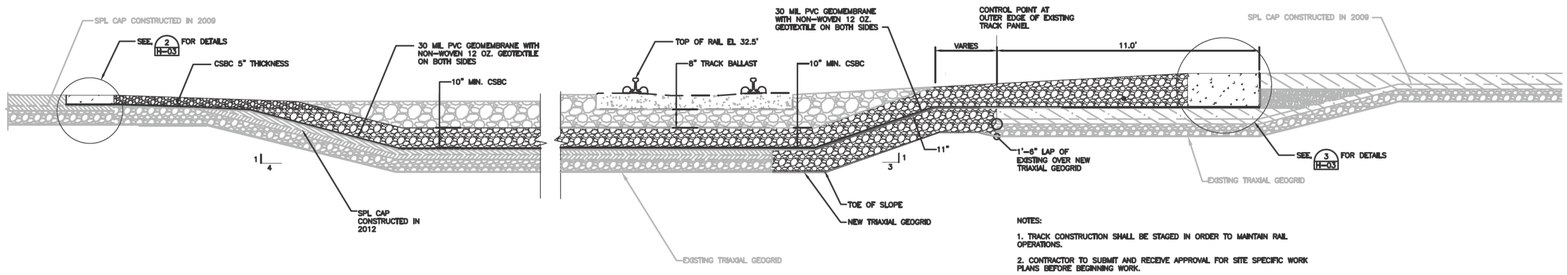


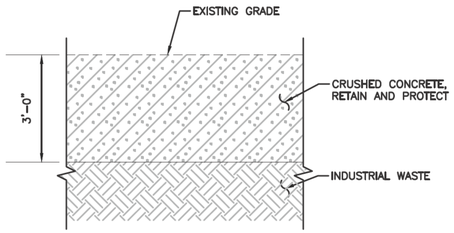
NOTES:

1. TRACK CONSTRUCTION SHALL BE STAGED IN ORDER TO MAINTAIN RAIL OPERATIONS.
2. CONTRACTOR TO SUBMIT AND RECEIVE APPROVAL FOR SITE SPECIFIC WORK PLANS BEFORE BEGINNING WORK.

SPL CAP SECTION

NTS

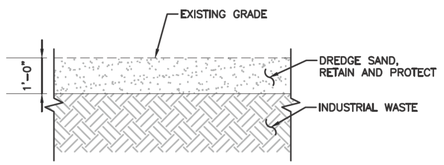
1 / 0100-CD-002



TYPICAL INGOT CAP SECTION

NTS

2 / 0100-CD-002



TYPICAL NORTH/NORTH 2 LANDFILL CAP SECTION

NTS

3 / 0100-CD-002

PRELIMINARY

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: EXISTING CAP SECTIONS

DESIGN:	DRS	START DATE:	2/3/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/3/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER: 0100-CD-004 | SHEET: 1/1 | REV.

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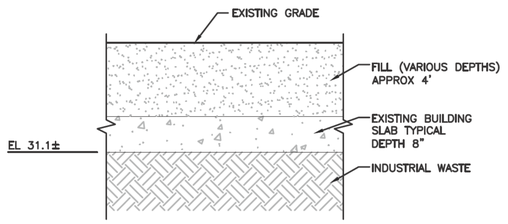
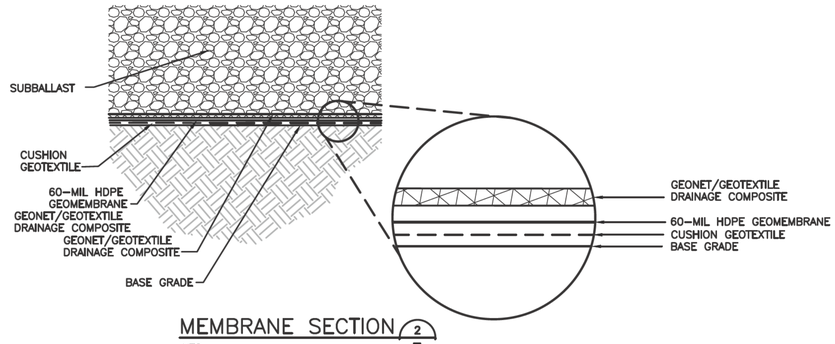
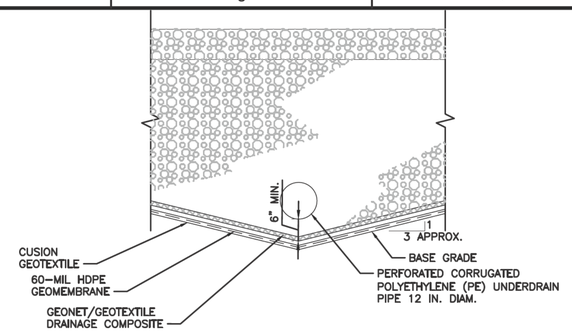


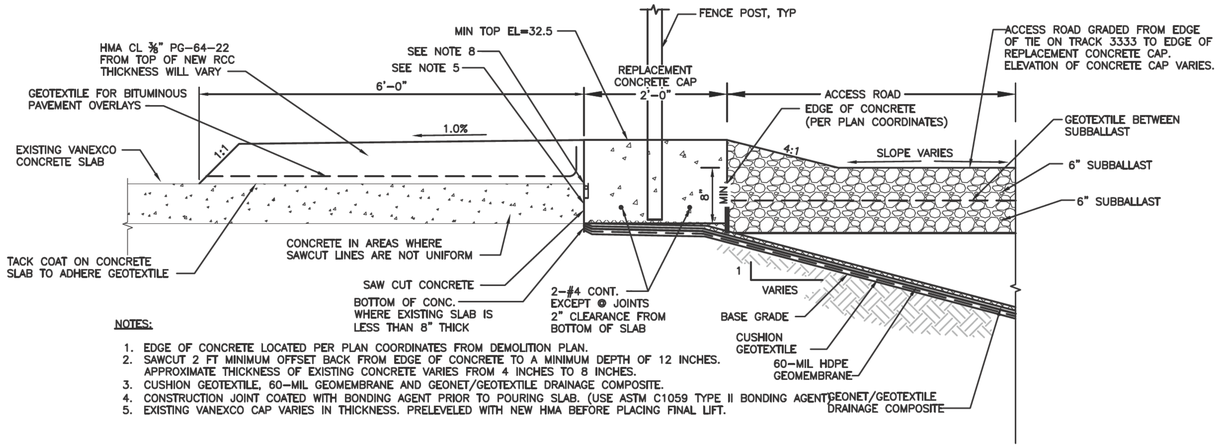
VANEXCO/ ROD MILL CONCRETE SECTION 1
NTS



MEMBRANE SECTION 2
NTS

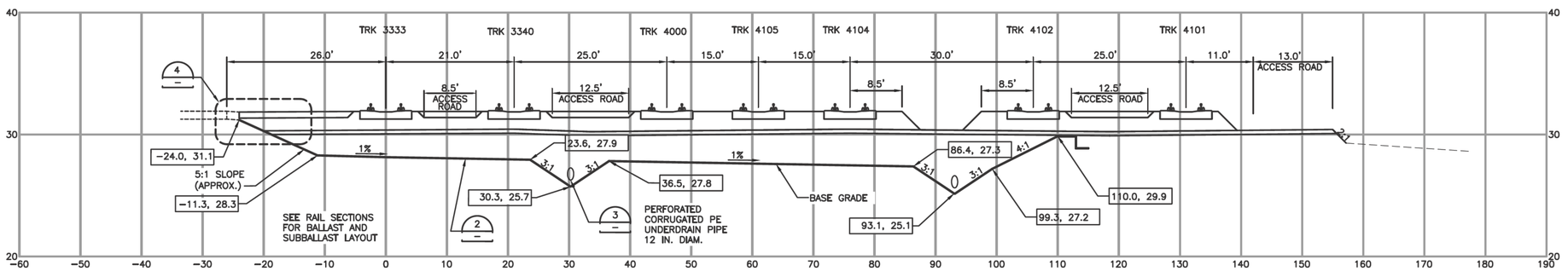


UNDERDRAIN PIPE SECTION 3
NTS



NOTES:
1. EDGE OF CONCRETE LOCATED PER PLAN COORDINATES FROM DEMOLITION PLAN.
2. SAWCUT 2 FT MINIMUM OFFSET BACK FROM EDGE OF CONCRETE TO A MINIMUM DEPTH OF 12 INCHES. APPROXIMATE THICKNESS OF EXISTING CONCRETE VARIES FROM 4 INCHES TO 8 INCHES.
3. CUSHION GEOTEXTILE, 60-MIL GEOMEMBRANE AND GEONET/GEOTEXTILE DRAINAGE COMPOSITE.
4. CONSTRUCTION JOINT COATED WITH BONDING AGENT PRIOR TO POURING SLAB. (USE ASTM C1059 TYPE II BONDING AGENT)
5. EXISTING VANEXCO CAP VARIES IN THICKNESS. PRELEVELED WITH NEW HMA BEFORE PLACING FINAL LIFT.

CONCRETE CAP CONNECTION DETAIL 4
NTS



VANEXCO LINER SECTION
SCALE: 1"=10' HORIZ
1"=5' VERT

PERMIT SET
NOT FOR CONSTRUCTION

PRELIMINARY

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
EXISTING VANEXCO SECTIONS

DESIGN:	DRS	START DATE:	2/9/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/9/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-005	1/1	

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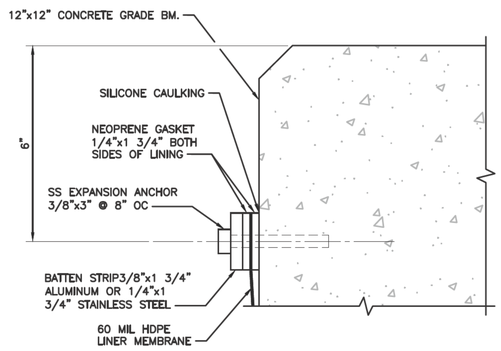
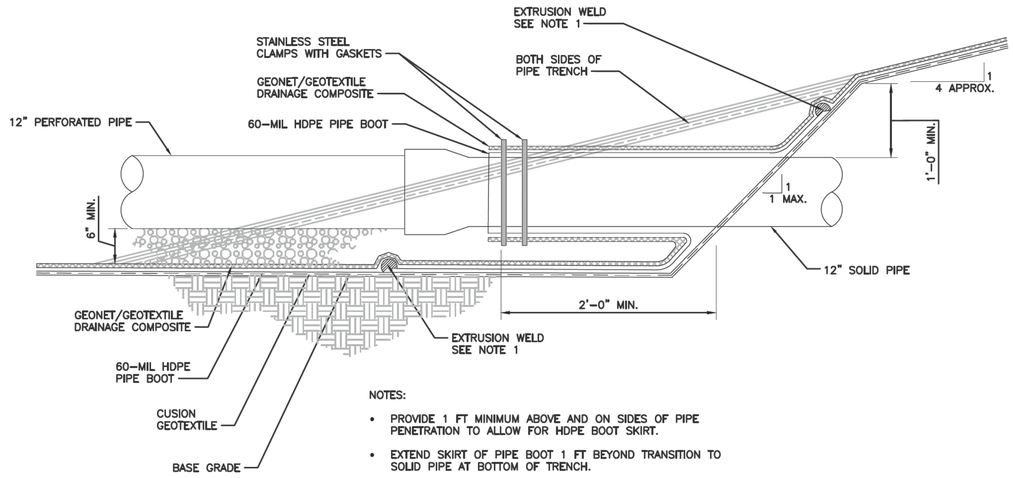


MEMBRANE/GRADE BEAM CONNECTION (1)
NTS



NOTES:

- PROVIDE 1 FT MINIMUM ABOVE AND ON SIDES OF PIPE PENETRATION TO ALLOW FOR HDPE BOOT SKIRT.
- EXTEND SKIRT OF PIPE BOOT 1 FT BEYOND TRANSITION TO SOLID PIPE AT BOTTOM OF TRENCH.

MEMBRANE PIPE PENETRATION BOOT (2)
NTS

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS — STATE OF WASHINGTON — 27330 — REGISTERED PROFESSIONAL ENGINEER — PRELIMINARY

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: VANEXCO RESTORATION DETAILS

DESIGN:	DRS	START DATE:	2/2/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/3/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24X36

DRAWING NUMBER	SHEET	REV.
0100-CD-006	1/1	

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Appendix D.8

Contaminated Media Management Plan

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Vancouver Energy
Contaminated Media Management Plan

Plan No. C.02 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 27 February 2015

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Vancouver Energy
Contaminated Media Management Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
27 February 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	27 February 2015	Submittal for Application Review

Vancouver Energy
Contaminated Media Management Plan

Table of Contents

Section

1. Introduction and Background 1
1.1 Purpose of Plan 1
1.2 Regulatory Requirements 1
1.3 Related Documents 3
2. Existing Site Conditions 3
2.1 Soil and Groundwater Conditions 7
3. Proposed Construction Activities 7
4. Potential Contaminated Media Impacts 9
5. Contaminated Media Handling and Disposal 9
5.1 Soil Excavation 12
5.2 Groundwater 13
5.3 Unanticipated Discoveries 13
5.4 Decontamination Procedures 13
6. Bibliography 14
7. List of Acronyms and Abbreviations 15

List of Tables

Table 1. Summary of the Deed Restricted Areas at the Proposed Project Site 5
Table 2. Summary of Proposed Ground Disturbing Activities at the Project Site 8
Table 3. MTCA and Port of Vancouver Fill Acceptance Criteria 10
Table 4. Soil and Groundwater Analysis Requirements for Restricted Areas 12

List of Figures

Figure 1. Site Plan 2
Figure 2. Contaminated Media Locations 4

List of Appendices

Appendix A. Vanexco Cap Engineering Drawings
Appendix B. Port of Vancouver Fill Sampling and Acceptance Criteria

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1. Introduction and Background

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 - Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 –Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude per day. Six nominal capacity 380,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move oil from Area 200 directly to Area 400. The Terminal is operated 24 hours a day, 7 days a week.

1.1 Purpose of Plan

This contaminated media management plan (CMMP) describes how Vancouver Energy will: (1) maintain the effectiveness of remedial measures previously undertaken at the site; (2) prevent the release or exposure to the environment of contaminated media remaining on site or the creation of new exposure pathways; (3) minimize risks to worker health/safety and the environment by disclosing the presence of known contaminants on the site; (4) conduct work in accordance with applicable consent decrees, agreed orders and related environmental restrictive covenants; (5) and handle and dispose of contaminated soil and groundwater that may be encountered during ground-disturbing construction activities. This CMMP establishes a framework for a contractor CMMP to govern procedures related to contaminated media that may be encountered at the site. Procedures for handling unanticipated/suspected contaminated materials are also addressed. Accordingly, this CMMP

- Identifies the locations where construction is expected to adversely disrupt caps or contaminated soils
- Describes measures that will be used to minimize disruptions; properly test, handle, store, and dispose of suspected or confirmed contaminated soils
- Identifies general cap restoration requirements

This CMMP applies to areas where ground-disturbing activities will occur in restricted areas of the site during construction and also addresses unanticipated discoveries of potentially contaminated media. Ground-disturbing construction activities will include tree/vegetation removal, grading, excavation for foundations and below-ground Facility components, relocation of on-site services/utilities, relocation of existing Port rail lines, and installation of ground improvements. This CMMP does not apply to Facility operations.

1.2 Regulatory Requirements

This CMMP is implemented so that construction activities are in compliance with the following regulatory requirements.

- Washington Administrative Code (WAC) 173-303
- WAC 463-60-352 (3) as applicable
- Code of Federal Regulations (CFR) 260-268

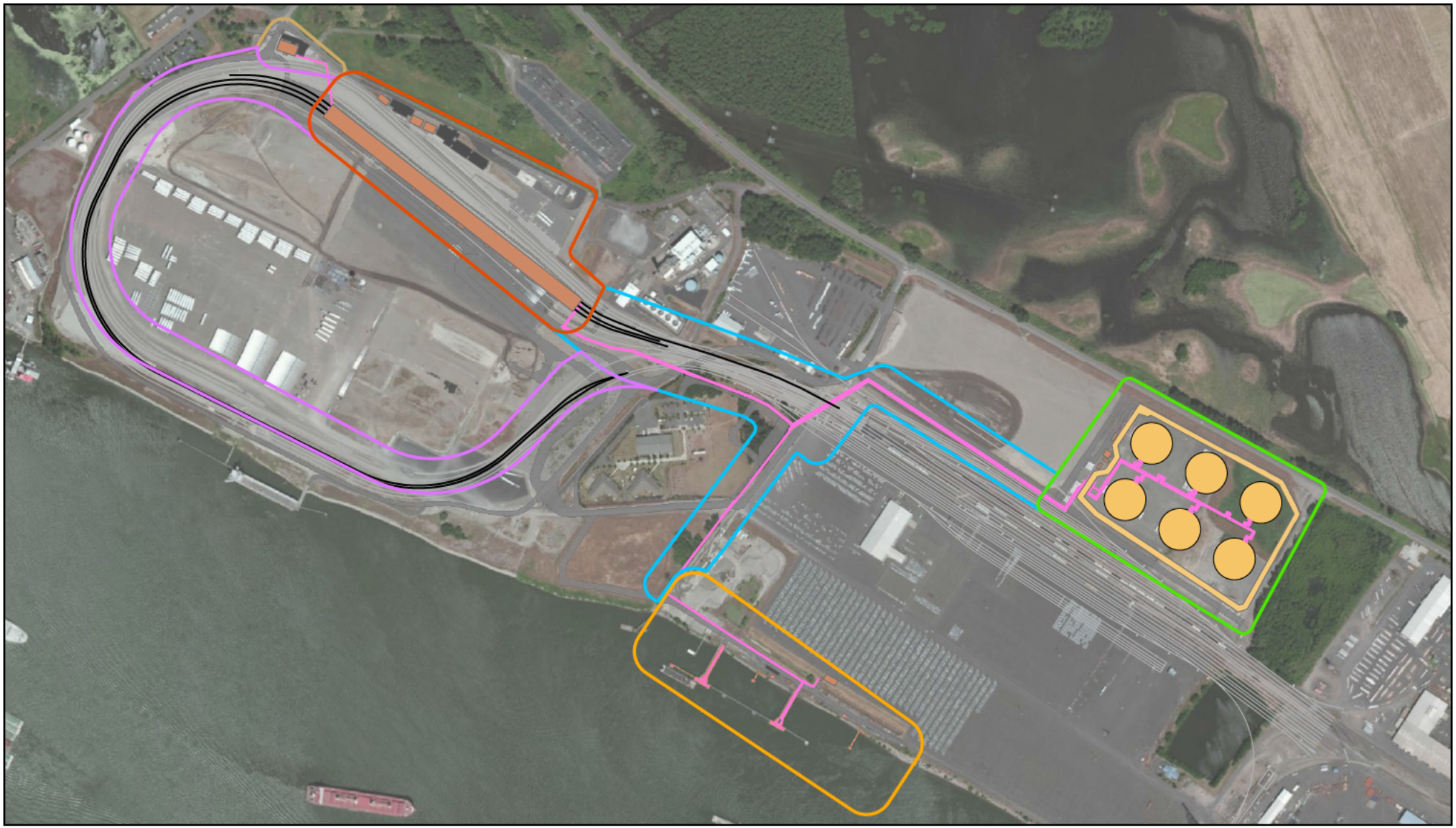

Figure 1 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000
Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

1.3 Related Documents

The following documents and plans implement additional protective measures and procedures in addition to those presented in this CMMP.

- Construction Stormwater Pollution Prevention Plan (SWPPP) – the construction SWPPP describes the site conditions and proposed construction activities in detail and enumerates the mitigation measures and best management practices (BMPs) that apply to each activity. Part of the construction SWPPP deals with managing materials that are or could be hazardous that are used and/or stored on site—paint, petroleum, solvents, etc. In contrast, the CMMP addresses contaminated media already at the site and how to manage it if encountered (or excavated, etc.).
- Construction Spill Prevention, Control, and Countermeasures Plan (SPCCP) – the construction SPCCP outlines BMPs, response actions in the event of a release, and notification and reporting procedures. The construction SPCCP also outlines management elements, such as personnel responsibilities, construction site security, site inspections, and training. Finally the construction SPCCP lists spill response equipment and where such equipment is maintained on site.
- Construction Health and Safety Plan – this plan provides personnel protective measures for construction activities conducted within areas of known or suspected contamination.
- Construction Security Plan – this plan prevents access to construction site by non-authorized personnel and public.

2. Existing Site Conditions

The Facility site consists of approximately 47.4 acres adjacent to the Columbia River. Portions of the Facility are being constructed at the former location of the Evergreen/ALCOA aluminum smelter site. Historic site use as an aluminum smelter resulted in soil and groundwater contamination with the following contaminants of concern (COCs): polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), fluoride, cyanide, volatile organic compounds (VOCs), and metals. Multiple regulatory orders have been implemented at the site in accordance with the Washington State Model Toxics Control Act (MTCA) and the Washington State Department of Ecology (Ecology) Toxics Cleanup Program. As of 2010, all of the remedial action work (other than monitoring) have been completed at the site. Current conditions and applicable restrictions at the site are summarized in Table 1.

Areas of the site and/or adjacent to the site are restricted for use because of the presence of subsurface soil and/or groundwater contamination remaining at the site following the remedial actions. In some areas, contaminated soil with low concentrations of contaminants was consolidated, capped, and left on site under the approved cleanup plans.

Currently there are six “deed restricted” or “capped/covered” areas where construction is proposed that contain contaminants at concentrations that exceed MTCA cleanup levels. These areas are shown on Figure 2. There may be additional areas where construction activities could encounter previously unidentified contaminated material. The management protocols discussed in section 5 of this plan apply to known areas of contamination and other potentially contaminated materials that could be inadvertently discovered during construction.

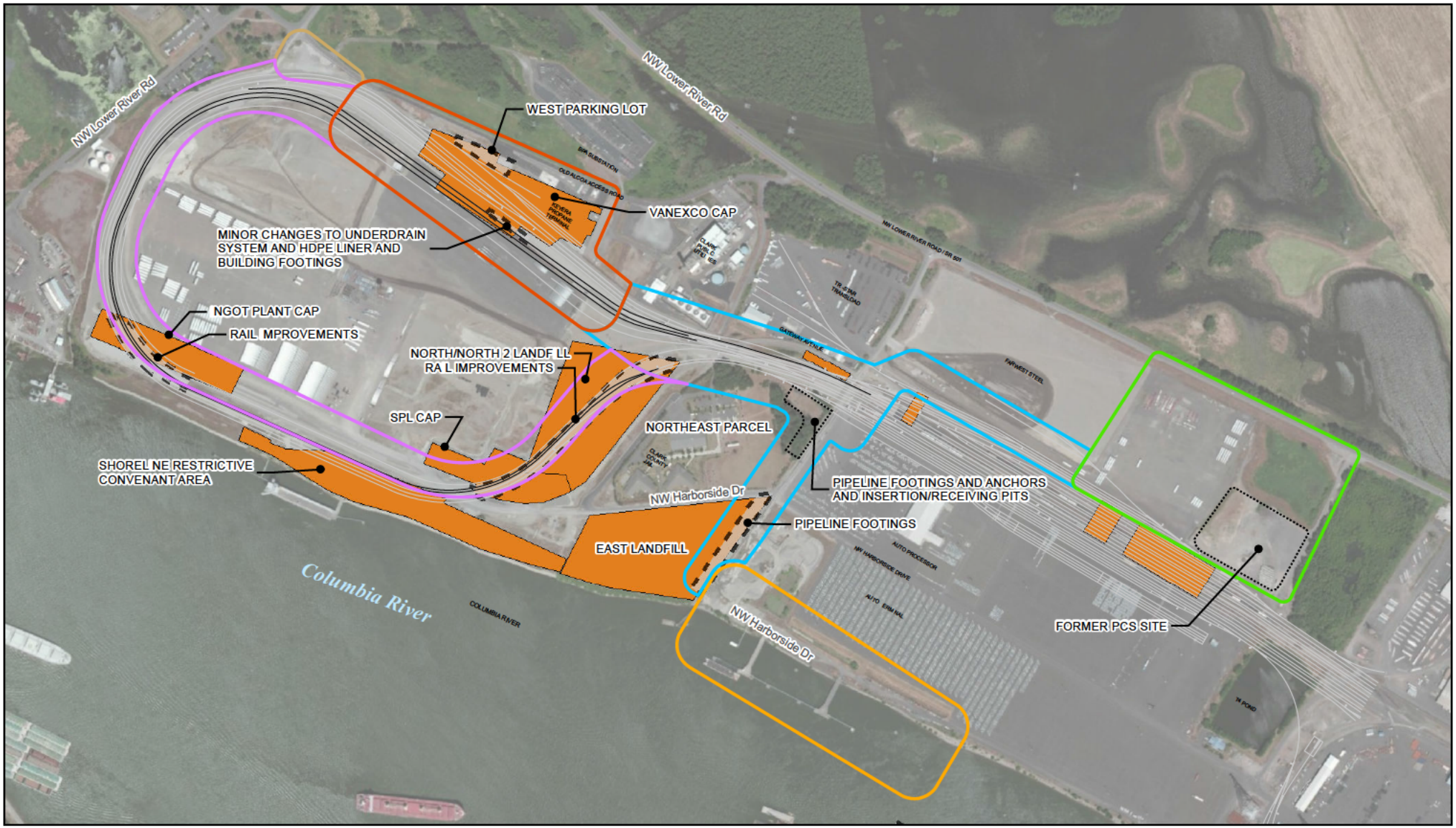

Figure 2 - Contaminated Media Locations

LEGEND

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

- Environmental Covenant Areas
- Limits of Construction Activity within Deed Restricted Area

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerail photo dated July 2010, courtesy of ESRI World Imagery service

0 250 500 1,000

Feet

N

Table 1 below summarizes the deed restricted/capped areas that could be impacted during construction of the proposed Facility.

Table 1. Summary of the Deed Restricted Areas at the Proposed Project Site

Area (see Fig 2)	Summary	Contaminants of Concern[1]		Regulatory or Cleanup Status
		Soil	Groundwater	
Ecology/ALCOA Consent Decree 95-2-03268-4				
Vanexco Cap	PCB impacted soil removal occurred in 1992. Groundwater monitoring from 1996 through 2001 indicated that groundwater is not affected by residual PCB impacted soils. The building foundations and floor slabs were left in place to form a cap over the contaminated soils as required by the Consent Decree. Approximately 4 feet of surface material was placed above the foundation and is sloped to provide drainage away from the area or the foundation is replaced with an impervious layer and stormwater control facilities are located above the layer.	PCBs – (concentrations up to 2,000 ppm left in soil and 16,000 ppm in concrete pit chip samples left in place after EPA approval in 1992) and hydraulic oil (greater than 2,000 ppm. 9 feet below the ground surface	No COCs detected (depth ranges from approximately 15 feet to 25 feet bgs)	Deed restricted site with no further remedial action required. The construction and groundwater monitoring portions of the Consent Decree have been completed. Ecology approved disturbance of the Vanexco cap during rail improvement construction in 2009.
Ecology/ALCOA Consent Decree 92-2-00783-9				
Spent Pot Liner (SPL) Cap	A former EPA NPL site; 47,500 cubic yards of SPL and reclaimed alumina insulation were removed in 1992. The residual affected soils were capped with a high-density polyethylene (HDPE) cover. In 2010, the Port placed a specially engineered double-layered asphalt cap over the HDPE cover.	Cyanide (concentrations up to 491 mg/kg) and fluoride (concentrations up to 2,500 mg/kg) Potentially extending from the HDPE cover to approximately 15 feet bgs, the vertical point of compliance defined in the Final 2008 Corrective Action Plan	Fluoride (concentrations up to 27,500 ug/l)	Deed restricted area. No further remedial actions are required. The operation and maintenance activities consisting of groundwater monitoring, institutional controls and cover maintenance continue. Ecology approved disturbance of the SPL cap during rail improvement construction in 2009.
Ecology/Evergreen Enforcement Order 4931				
Ingot Cap	Approximately 14,000 tons of brick, concrete, and soil were removed and the area was covered with 1 foot of soil. Subsequently the Port has placed additional material over the capped area to raise the site grade.	PCBs at concentrations less than 10 mg/kg are estimated to be present from 1 foot bgs to the depth of the groundwater surface, between approximately 15 and 25 feet bgs	None detected	Deed restricted area. No further remedial action required.

[1] Anchor Environmental LLC, 2008. "ALCOA/Evergreen Vancouver Site RI/FS"

Area (see Fig 2)	Summary	Contaminants of Concern[1]		Regulatory or Cleanup Status
		Soil	Groundwater	
Ecology/ALCOA Agreed Orders DE90-I053 and DE03 TCPIS-5737				
North/North 2 Landfill	In 2004 approximately 38,000 cubic yards of contaminated soil at the North/North 2 Landfill site was removed and the area was covered with 1 foot of sand.	Concentrations likely present up to the following industrial MTCA site soil clean levels: PCBs (up to 10 mg/kg),PAHs (20 mg/kg), VOCs (up to 0.03 mg/kg trichloroethylene [TCE]) (estimated to be present from 1 foot bgs down to at least groundwater level)	VOCs [vinyl chloride at 3.3 micrograms per liter (ug/l)], PAHs [benzo(a)-pyrene up to 0.30 ug/l] and PCBs (up to 2 ug/l) Groundwater level is estimated at 15 to 25 feet bgs.	Deed restricted area with no further remedial action required.
Ecology/ALCOA Consent Decree 09-2-00247-2				
East Landfill	Contaminated material from the South Bank and North/North 2 landfills were placed into the East Landfill in 2003. A multi-layer impermeable cap consisting of a geosynthetic liner and a clay layer covered with HDPE, a synthetic drainage net, a 19-inch layer of compacted fill soil, a 6-inch layer of soil and vegetation was placed over the East Landfill in 2004. The shoreline adjacent to the East Landfill was armored to help stabilize the riverbank and engineered cap.	Lead, cyanide, fluoride, PCBs (concentrations exceeding 10 mg/kg), petroleum hydrocarbons, VOCs (concentrations potentially exceeding 0.03 mg/kg for TCE) and PAHs (concentrations potentially exceeding 20 mg/kg) (estimated present in soil below approximately 2 feet bgs)	VOCs: (TCE, vinyl chloride) (TCE concentrations up to 620 ug/L in the intermediate zone)	The area is capped and monitored for natural attenuation by conducting quarterly groundwater sampling.
Ecology/Alcoa Agreed Order DE97 TCI032				
Northeast Parcel	In 1997 approximately 12,000 tons of contaminated soil were removed from the Northeast Parcel. Confirmation soil samples indicated that the site was remediated in accordance with MTCA Method A unrestricted use soil cleanup levels. The area was covered with clean fill compacted, graded for proper surface water drainage, and vegetated.	PCBs, metals, and PAHs (estimated to be present below groundwater depth at concentrations less than MTCA Method A CULs.	VOCs (vinyl chloride – 6.6 ug/l) Groundwater level is estimated at about 10 feet bgs (Hahn and Associates, 2013)	Remediated and covered; no further remedial action required.

2.1 Soil and Groundwater Conditions

The dominant native soil type at the site is silt or clay between 15 and 25 feet thick. This soil is overlain by fine to medium dredge sand fill that varies from 15 to 25 feet thick. Crushed concrete and imported fill rock lie above the dredge sands throughout the site.

Four hydrogeologic zones have been identified at the site. The shallow zone consists of dredge fill sand ranging from 7 to 25 feet. The presence of groundwater varies with the seasons and may be locally perched on the underlying silts. The intermediate zone ranges from 15 to 35 feet below ground surface (bgs) and is comprised of silt, fine sand, and clay. The deep zone is 40 to 60 feet of fine to medium sand. The aquifer zone (Unconsolidated Sedimentary Aquifer or USA) extends from 95 to 125 feet bgs. This zone consists of coarse-grained flood deposits.

Groundwater at the site is expected to flow south towards the Columbia River.

3. Proposed Construction Activities

Construction of the facility that will occur in restricted areas includes

- **Vanexco Cap—**(1) Parking facilities and a portion of the rail unloading area within the Vanexco/Rod Mill restricted covenant area (see Figure 2). The parking facilities do not require deep excavations and will not penetrate the cap; new pavement will serve as an additional impervious layer to prevent precipitation from reaching the existing PCB-contaminated soils. (2) Approximately 250 linear feet of the northern edge of the rail unloading area; this will be located above the cap and will not penetrate the cap. (3) Erection of the rail unloading structure will require excavation for concrete foundations and driving piles within the cap area, and modification of the underdrain system and HDPE liner.
- **Ingot Plant Cap—**One additional rail loop will be constructed within the ingot plant area. Excavation into or beneath the 1-foot-thick cap will not be necessary.
- **Spent Pot Liner Cap—**One additional rail loop may be constructed within the SPL storage area. The cap consists of an HDPE liner and asphalt pavement. Excavation into the cap and exposure of the contaminated materials the cap covers will not be necessary.
- **North/North 2 Cap—**Two additional rail loops will be constructed within the North/North 2 area. Excavation into the cap will not be necessary.
- **East Landfill—**Construction within the east landfill cap area consists of grading a suitable level bench within the area to construct foundations for the aboveground crude oil pipeline. Improvements in this area are designed to not impact the engineered cap.

A portion of improvements related to Area 300 - Storage will be constructed in an area previously occupied by Pacific Coast Shredding (PCS). PCS had a two-year lease to store heavy melting steel material at the site. As a result of the heavy melting steel storage activities, soil was contaminated with petroleum hydrocarbons (low levels), PAHS, heavy metals (primarily cadmium), and PCBs. The contamination was confined to a 5-acre portion in the southeast portion of the Port's Parcel 1A (see Figure 2). Approximately 2,600 cubic yards of soil was excavated from the site at depths ranging from 1 inch (east end) to 20 inches. The excavated soil is currently stockpiled pending transport to a landfill. Groundwater was not encountered during the excavation. The Port collected baseline (background) soil samples and excavation confirmation soil samples. Five groundwater samples were also collected. Results from the confirmation soil and groundwater samples did not exceed MTCA unrestricted cleanup levels.

Proposed construction elements with respect to contaminated media and excavation depths are summarized in Table 2 below. Proposed activities to be located in the capped areas are shown on Figure 2.

Table 2. Summary of Proposed Ground Disturbing Activities at the Project Site

Construction Area	Capped/Known Contaminated Area (see Figure 2)	Excavation		Will the Capped or Contaminated Material Be Impacted?
		Activity	Approximate Depth (feet below the existing ground surface)	
Area 200 (Unloading and Office Area)	Vanexco	West Parking Lot	4	No, the proposed excavations will occur above the concrete Vanexco cap and will not remove or penetrate the cap.
		Northern Edge of Rail Unloading	4	
		Footings for the rail unloading building and associated minor modifications to the underdrain system and HDPE liner	6	Yes, excavation will occur about 2 feet below the liner. The liner will be attached to the footing so that an impermeable surface is maintained. Please see the engineering drawings for details on how the cap will be repaired attached as Appendix A.
Area 500 (Transfer Pipelines)	East Landfill	Transfer pipeline footings and anchors	8	No, the excavations are designed to be outside of the landfill limits.
	Northeast Parcel	Pipeline footings and anchors	8	Yes. Groundwater, if present in excavations, is suspected to be contaminated with VOCs (vinyl chloride). According to a 2013 subsurface investigation completed by Hahn and Associates vinyl chloride was detected in groundwater at concentrations greater than MTCA adjacent to the west/southwest of the proposed excavations. Groundwater conditions within the proposed excavation are not known. Excavation will not occur within the capped area of the Northeast Parcel.
		Insertion/receiving pits	12	
Rail Line	Ingot Cap, North/North 2 Cap, and SPL Cap	Rail improvements	1 to 2	No, the excavations are designed to occur above the caps.
Area 300 (Storage)	Former PCS Site (southeast corner)	Pump vaults	15	No, soil and groundwater have been cleaned up at this site. The Port has notified Ecology of these activities (Ecology, 2014).
		Stone columns	70	

4. Potential Contaminated Media Impacts

The potential for contaminated media impacts summarized below will be managed via a contractor-created CMMP prepared in accordance with the guidance provided in this document, the project health and safety plan, and project-specific BMPs contained in the project SWPPP The contractor CMMP will be reviewed for compliance with this guidance document.

Mobilization of contaminated soil within and beyond the boundaries of the site could result from construction activities via the following mechanisms.

- Erosion of contaminated soil by stormwater from uncontrolled/unprotected excavations
- Stormwater erosion or entrainment of contaminants and/or contaminated soil from unprotected stockpiles of excavated material
- Stormwater mobilization of contaminants through the site or off site from improperly controlled stormwater management and flow through excavations, stockpiled soil, and/or improper handling of dewatering water
- Vehicle traffic
- Improper dust control
- Slope destabilization resulting from construction activities, including improperly sloped/shored excavations, improper dewatering protocols, etc.

Contaminated groundwater may be encountered in the areas identified in Tables 1 and 2 (unloading area footings, pipeline footings, anchors, and inserting/receiving pits). Groundwater contamination may also be present in other areas at the site and may be encountered during excavations. Groundwater encountered throughout the site during construction should be assumed to be contaminated. Impacts associated with contaminated groundwater at the site include the following.

- Mobilization of contaminants by increasing stormwater recharge of the groundwater from impervious surface (concrete, asphalt, etc.) removal
- Creation of preferred pathways for contaminated groundwater when installing utilities, foundations, etc.
- Improper handling of dewatering processes and management of potentially contaminated groundwater

Activities in locations of known contamination will include the following general mitigation measures.

- Areas that are disturbed or removed as part of final construction will be covered with at least 1 foot of clean soil fill to prevent a future direct contact hazard. Where new pavement is placed, it will substitute for 1 foot of clean fill to prevent a future direction contact hazard.
- Soils that are excavated will either be direct loaded or stockpiled, sampled, and analyzed for PAHs and total petroleum hydrocarbons and other parameters based on the anticipated contaminants, and disposed of off site, or reused on site in accordance with applicable regulations and covenant restrictions.
- Groundwater that is pumped out of the excavations will be collected, stored, characterized, and treated in accordance with state and federal regulations prior to disposal.
- Stormwater generated in construction areas with known soil contamination will be collected, managed, treated, and disposed of in accordance with the Facility National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit.
- Standard dust control measures, such as spraying exposed soil surfaces with water, will be employed during construction to prevent the release of airborne particulates.
- Construction workers will employ appropriate health and safety measures during the handling of contaminated soils.

5. Contaminated Media Handling and Disposal

Soil and groundwater encountered in restricted areas of the site and any suspected contaminated soil or water will be handled/disposed of in accordance with procedures described in this document, including transport to an approved location and storage in a lined container or stockpile that is covered and

protected from wind/stormwater erosion pending further analysis, reuse and/or off-site disposal. Handling and disposal procedures will include

- Protocols for tracking all excavated soil and/or groundwater from site of origin through disposal or reuse will be established and used throughout construction activities.
- Contaminated soil will be separated and stored on an impervious surface or in containers until it can be transported to an appropriate facility or reused as fill material.
- Soil will be reused on site if it meets the Port's fill acceptance criteria included as Table 3 below.

Table 3. MTCA and Port of Vancouver Fill Acceptance Criteria[2]

Analyte	Port Guidance Tier 1[(1,2)] (mg/kg)	MTCA Method A Soil Cleanup Levels for Unrestricted Land Use (mg/kg)	MTCA Method B Soil Cleanup Levels for Unrestricted Land Use (mg/kg)	MTCA Method C Soil Cleanup Levels for Industrial Land Use (mg/kg)
EPA Priority Pollutant Metals				
Antimony	15.5	NE	32	1,400
Arsenic	10	20	24	8,750
Beryllium	150	NE	1,600	7,000
Cadmium	1	2	80	3,500
Chromium	9.5	19	240	1.10E+07
Copper	3,100	NE	3,200	1.40E+05
Lead	125	250	NE	NE
Mercury	1	2	NE	NE
Nickel	1,600	NE	1,600	70,000
Selenium	390	NE	400	17,500
Silver	390	NE	400	17,500
Thallium	NE	NE	0.8	35
Zinc	23,000	NE	24,000	1.10E+06
cPAHs				
Benzo (a) anthracene (TEF 0.1)	NE	MTCA Method A clean up level for the sum of all cPAHs	1.37	180
Benzo (a) pyrene (TEF 1.0)	0.05		0.137	18
Benzo (b) fluoranthene (TEF 0.1)	NE		1.37	180
Benzo (k) fluoranthene (TEF 0.1)	NE		13.7	1,800
Chrysene (TEF 0.01)	NE		137	18,000
Dibenz (a,h) anthracene (TEF 0.1)	NE		0.137	18
Indeno (1,2,3-cd) pyrene (TEF 0.1)	NE		137	180
Total TEQ cPAHs	--	0.1	--	--

[2] For the purposes of this document, the contaminants listed in this table reflect only potential contaminants of concern at the project site. See the Port's 2014 Fill Acceptance Criteria Document included as Appendix B for additional information.

Analyte	Port Guidance Tier 1[1,2] (mg/kg)	MTCA Method A Soil Cleanup Levels for Unrestricted Land Use (mg/kg)	MTCA Method B Soil Cleanup Levels for Unrestricted Land Use (mg/kg)	MTCA Method C Soil Cleanup Levels for Industrial Land Use (mg/kg)
Chlorinated VOCs				
Trichloroethylene	0.015	0.03	12	2.85E+03
Vinyl Chloride	NE	NE	2,400	1.05E+04
PCBs				
PCB Sum[1]	0.5	1	NE	NE
Petroleum Hydrocarbons				
GRO without Benzene[1]	50	100	NE	NE
Other GRO[1]	15	30	NE	NE
DRO	1,000	2,000	NE	NE
Heavy Oil	1,000	2,000	NE	NE

Notes:

[1] Tier 1 Port Guidance Levels are generally one-half of the MTCA Method A concentrations

[2] If concentrations are higher than Tier 1, the approval to replace on site is subject to more stringent analysis by the Port's Environmental Department prior to acceptance

GRO = Gasoline Range Organics

DRO = Diesel Range Organics

cPAHS = carcinogenic polynuclear aromatic hydrocarbons

NE = not established

TEF = toxic equivalency factor

TEQ = toxic equivalent

Soil analysis will be conducted by an accredited analytical laboratory for the following COCs and laboratory methods. COCs for known areas of contamination are identified in Table 4.

- PCBs using EPA Method 8082
- PAHs using EPA Method 8270-SIM
- VOCs (including TCE and vinyl chloride) using EPA Method 8260B
- Priority Pollutant 13 Metals using EPA Methods 6010C/200.8/7471
- Cyanide using EPA Method 9016
- Fluoride EPA Method 9214
- Petroleum hydrocarbons using NWTPH-HCID

Groundwater and/or dewatering water encountered at the site from the areas identified in Tables 1 and 2 and/or groundwater suspected of contamination will be analyzed by an accredited analytical laboratory for the COCs by the methods indicate below. COCs for known areas are identified in Table 4.

- VOCs (including TCE and vinyl chloride) using EPA Method 8260B
- PAHs using EPA Method 8270-SIM
- Fluoride EPA Method 9214

Table 4. Soil and Groundwater Analysis Requirements for Restricted Areas

	PAHs	VOCs	Metals	PCBs	Cyanide	Fluoride	Petroleum Hydrocarbons	PAHs	VOCs	Metals	PCBs	Cyanide	Fluoride[3]	Petroleum Hydrocarbons
Restricted Area (see Fig 2)	**Soil**							**Groundwater**						
Vanexco Cap				X			X				X		X	
Spent Pot Liner Cap					X	X							X	
Ingot Cap				X							X		X	
North/North 2 Landfill	X	X	X	X	X	X			X		X		X	
East Landfill	X	X	X	X	X	X	X	X	X		X		X	

All contaminated media encountered at the site, whether identified prior to or during construction, will be handled in accordance with the following BMPs. All hazardous materials removed from the site will be disposed in a manner that meets all local, state, and federal regulations.

- Contaminated soil stored on site will be covered to prevent contact with rain/stormwater.
- Stockpiled contaminated soil will be isolated (temporary fencing, roping off, signs etc.) from site workers and activities and clearly designated as accessible only as authorized by persons with hazardous waste operations and emergency response (HAZWOPER) training.
- Contaminated groundwater from dewatering excavations will be collected, stored, and characterized for appropriate disposal. Analytical results will be used to determine the appropriate disposal facility to which it can be transported and disposed.
- Infiltration of stormwater will be avoided in the identified capped areas to the maximum extent possible; potentially contaminated groundwater collected during dewatering will not be disposed by on-site infiltration unless the analytical data show compliance with MTCA groundwater quality criteria.
- All contaminated media excavation, transport, and management will be conducted by workers trained in 40-hour HAZWOPER and in the proper use of personal protection equipment (PPE) and decontamination procedures. Hazardous materials handling training is discussed in more detail in the health and safety plan.

5.1 Soil Excavation

- Soil excavated from areas above existing caps will be stockpiled separately from materials excavated from areas beneath caps and can be reused as on-site backfill.
- Excavation of soils in areas of concern at depths known or suspected to have contaminated soil will be excavated and placed directly into a truck to be transported to the contaminated soil management area.
- Stockpile areas will be lined with HDPE or heavy-duty plastic to prevent stormwater infiltration into existing soils.
- Stockpile areas will be bermed to prevent stormwater flow into the stockpile and covered to prevent rain from infiltrating stockpiled soils.
- Stormwater runoff from the covered piles will be routed to a collection sump and transferred to a tank for storage, characterization, and disposal.
- Stockpiled soil will be sampled and submitted to a laboratory for analysis of chemicals of concern in accordance with their origin. Additional analyses, such as toxicity characteristic leaching procedure, may be required.

[3] Included for all sites due to a site-wide restrictive covenant for fluoride in groundwater.

- Soil with concentrations greater than Port criteria will be transported to an off-site landfill as appropriate based on the contaminants present, their concentrations, and waste disposal profile. Appropriate disposal facilities include, but are not limited to, the Waste Management Hillsboro Landfill in Hillsboro, Oregon; Waste Connection Wasco Landfill in The Dalles, Oregon Cowlitz County Landfill; and Chemical Waste Management in Arlington, Oregon.
- Contaminated soils will be transported by rail or truck to the landfill facility in accordance with Washington's waste transport regulations (Washington Administrative Code 173-303-250).
- Waste disposal manifests and transport records will be maintained and submitted to the project engineer and the Port.
- If the soil meets the Port's fill acceptance criteria, it can be reused on site as backfill.

5.2 Groundwater[4]

Groundwater encountered and removed from excavations during construction activities in areas of known contamination will be handled as follows.

- All groundwater removed from a contaminated area will be captured and transferred to holding tanks for characterization and disposal.
- If the water meets the City's disposal criteria, it will be treated on site and disposed of via the City's sanitary sewer system; or if the water does not exceed state water quality levels, it will be managed in accordance with the Facility NPDES Construction Stormwater Permit requirements. If the dewatering water exceeds the City or state criteria, it will be removed by a licensed commercial waste disposal facility for off-site treatment and disposal

5.3 Unanticipated Discoveries

Soil, groundwater, and/or other materials in "unrestricted" areas that exhibit the following characteristics will be designated as suspected of contaminated media.

- Visible staining or unusual color
- Presence of black granular material
- Unusual odor
- Presence of debris
- Presence of visible sheen

The following actions will be taken if suspected contaminated media are encountered in areas not previously identified as restricted or contaminated.

- Work will be stopped in the suspect area.
- The Port, Vancouver Energy, and Ecology will be notified immediately.
- The nature and extent of the contaminated media will be evaluated.
- Handling, characterization, and appropriate disposal or reuse will be conducted in accordance with the procedures described in this CMMP.

5.4 Decontamination Procedures

Decontamination procedures will be required for all personnel and equipment working with and/or contacting potentially contaminated media. Decontamination stations will be established and used as needed in the known areas of contaminated media in accordance with work activities. The decontamination areas will be located adjacent to contaminated media work areas and will include

- Restricted access, limited to only people and equipment potentially contacting contaminated media.
- Designated decontamination zones with soap, water, and brushes for PPE and hand-operated tools and large equipment cleaning, along with a means to contain wash water.

[4] Note: Groundwater is expected to be encountered in only one construction area: the Northeast Parcel. See Table 2 for more information.

- Waste receptacles for used disposable PPE, such as gloves, booties, protective overalls, etc.
- Decontamination pads constructed of concrete, wood, or plastic sheeting to prevent wash water from infiltrating into the ground.
- Wash water will be will be captured and transferred to holding tanks for characterization and disposal.
- Each decontamination area will have a designated exit to “clean” zones.
- Water or steam for cleaning heavy equipment tires and body, soap and brushes and a means for capturing the water generated.
- Protocols and tracking methods for decontamination area use and disposal of generated waste and used water.

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7. List of Acronyms and Abbreviations

bbl: barrel and barrels

bgs: belowground surface

BMPs: best management practices

CFR: Code of Federal Regulations

City: City of Vancouver

CMMP: contaminated media management plan

COCs: contaminants of concern

DRO: diesel range organics

Ecology: Washington State Department of Ecology

EFSEC: Energy Facility Site Evaluation Council

EPA: U.S. Environmental Protection Agency

Facility: Vancouver Energy

GRO: gasoline range organics

HAZWOPER: hazardous waste operations and emergency response

HDPE: high-density polyethylene

MTCA: Model Toxics Control Act

NE: not established

NPDES: National Pollutant Discharge Elimination System

PAHs: polynuclear aromatic hydrocarbons

PCBs: polychlorinated biphenyls

PCS: Pacific Coast Shredding

PPE: personal protection equipment

ppm: parts per million

SPCCP: spill prevention, control, and countermeasures plan

SWPPP: stormwater pollution prevention plan

SPL: spent pot liner

TCE: trichloroethylene

TEF: toxic equivalency factor

TEQ: toxic equivalent

VOCs: volatile organic compounds

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Appendix D.9

Natural Resources Management Plan

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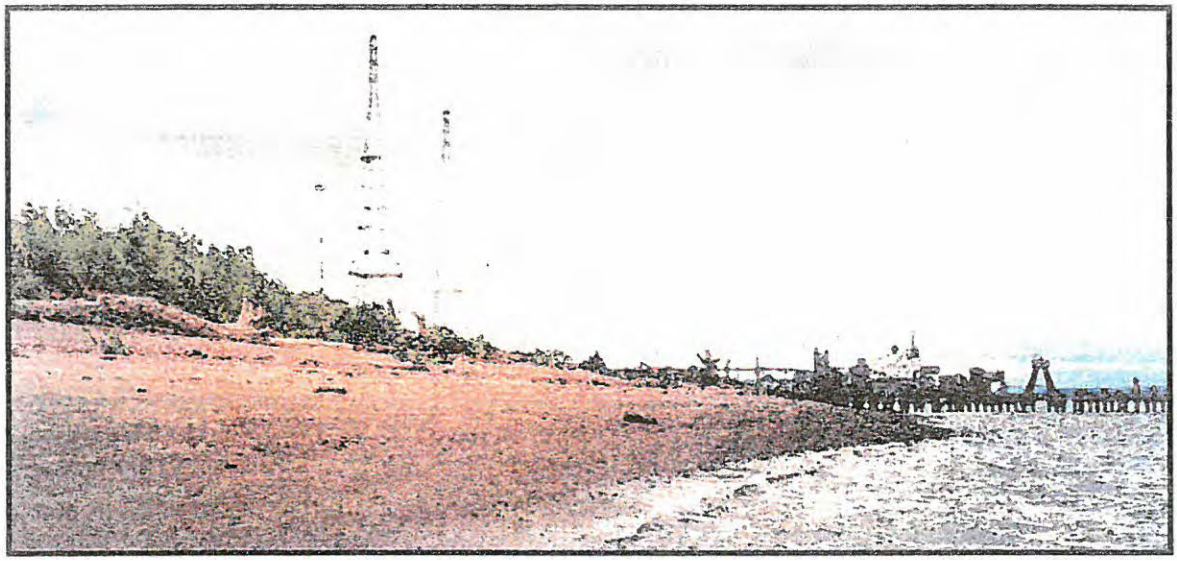
REEDER

Port of Vancouver USA

Natural Resources Inventory Management Plan



for

Port of Vancouver, USA
3103 NW Lower River Road
Vancouver, Washington

October 15, 2004

by

VIGIL AGRIMIS, INC.
819 SE Morrison Street, Suite 310
Portland, Oregon

and

Herrera Environmental Consulting
2200 Sixth Avenue, Suite 1100
Seattle, Washington

TABLE OF CONTENTS

INTRODUCTION 1
Purpose of the Natural Resources Inventory Management Plan 1
Scope of the Natural Resources Inventory Management Plan 4
Methods of the Natural Resources Inventory Management Plan 5
FRAMEWORK 6
Port of Vancouver Activity Areas 7
Port of Vancouver Natural Resource Areas 9
Port of Vancouver Permitting 10
Port of Vancouver Critical Intersections 11
NATURAL RESOURCES INVENTORY, MAPPING AND FUNCTIONAL ASSESSMENT 13
Landscape Level Natural Resource Examination 13
Natural Resources Inventory on the Port's Developed Property 14
Functional Assessment of Water Quality, Hydrology, and Food Webs and Habitat 19
Improving Functions in Aquatic and Shoreline Zones 25
HABITAT MANAGEMENT PLAN 34
Development and Maintenance Activities and Natural Resources 34
Avoiding and Minimizing Impacts 36
Mitigating for Unavoidable Impacts 37
Spatial Distribution of Mitigation Treatments 39
Mitigation Analysis 39
DISCUSSION AND CONCLUSIONS 44

Appendix B: Statistical Analysis of Slope Breaks 60
Appendix C: Design Details 61
Appendix D: Mitigation Survey Photographs 62
Appendix E: Costs 63

LIST OF FIGURES

INTRODUCTION 1
Figure 1. Site Context 2
Figure 2. Conceptual Diagram, Water – Shore – Land 4
FRAMEWORK 6
Figure 3. Port of Vancouver Zones – Conceptual Cross-Section Dock Facility 7
Figure 4. Port of Vancouver Zones – Conceptual Cross-Section Undeveloped Shore 9
Figure 5. Port of Vancouver Zones – Conceptual Cross-Sections Permitting 10
Figure 6. Port of Vancouver Zones – Conceptual Cross-Section Critical Intersection 12
NATURAL RESOURCES INVENTORY, MAPPING AND FUNCTIONAL ASSESSMENT 13
Figure 7. Landscape Level Examination 27
Figure 8. Transect Locations 28
Figure 9. Transect Cross-Sections Mean Spring Conditions 29
Figure 10. Transect Cross-Sections Ordinary High Water Conditions 30
Figure 11. Reference Cross-Sections Mean Spring Conditions 31
Figure 12. Reference Cross-Sections Ordinary High Water Conditions 32
Figure 13. Approximate Extent of Nearshore Habitat 33
HABITAT MANAGEMENT PLAN 34
Figure 14. Developed Shoreline – Conceptual Cross-Section Existing Conditions 36
Figure 15. Strategies for Avoiding and Minimizing Impacts 37
DISCUSSION AND CONCLUSIONS 44
Figure 16. Gradually Sloping Shoreline Treatments 47
Figure 17. Moderately Sloping Shoreline Treatments 48
Figure 18. Steeply Sloping Shoreline Treatments with Piles 49
Figure 19. Steeply Sloping Shoreline Treatments with Piles and Open Water 50
Figure 20. Steeply Sloping Shoreline Treatments with Dense Piles 51
Figure 21. Steeply Sloping Shoreline Treatments with Pile Removal 52
Figure 22. Steeply Sloping Shoreline Treatments with Partial Pile Removal 53
Figure 23. Nearshore Habitat Extent Based on Slope Classifications 54
Figure 24. Gradually Sloped Shoreline 55
Figure 25. Moderately Sloped Shoreline 56
Figure 26. Steeply Sloped Shoreline 57
Figure 27. Site Specific Mitigation Opportunities 58

LIST OF TABLES

INTRODUCTION 1
FRAMEWORK 6
Table 1. Columbia River Stage Conditions Referenced to Columbia River Datum (CRD) 6
Table 2. Port Facilities by Terminal 8
NATURAL RESOURCES INVENTORY, MAPPING AND FUNCTIONAL ASSESSMENT 13
Table 3. Summary of Transect Nearshore Bed and Bank Conditions 16
Table 4. Nearshore Habitat Quantities 18
Table 5. Generalized Assessment of Water Quality Functions 20
Table 6. Generalized Assessment of Hydrologic Functions 21
Table 7. Generalized Assessment of Food Web and Habitat Functions 22
HABITAT MANAGEMENT PLAN 34
Table 8. Development and Maintenance Activities and Locations 35
Table 9. Existing Wetland and Upland Locations 36
Table 10. Functional Impacts of Activities and Mitigation Options 41
Table 11. Preliminary Cost Estimate 43
DISCUSSION AND CONCLUSIONS 44

INTRODUCTION

Purpose of the Natural Resources Inventory Management Plan

The Port of Vancouver, USA (the Port) prepared this Natural Resources Inventory Management Plan (NRIMP) for its developed industrial property along the Columbia River. The NRIMP will facilitate the development, redevelopment and maintenance of Port property while limiting impacts to aquatic, shoreline and terrestrial habitats. This comprehensive plan will help the Port:

- Streamline the environmental permitting process,
- Avoid project delays by identifying appropriate mitigation/conservation options early in the project development process,
- Assist with budget process for facility improvements by providing cost estimates to implement mitigation options,
- Improve management of Port environmental assets,
- Avoid piece-meal mitigation planning,
- Meet or exceed local, state and federal agency requirements for comprehensive resource protection.

Figure 1 describes the site context for the NRIMP.

Three major sections are included in the NRIMP:

- Framework,
- Natural resources inventory, mapping and functional assessment,
- Habitat management plan.

The framework section reviews pertinent scientific literature, documents, maps and aerial photographs to describe existing conditions at the Port and to identify the key issues and themes addressed in the NRIMP. Preliminary mapping was followed by a natural resources inventory conducted in early September 2003. This inventory focused on the shoreline areas of the developed Port. Water quality, hydrologic and food web and habitat functions were assessed for the inventoried areas. Assessments of the potential impacts to these functions brought about by redevelopment and maintenance activities were the basis for the development of the habitat management plan (the Plan). The Plan provides options for the replacement of lost functions due to future unavoidable impacts to natural resources.

Embedded in the NRIMP are some key concepts that have shaped its development:

- Providing a flexible planning tool,
- Taking a proactive approach to regulatory permitting,
- Focusing on the developed shoreline,
- Addressing the range of natural resource areas (water – shore – land),
- Focusing on Critical Intersections – locations where value is high for both natural resources and Port activities,
- Compensating for unavoidable impacts with mitigation templates based upon location, and habitat type as well as Port activity.

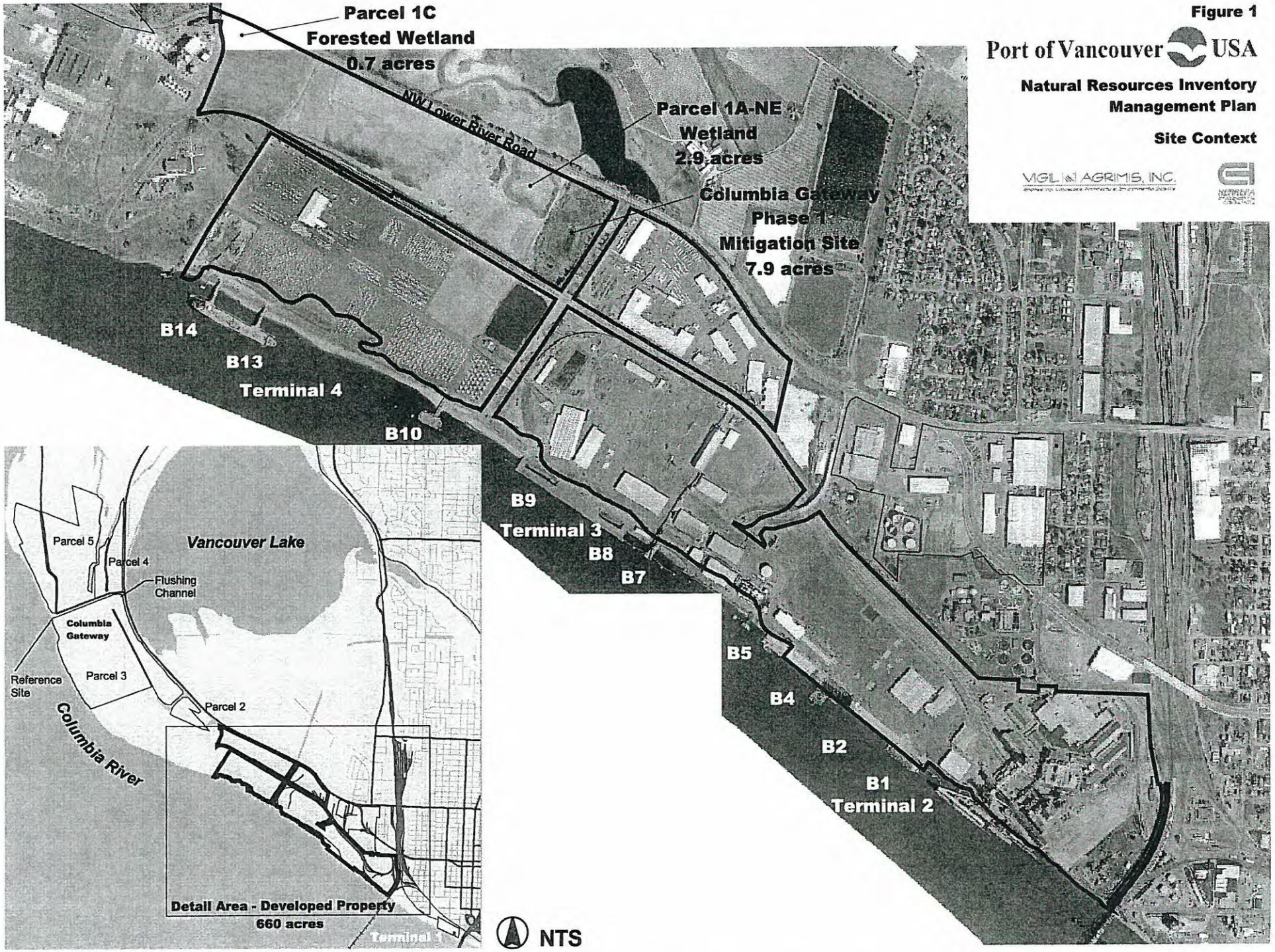


Figure 1

Port of Vancouver USA

Natural Resources Inventory Management Plan

Site Context

VIGIL-AGRIMIS, INC.

Providing a Flexible Planning Tool

Though it is intended for application on the Port's developed property, the NRIMP also provides the Port with a flexible tool allowing the Port to better anticipate the permitting and mitigation requirements associated with the range of development, redevelopment and maintenance choices facing the Port over the next 20 years. It provides a framework for a consistent approach to managing the Port's natural resources. The goal of the NRIMP is to evaluate the impacts of development, redevelopment and maintenance activities on water quality, hydrologic and habitat functions and provide guidance on how these impacts can be avoided, reduced and mitigated for. As such, the Plan provides a set of general principles that can be applied Port-wide.

The NRIMP will not eliminate the need for regulatory consultation or the completion of Biological Assessments (BA) on a project-by-project basis. However, the NRIMP will allow the Port to complete a significant portion of a BA for a specific project by providing information on the natural resources that are present on the Port's developed shoreline, the functions and values of those resources and how those resources are likely to be impacted by a number of common Port activities.

Taking a Proactive Approach to Regulatory Permitting

The NRIMP is intended to anticipate permit requirements for development and maintenance activities on developed Port property. A number of permits or approvals may be required for these activities given the breadth of natural resources encompassed in Port facilities. These could include compliance with federal, state and local regulations associated with the National Environmental Policy Act (NEPA), Endangered Species Act (ESA) and Section 401/404 permits of Clean Water Act.

Section 401/404 of the Clean Water Act, NEPA and ESA all require that alternatives be evaluated to illustrate that:

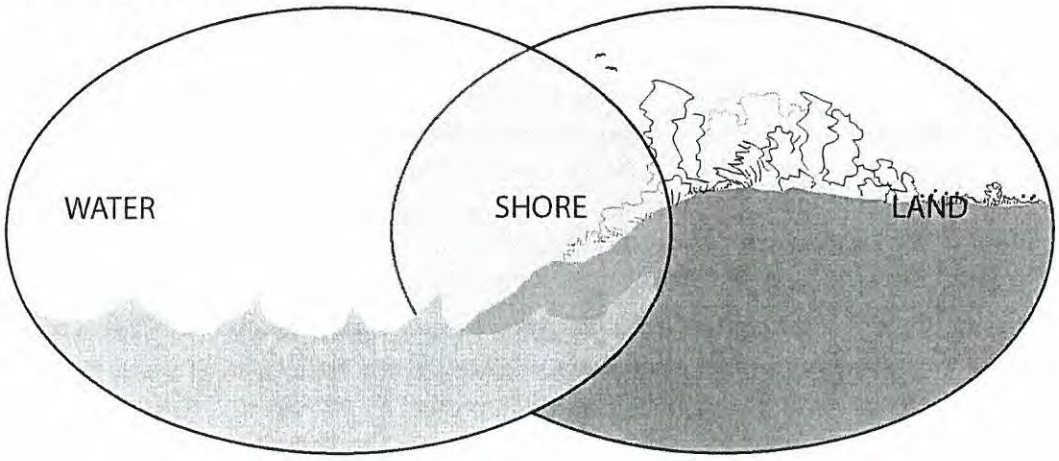
- Impacts are being avoided to the greatest extent practicable,
- Impacts are being reduced to the greatest extent practicable,
- Impacts that are neither avoidable nor reducible are compensated for.

Addressing the Range of Natural Resource Areas (Water – Shore – Land)

Ports with marine facilities are unique in their landscape position – encompassing water, shoreline and land areas (Figure 2). The NRIMP addresses all of these areas but to various levels because natural resources do not have the same quality of functional value across the Port's developed property. The NRIMP is focused on locations where natural resource and Port Activity values are high.

Several fish species that are federally or state listed as threatened or endangered, are candidate species for listing or are of special concern use the Columbia River in the vicinity of the Port of Vancouver. These species include Chinook salmon, chum salmon, coho salmon, steelhead trout, bull trout, coastal cutthroat and Pacific lamprey. Anadromous salmon and steelhead use the River to migrate between upstream spawning areas and the Pacific Ocean. These species utilize shallow water areas along the shoreline while migrating (Fishman Environmental Services 2002).

Figure 2. Conceptual Diagram, Water – Shore – Land



Scope of the Natural Resources Inventory Management Plan

The Port prepared the NRIMP for 660 acres of developed industrial property along the Columbia River. As shown in Figure 1, the developed Port extends approximately 2-miles along the north shore of the Columbia River. It is located between river mile 105.5 (the railroad bridge adjacent to the grain elevator) and river mile 103.5 (berth 14).

Columbia Gateway consists of 1,106 acres of undeveloped land west of the developed Port. It is covered generally but not explicitly in the NRIMP because it is currently proceeding through a State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS) process. Columbia Gateway includes Parcel 2 (31 acres), Parcel 3 (534 acres), Parcel 4 (111 acres) and Parcel 5 (430 acres). The area is 2 miles in length. The Subarea Plan for Columbia gateway incorporates water, heavy and light industrial uses. Under the plan Parcel 2 is a dedicated wetland mitigation site. The NRIMP does not cover the Inn at the Quay at Terminal 1.

Focusing on the Developed Shoreline

The NRIMP focuses on the developed shoreline including Terminals 2 through 4. Terminal 2 runs from river mile 105.5 to approximately to river mile 104.5 and includes the Grain Elevator and Berths 1, 4, 5, 7. Common activities on Terminal 2 are break-bulk, liquid bulk, and dry bulk. The shore in this area is generally steep and has been modified with riprap or bulkheads.

Terminal 3 extends from approximately river mile 104.5 to 104 and consists of Berths 8 and 9 which are primarily used for break-bulk. The shore in this area is also generally steep and modified with riprap or bulkheads.

Terminal 4 stretches from river mile 104 to 103.5 and features the auto roll-on/roll-off dock at Berth 10 and the lay berths 13 and 14. The shore in this area is more gradually sloped. It has been modified with riprap but a beach extends between this riprap and the water.

As shown in Figure 1, much of the aquatic, shoreline and land area within the developed port has been built. Natural resource areas within the developed Port include a combination of existing environments created or enhanced areas, and mitigated sites. These areas include shore plantings at Terminal 2 between Berth 5 and 7 and at Terminal 4 between Berth 10 and 13. Wetland and upland sites in Parcel 1 are labeled and include:

- Columbia Gateway Phase I Mitigation Site,
- Parcel 1A-NE Wetland,
- Parcel 1C Forested Wetland and

Parcels 2 – 5 which are located on the inset map in Figure 1 are included in Columbia Gateway Phase II and are covered by the current EIS. These wetland resources will be discussed in more detail later in the document.

Focusing on Critical Intersections

The locations of Port maintenance activities and natural resources were reviewed to identify areas of critical intersection. Appropriate mitigation is dependent upon the type of habitat affected, the level of impact, and the location of the resource. The NRIMP identifies critical intersections in areas where natural resources such as wetlands, riparian buffers, and deep and shallow aquatic habitats occupy the same location as development and maintenance activities. These activities include: shore stabilization, bulkhead construction and dock and dolphin construction and maintenance. The rationale behind the critical intersection locations is discussed in detail in the following section.

Methods of the Natural Resources Inventory Management Plan

The development of the NRIMP began with a review of scientific literature and BAs, wetland delineations, and mitigation monitoring reports that were previously completed for the Port. Once the nearshore habitat was identified as a significant resources a reach analysis and field reconnaissance were conducted. The reach analysis was performed to improve our understanding of the significance of the nearshore habitat on and near Port property by placing it within this larger landscape context. The fieldwork provided the basis for a natural resources inventory and functional assessment. This information was used to describe conditions along the developed shoreline and at a reference location. Two reference transects were established along the shoreline in Columbia Gateway immediately downstream of the Flushing Channel to assist development of the NRIMP. Many of the principles and mitigation activities described in this plan could be applied to redevelopment and maintenance activities in Columbia Gateway.

FRAMEWORK

To provide a framework for the NRIMP we looked at the water, shore and land areas on the Port's developed shoreline from the point-of-view of Port activities, natural resources and permitting. This exercise identified critical intersections that enabled us to focus the field inventory and management plan recommendations on the most significant natural resources. Three basic zones were identified for this exercise:

- Aquatic Zone (including shallow and deep water areas),
- Shoreline Zone
- Land Zone

For the purposes of the NRIMP the Aquatic Zone is defined as the area below OHW. It encompasses both shallow and deep water. The Shoreline Zone extends from OHW to the top of the bank of the Columbia River (top-of-bank). Based on topographic information top-of-bank is approximately 30-feet CRD. Everything landward of the top-of-bank is the Land Zone. The Land Zone is primarily uplands but includes jurisdictional wetlands and areas that are in the 100-year floodplain of the Columbia River.

The locations of the boundaries between these zones were defined by combining Port activity areas provided by Port staff and habitat areas defined in scientific literature. These zones were spatially located along the Port's developed shoreline using bathymetry and land surface elevation data provided by the Port and water surface elevation data available thru the US Army Corps of Engineers for the staff gage at River Mile (RM) 106.5 at the I-5 Bridge.

The water surface elevation of the Columbia River changes both daily and seasonally in response to tidal flow and seasonal precipitation and dam operations. The water surface of the Columbia River also loses elevation as it passes by the Port of Vancouver. Table 1 shows the water surface elevation at two locations along the Port's shoreline for two conditions. Mean Spring Conditions occur in the spring when snow melt and rainfall combine to increase river flow. This condition is significant for outmigrating salmonids. Ordinary High Water (OHW) is a regulatory water surface elevation intended to describe the frequently wetted area of the channel. It is often associated with the 2-year flood elevation, the channel-forming flow.

Table 1. Columbia River Stage Conditions Referenced to Columbia River Datum (CRD)

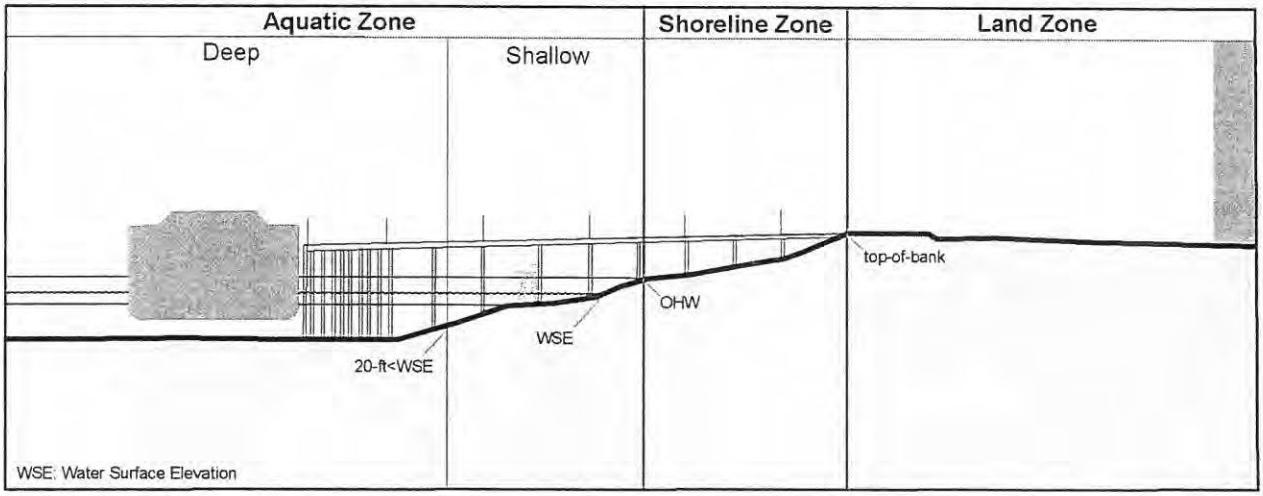
	Mean Spring Conditions	Ordinary High Water (OHW) 2-Year Flood Conditions
River Mile 104 (Terminal 3)	13.4 feet	15.4 feet
River Mile 101 (Reference Site at Flushing Channel)	13.1 feet	15.1 feet

The sections that follow briefly review port activities, natural resources and permitting within the zones described above and identify the critical intersections which serve to focus the NRIMP on a subset of Port activities and natural resources.

Port of Vancouver Activity Areas

Port facilities include: dry bulk, liquid bulk, break bulk, warehouse and other industrial uses and auto processing facilities. These loading and off-loading facilities are abutted by open and/or warehouse storage facilities on the land side and berths and docks on the water side. Figure 3 provides a general diagram of the zones and illustrates their relationship to Port activity areas. Table 2 quantifies the facilities in the developed Port by Terminal.

Figure 3. Port of Vancouver Zones – Conceptual Cross-Section Dock Facility



Aquatic Zone

The Aquatic Zone is divided into deep water and shallow water.

Deep Water - Deep water is in excess of 20-feet in depth. The primary deep water facilities located in this zone are ship berths, which take advantage of the deep water in these areas. The primary activities associated with these facilities include; pile driving, pile removal, pile replacement, sheet pile installation, dolphin installation and dredging.

Shallow Water - Shallow water extends from 20-feet in depth to OHW. Facilities in this area consist of mooring areas, such as dolphins, docks and floating docks. In some cases these facilities can extend into deep water. Ramps, which provide access to floating docks and other non-continuous docks, are also found in the shallow water area. The final element found in the shallow water area is shore protection such as riprap. The primary activities associated with these facilities include; pile driving, pile removal, pile replacement, sheet pile installation, concrete bulkhead construction, and riprap placement.

Shoreline Zone

The Shoreline Zone extends from OHW to top-of-bank. This zone is the transition from the aquatic to the land environment. Dock and ramp facilities extend from the aquatic area and are anchored to the bank in the shoreline area. Shore protection such as riprap also extends above OHW, often to top-of-bank. The primary activities associated with these facilities are the same as those in the shallow water area and include; pile driving, pile removal, pile replacement, vegetation clearing and riprap placement.

Land Zone

The Land Zone includes everything above top-of-bank. The primary facilities located in this zone include open and warehouse storage, offices, roads and railway tracks. Typical activities associated with these facilities include placing fill material, paving and construction. Some of these fills require unavoidable impacts to jurisdictional wetlands that are regulated.

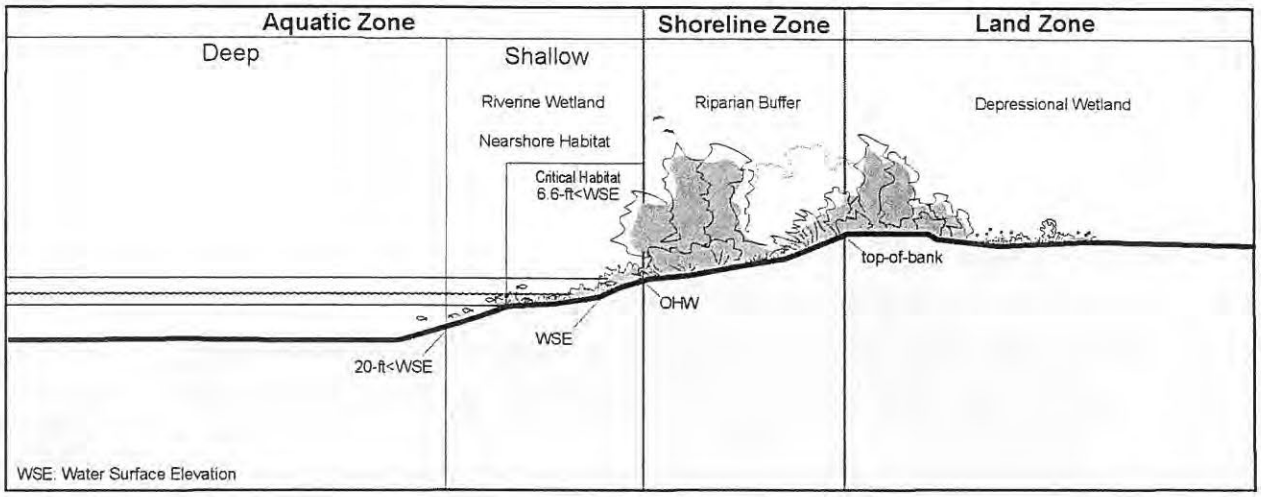
Table 2. Port Facilities by Terminal

Facility	Zones			
	Aquatic		Shoreline	Land
	Deep	Shallow		
Terminal 2 - Renovated 2002				
Open Storage (acres)				40
Covered Storage (square feet)				280,000
Riprap		Grain Terminal Dock, Grain Elevator Barge, B1, B2, B4, B5, B7	Grain Terminal Dock, Grain Elevator Barge, B1, B2, B4, B5, B7	
Dock (lineal feet) B1, B2, B4		1,740		
Dock (lineal feet) Grain Elevator Warf		715		
Dock (lineal feet) B5		400		
Dock (lineal feet) B7		800		
Sheet Pile Wall or Concrete Seawall		B1, B2, B4, B5, B7		
Dolphin(s)		Grain Terminal Dock, Grain Elevator Barge, B7		
Berths (number of)	7			
Terminal 3 - Renovated 2004				
Open Storage (acres)				50
Covered Storage (square feet)				300,000
Riprap		B8, B9	B8, B9	
Dock (lineal feet) B8, B9		1,250		
Sheet Pile Wall or Concrete Seawall		B8, B9		
Dolphin(s)		B8, B9		
Berths (number of)	2			
Terminal 4				
Open Storage (acres)				40
Covered Storage (square feet)				30,500
Riprap			B10, B13, B14	
Dock (lineal feet) B10		1,040		
Dock (lineal feet) B13, B14		1,360		
Sheet Pile Wall or Concrete Seawall				
Dolphin(s)		B10, B13, B14		
Berths (number of)	3			

Port of Vancouver Natural Resource Areas

Port natural resources include aquatic habitat significant to salmonids, riparian areas, and wetlands. Figure 4 shows the zones and illustrates their relationship to these natural resources.

Figure 4. Port of Vancouver Zones – Conceptual Cross-Section Undeveloped Shore



Aquatic Zone

The Aquatic Zone is divided into deep water and shallow water.

Deep Water – There are no significant natural resources within the deep water area along the Port's developed shoreline.

Shallow Water - Scientific literature and resource agency staff identify nearshore habitat as being especially important to anadromous fish; particularly salmonid species. Nearshore habitat is defined in the literature as a zone within the water column that extends between the water's edge to the "photic limit" (the depth that light typically penetrates at levels that sustain photosynthesis, 20-feet deep) (May and Peterson 2003; Williams and Thom 2001). Light penetration at these shallow water depths fosters abundant plant and animal growth. For the purposes of the NRIMP, nearshore habitat occupies the same area as the shallow water area of the aquatic zone. The water's edge is referenced to OHW. Figure 4 illustrates the relationship between nearshore habitat and the aquatic zone. The zone width varies with river stage and tidal influence, and according to the shape of the channel and adjacent riverbank.

Shallow water areas that are less than 6.6 feet deep are especially important for anadromous fish (Carrasquero 1997; Bennett et al. 1992; Dauble 1989). These shallow areas with sand bottom are the preferred out migration habitats for anadromous fish. The outmigrating smolts ride the spring freshet flows facing upstream; finding food and cover in the nearshore zone. The access to potential plant and insect sources, cover from large woody debris and the ability to navigate with the aid of celestial markers are key elements that make the nearshore habitat important to anadromous salmonids. Historically, this habitat type occurred extensively on broad shoreline margins paralleling the Columbia River.

Shoreline Zone

The shoreline zone is associated with riparian buffers that are used by bird species such as king fisher, great blue heron, osprey, bald eagle, and others. These species also utilize adjacent aquatic and land zones for feeding.

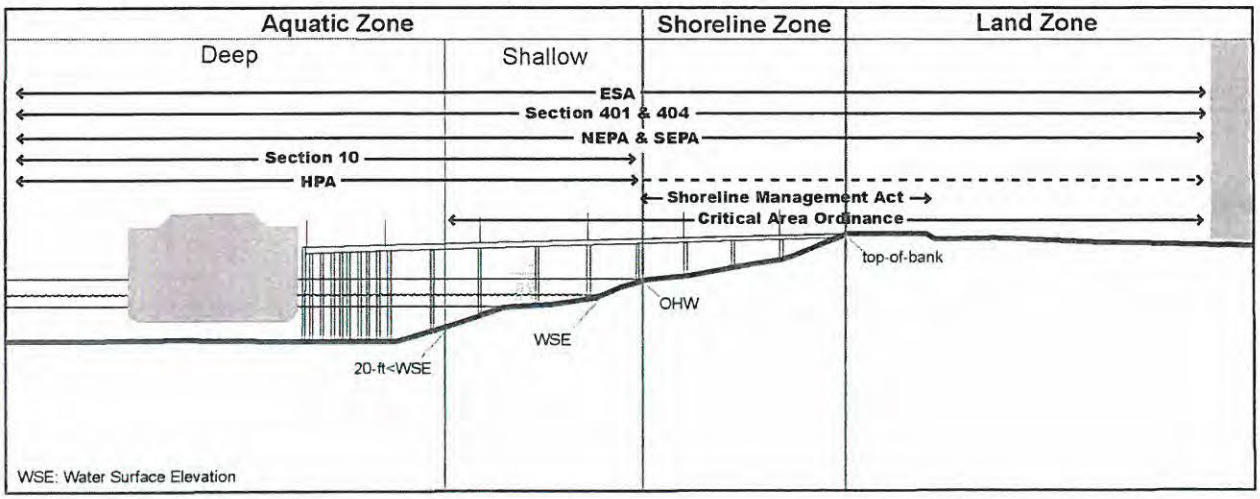
Land Zone

The land zone of the developed Port contains several jurisdictional wetlands. One is an 8-acre mitigation site for Columbia Gateway, Phase I.

Port of Vancouver Permitting

The Port routinely applies for permits for both new development and maintenance activities. These permits comply with federal, state and local regulations for water quality, habitat, and navigability. The following is a general description of typical federal, state and local permitting requirements. Figure 5 shows the zones and illustrates their relationship to federal, state and local regulations.

Figure 5. Port of Vancouver Zones – Conceptual Cross-Sections Permitting



The Federal government began regulating water quality in 1972 with the passage of the Federal Water Pollution Control Act Amendments commonly known as the Clean Water Act. This law also includes the protection of wetlands and waters of the US. In 1973 the Endangered Species Act (ESA) was passed to protect decreasing population of fish and wildlife species. As a result of these regulations, wetlands and listed species were offered protection. Any development that could potentially impact these resources requires approval from the federal government. State and Local permitting requirements meet or exceed those of the federal government.

Federal Permits

Federal permits of concern for the NRIMP include the National Environmental Policy Act (NEPA of 1969, Sections 401 and 404 of the Federal Water Pollution Control Act Amendments, commonly known as the Clean Water Act, of 1972, the Endangered Species Act (ESA) of 1973 and Section 10 of the Rivers and harbors Act of 1899. NEPA requires that projects with a federal nexus consider the environmental consequences of a proposed activity before taking action. It reviews the impacts of an action on a broad range of indicators including, habitat, water quality, hydraulics, as well as

air quality and noise. NEPA regulates activities in Aquatic, Shoreline and Land Zones. Section 401 and 404 regulate the filling of wetlands, and the use of Best Management Practices to limit the water quality impacts from construction activities in all areas. The ESA regulates impacts to listed species and any designated critical habitat. The species of the greatest concern at the developed port are listed anadromous fish species. These species make extensive use of shallow water areas of the Columbia River. A programmatic Biological Opinion and the Magnuson-Stevens Fisheries Conservation and Management Act provide consultation for Standard Local Operating Procedures for Endangered Species (SLOPES). Many of the Port's maintenance activities fall under this umbrella. Section 10 of the Rivers and Harbors Act regulates activities in navigable waterways.

State Permits

State regulations must meet and in some cases are more stringent than Federal regulations. The State Environmental Policy Act (SEPA) of 1971 provides a framework for agencies to consider the environmental consequences of a proposed activity before taking action. It reviews the impacts of an action on a broad range of indicators including, habitat, water quality, hydraulics, as well as air quality and noise. As such SEPA regulates activities in Aquatic, Shoreline and Land Zones. The Shoreline Management Act of 1972 regulates development in shoreline areas within a 200-foot buffer extended from OHW or within the floodplain. The Washington Department of Fish and Wildlife's - Hydraulic Project Approval (HPA) primarily regulates activities, such as dredging and dock construction and maintenance, waterward of the OHW line in regards to impacts on wildlife and habitat. It can be used to regulate wetlands but generally corresponds to the Aquatic Zone.

Local Permits

The City of Vancouver is streamlining its environmental regulations while complying with the Growth Management Act. Vancouver's Critical Area Ordinance, which will be decided in early 2005, combines existing regulations of wetlands, streams, lakes, floodplains, trees, fish and wildlife habitat as well as certain types of soils and slopes into one ordinance. Like SEPA this local ordinance regulates activities in Aquatic, Shoreline and Land Zones. In terms of SEPA, the City of Vancouver often serves as the lead agency for processing SEPA checklists. Also, the Shoreline Permit is submitted to the City for local review and appeal prior to state approval.

Port of Vancouver Critical Intersections

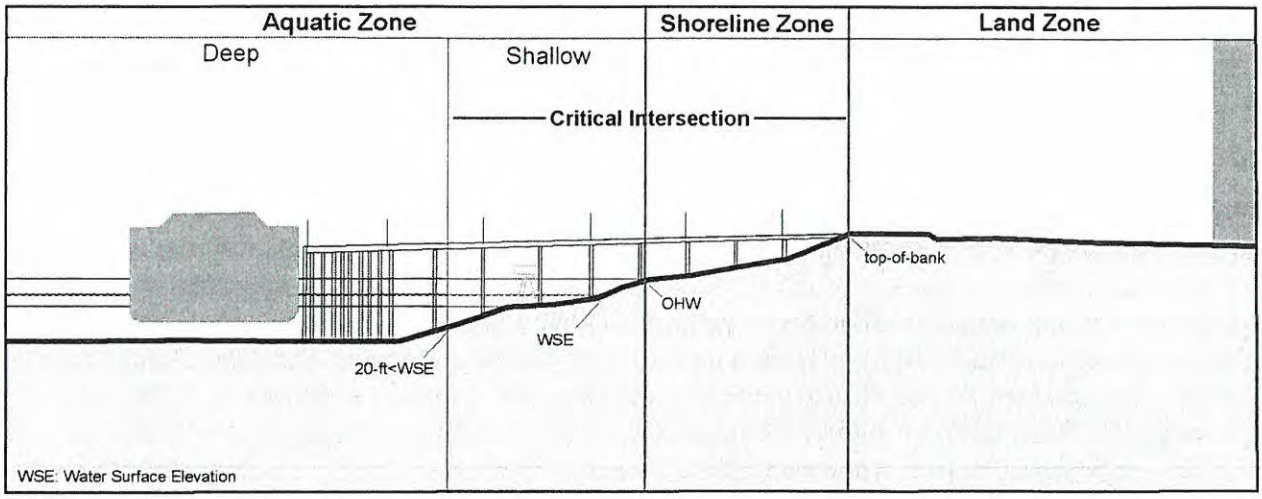
Critical intersections occur where project activities, natural resources, and regulatory requirements overlap. Limited activities where natural resources functions are low or regulatory requirements are very limited or non-applicable will require little if any mitigation. Some activities may require considerable permitting and mitigation.

As described in the Introduction of this document, the NRIMP focuses on redevelopment and maintenance activities on the Port's developed property. The amount and quality of natural resources on the developed property varies. The NRIMP puts greater emphasis on the protection and mitigation for higher functioning resources that were found to be at the greatest risk of impact. The NRIMP assumes that appropriate BMPs will be used during redevelopment and maintenance activities and focuses on recommending a series of mitigation options for impacts to water quality, hydrologic and habitat functions cause by structural changes to the landscape.

A majority of the maintenance activities will take place in the shoreline zone and the shallow aquatic zone (Figure 6). To a lesser extent activities will take place in the deepwater aquatic zone.

Common activities include: removal and repair of treated and untreated wood piles and driving of replacement steel piles; rip rap placement; vegetation removal; and dock repair.

Figure 6. Port of Vancouver Zones – Conceptual Cross-Section Critical Intersection



NATURAL RESOURCES INVENTORY, MAPPING AND FUNCTIONAL ASSESSMENT

The critical intersections discussion in the Framework section of this document identifies the shallow water area of the aquatic zone and the shoreline area as the most critical locations addressed by the NRIMP. An inventory of these natural resources along the Port's developed shoreline was conducted in order to better understand the extent and quality of the critical habitats. This inventory and assessment is the foundation of a meaningful habitat management plan. The inventory examines nearshore habitat at the landscape level along the Columbia River from the Sandy River Delta to Sauvie Island to improve our understanding of the significance of the nearshore habitat on and near Port property by placing it within this larger landscape context. It then focuses on the Port's developed shoreline. At this scale, natural resources are inventoried and mapped. An assessment of the water quality, hydrologic and habitat and food web functions is provided for habitat areas along the developed shoreline.

Terrestrial habitat extents and functions in the shoreline and land zones were not inventoried because of the limited extent of riparian vegetation and wetlands in this management area. Existing reports describing these resources were reviewed to provide an understanding of the existing wetland and upland resources in the area. Much of the existing riparian vegetation, where it exists at all, is non-native Himalayan blackberry. Control of the Himalayan blackberry and conversion to native riparian tree, shrub, and forb species, where practical and compatible with Port operations, would provide riparian continuity and provide better bird and small mammal habitats. The existing wetlands are located along River Road – away from a majority of the Port maintenance activities. Many of these wetlands are mitigation sites.

Landscape Level Natural Resource Examination

Nearshore habitat was initially examined at a landscape level. The extent of nearshore habitat at this scale was estimated for the area between Sandy River Delta and Sauvie Island and is shown in Figure 7. This region includes two major tributaries to the Lower Columbia River: the Sandy River and the Willamette River. This examination was conducted to improve our understanding of the significance of the nearshore habitat on and near Port property by placing it within this larger landscape context.

The examination was performed by compiling 100-year floodplain data layers from Clark County Department of Assessment and GIS and Metro's Regional Land Information System with National Wetland Inventory data. Nearshore habitat was assumed to be approximated by wetland habitat mapped by the National Wetlands Inventory (Cowardin classes) that is within the 100-year floodplain.

Figure 7 illustrates the extent to which urbanization and shoreline development have reduced the spatial extent of both wetland vegetation and of land inundated by flooding. With the clear exception of areas such as the Sandy River Delta, Lady Island and Camas Slough area, Government Island, and Hayden Island, little wetland habitat remains within the shorelines. Notably, the reference site, just downstream of the Flushing Channel, is a small wetland discernable on Figure 8.

Natural Resources Inventory on the Port's Developed Property

The extent of nearshore habitat and the ecological functions provided on the Port's developed property were assessed using river depth and substrate data collected in the field, topographic mapping, aerial photo interpretation, and recent fisheries, wetland, and riparian habitat assessment literature. Figure 8 shows Port's developed shoreline and the areas where data were collected for the inventory. Analysis of the nearshore habitat is based on key Columbia River hydrologic events and shoreline geomorphology. The inventory characterizes ecological functions that are being provided on Port property, particularly regarding fish habitat.

Methods

Ten transect locations were selected using Port supplied bathymetry and aerial photos (Figure 8) to provide adequate coverage to represent the full range of shoreline conditions along approximately 6,000 linear feet of developed shoreline. In addition, two transect locations were selected at a reference site at an undeveloped location immediately west of Parcel 5, just downstream of the Flushing Channel (Figure 8). This site was chosen because it includes a full range of habitats including deep and shallow aquatic, shoreline and upland areas including a hardwood riparian forest. This undeveloped shoreline likely represents historic shoreline conditions. Ecological functions were assessed at the reference site to provide a base of comparison for the developed shoreline.

Data was collected at the ten 150-foot long transects on September 11, 2003. A 13-foot research boat equipped with GPS and a laser range finder was used to locate sampling points at 30-foot intervals along each transect. The US Army Corps of Engineers (Corps) recording gage (VANW1) at the Interstate 5 Bridges was used to determine water surface elevation and to correct for tidal impacts. An acoustic depth finder was used to determine depth at every sampling point. We observed substrate materials and aquatic vegetation using a wide-angle underwater viewer. Photos were taken at the ten pre-selected transects showing the shoreline with upstream and downstream views. Photos taken at these transects are shown in Appendix A.

Mean Spring Condition and Ordinary High Water Condition were compared to land surface elevations to determine the availability of nearshore habitat along the developed shoreline. The Mean Spring Condition and the Ordinary High Water Condition defined in Table 1. Mean Spring Condition, the mean of maximum monthly spring stage from March through June, was used to define the lower boundary of habitat access. This water surface elevation is important because it reasonably describes conditions during the peak salmonid outmigration season. Ordinary High Water (OHW) was used to define the upper boundary for two reasons. First it closely approximates the 2-Year Flood which is a channel-maintaining event from a geomorphic standpoint. Second it has a long history of regulatory use. Corps OHW is approved for regulatory functions, i.e. JARPA and HPA permits.

Nearshore habitat volumes were quantified using a computer-aided drafting (CAD) program to compare the shoreline transect cross-sections with the Mean Spring and Ordinary High Water surface elevations. This comparison provides a spatial representation in cross-section and plan view of the data analysis results. The condition and quantity of nearshore habitat was identified for areas less than 20 feet in depth and areas less than 6.6-feet in depth – the high quality habitat area within the shallow water area. The areas less than 6.6-feet deep were highlighted because juvenile salmon, particularly Chinook salmon, prefer these areas (Carrasquero 1997; Bennett et al. 1992; Dauble

1989). In addition to water depth, several studies indicate that in eastern Washington, juvenile Chinook salmon prefer habitats that exhibit the following characteristics (Bennett et al. 1992; Curet 1993; Garland and Tiffan 1999):

- Shallow nearshore habitats with sandy bottom and no aquatic vegetation,
- Nearshore shallow water with a low gradient in free-flowing areas,
- Littoral shore habitat with low water velocities.

Findings

The data collected in the field was used to break the Port's developed shoreline up into meaningful slope categories. These areas were then quantified, evaluated qualitatively and mapped. Figure 9 shows four cross-sections (T3, T5, T6 and T8) which were selected as representative of the range of shoreline conditions from the 10 transects along the developed shoreline. A fifth cross section is an overlay of transects T3, T5, T6, and T8 that compares general shoreline slopes observed on the Port's developed property. This figure shows the range of nearshore habitat at Mean Spring Conditions. Figure 10 shows nearshore habitat the same four representative sections for the Ordinary High Water Condition.

There are three shoreline conditions based on slope evident in the cross-section comparisons: steep (S), moderate (M) and gradual (G). A statistical assessment of these breaks in slope is provided in Appendix B. As expressed as a ratio of horizontal to vertical change,

- Steep shorelines were approximately 1.5:1 to 3:1,
- Moderate shorelines were approximately 5:1 to 10:1, and
- Gradual shorelines were approximately 12:1 to 100:1.

Steep Shorelines – Steep shorelines are found at transects T3 and T5 at Berth 1 and Berth 8 at Terminals 2 and 3. Slopes at these locations rang from about 1.2:1 to about 2.5:1 where slopes armored with riprap, rubble, debris, or scattered rock separate the river from its former floodplain. Generally, the steep shoreline areas of the Port property had little to no beach areas at the flow conditions observed during the field inventory.

Moderate Shorelines – Moderate shorelines are found at transects T6 and T8 at Berth 9 and Berth 13 at Terminals 3 and 4. Slopes range from about 4:1 to 8:1.

Gradual Shorelines – Figure 11 shows transects R1 and R2 and describes the nearshore habitat at the reference site for the Mean Spring condition. Figure 12 shows the same transects for the Ordinary High Water condition. These gradual slopes, 8:1 and flatter, provide longer beach and back beach areas than those observed within the Port property. Because of their higher elevation, these back beach areas provide more suitable conditions for longer-term recruitment of large woody debris than the conditions at beach areas within the Port property, even those areas with moderate shorelines (i.e., transects T6 and T8).

Quantity and Quality of Nearshore Habitat – Tables 3 and 4 summarize field observations of conditions at the transect locations to provide a quantitative and qualitative assessment of the areas. The tables include observations of substrate, structures, bank conditions and vegetation and quantify the width of nearshore habitat and quality nearshore habitat along the developed shoreline.

Table 3 is a summary of nearshore bed and bank conditions at the transect locations. A sand substrate was found offshore at all developed area transects. Three of the ten transects (between the railroad bridge and Berth 1) have riprap visible at the shoreline at the water levels

present during the fieldwork. Six of the ten transects have riprap on the bank above the shoreline (railroad bridge to Berth 7). Vegetation was generally sparse, and where present, often includes Himalayan blackberry. Cottonwoods and willows have colonized within the riprap in some areas.

Table 3. Summary of Transect Nearshore Bed and Bank Conditions

Sta.	Location	Substrate 30 ft. from Shore	Substrate at Shoreline	Nearshore Structures	Bank Above Shoreline	Vegetation
T1	RR Bridge	Sand	Riprap	Old Wood Piles	Riprap	Mostly barren, some Himalayan blackberry and other weeds with small trees on top of bank
T2	Grain Elevator	Sand	Riprap	Old Wood Dock	Riprap	Mostly barren, some Himalayan blackberry and small willows
T3	Berth 1	Sand	Riprap	Steel Piles and Dolphins	Riprap	Himalayan blackberry with bare spots
T4	Berth 6	Sand with Gravel	Sand with Gravel	Old Wood Pier	Riprap	Willows and Himalayan blackberries established in Riprap
T5	Berth 8	Sand	Riprap and Sand	Concrete Piles for Dock	Riprap	Mostly barren with some blackberries and other weeds
T5A	Berth 7	Sand	Sand	Steel Piles	Riprap	Mostly barren with some blackberries and willows
T6	Berth 9	Sand	Gravel	Concrete Piles	Sand and gravel on beach with Riprap on far bank	Some rooted aquatics 30 ft from shore. Small willows and cottonwoods have colonized portions of the Riprap bank
T7	Berth 10	Sand	Sand	Steel Piles	Sand and gravel on beach with rock on far bank.	Small willows and cottonwoods have colonized portions of the Riprap bank.
T8	Berth 13	Sand	Sand	None	Sand and gravel on beach with rock on far bank.	Willows and cottonwoods have colonized portions of the Riprap bank.
T9	Berth 14	Sand	Sand	Steel Piles	Sand and gravel on beach with rock on far bank	Willows and cottonwoods have colonized portions of the Riprap bank.

Table 3 shows that there is marked variation in substrate materials and bank vegetation along the developed Port shoreline. This variation is found along the shoreline from B1 to B4 and includes riprap banks, vegetated riprap banks, and sandy shores; and across the shoreline from top of bank to the channel. Typically there is a distinct edge between the riprap armoring, which has coarsened the substrate at the shoreward side, and the sandy substrate that predominates in the river channel.

In-water and over-water structures are present in the immediate vicinity of the surveyed transects and are found across the Port waterfront properties. In-water structures consist of steel, wood, or

concrete piles and dolphins. Over-water structures consist of wood or concrete docks and piers. Most of the shoreline within the Port property is armored with riprap. The exception is Terminal 4 from Berth 10 to berth 14 where the banks are sand with scattered rock (Coleman 2004. pers. comm.).

The results of the habitat access assessment that was based on the analysis of cross-section data is presented in Table 4. Table 4 presents the width of near shore habitat during Mean Spring and Ordinary High Water Condition and evaluates these shorelines by type (i.e. steep, moderate and gradual). Spatially describing the varied width of the nearshore habitat is instructive for identifying existing constraints and potential future opportunities. It is noteworthy that the habitat quantity varies substantially between steep, moderate, and gradual shoreline types. The mean widths of the nearshore habitat for Mean Spring and Ordinary High Water Conditions are approximately 24 feet, 92 feet, and 820 feet by shoreline type respectively. The difference for high quality habitat (<6.6 feet depth) is dramatic. The mean widths are approximately 6 feet, 25 feet, and 520 feet by shoreline type respectively. Only approximately 27 percent of the steep and moderate shoreline types are high quality habitat according to the depth criteria. Approximately 63 percent of the gradual shoreline type, found at the reference site, is high quality habitat according to the depth criteria. This means that there is potentially two orders of magnitude greater amount of habitat along the gradual shoreline type (520 feet) versus the steep shoreline type (6.5 feet).

Mapping – Nearshore habitat areas are constantly shifting with river stage fluctuations. It is important to understand that habitat needs vary seasonally during these fluctuations, and that the spring outmigration is a key season. This season is important ecologically because of the high transport rates of water, sediment, nutrients, chemicals, and fish and wildlife species. Table 4 shows that available habitat area doesn't necessarily increase during the Ordinary High Water event, and because the Ordinary High Water event is typically a very short duration event of hours or days occurring in the November to March window, this habitat availability is temporally constrained. The Mean Spring event is a long duration event of many weeks occurring during March through June window. The in-water work window restrictions that apply below OHW occur through spring is recognition of the importance of the high hydrologic and biologic transport that occurs.

Figure 13 shows the approximate extent of nearshore habitat for the developed shoreline and along the reference shoreline. The width of nearshore habitat shown is the graphic depiction of the data in Table 4 mapped using available bathymetric and topographic information. Nearshore habitat on this figure combines nearshore habitat at the Ordinary High Water and Mean Spring water elevations to depict the total area of potential nearshore habitat. The upper limit of the nearshore habitat is approximated by the 16-foot CRD contour, the upper end of the Ordinary High Water nearshore habitat extent. The lower limit of the nearshore habitat is approximated by the –6-foot CRD contour, the lower end of the Mean Spring nearshore habitat extent.

Table 4. Nearshore Habitat Quantities

Shoreline Type	Location	Mean Spring Width (Feet)	OHW Width (Feet)	Mean Spring High Quality Width (Feet)	OHW High Quality Width (Feet)	Comments
S	Transect 3	18	18	5	6	These Steep shorelines have narrow nearshore habitat bands (just 3 percent of the Uniformly Shallow habitat width.
	Transect 5	31	30	8	9	
	Mean	**24.5**	**24.0**	**6.5**	**7.5**	
M	Transect 6	102	96	16	13	These Moderate shorelines have almost four times the available habitat when compared to Steep shoreline types.
	Transect 8	85	88	34	33	
	Mean	**93.5**	**92.0**	**25.0**	**23.0**	
G	Reference 1	830	800	600	495	These Gradual shorelines have almost two orders of magnitude more available high quality habitat when compared to Steep shoreline types.
	Reference 2	780	870	435	500	
	Mean	**805**	**835**	**518**	**498**	

S – Steep
M – Moderate
G – Gradual

Functional Assessment of Water Quality, Hydrology, and Food Webs and Habitat

The assessment of ecological functions is focused on nearshore habitat. As described earlier, habitat availability was assessed based on the locations and dimensions of nearshore habitat under Mean Spring and Ordinary High Water conditions. Tables 5, 6 and 7 provide a generalized assessment of water quality, hydrologic, and food web and habitat functions respectively based on Sheldon, et al (2003). These tables compare riverine wetland functions for the mean characteristics of transects 3 and 5 and transects 6 and 8 to the reference transects. As in Figures 9 to 11, data has been lumped based on similar shoreline slope characteristics of steep, moderate, and gradual.

Tables 5, 6, and 7 show that water quality, hydrologic and habitat functions are generally performed at low to nonexistent levels in the moderate and steep shoreline areas but perform fully at the Reference Site which has gradual shorelines. The following section highlights key portions of the generalized assessment presented in Tables 5, 6, and 7.

Water Quality Function (Table 5)

Low slopes, sandy substrates, and limited woody vegetation along the moderate and gradual shorelines provide some removal of nutrients and fine sediment. This function cannot be performed where riprap is found along steep shorelines. The reference site has gradual slopping, sandy shorelines. In addition it has stands of trees and herbaceous plant with depressions of various sizes to help trap and then hold fine sediment, and bind nutrients in plants and sediment.

Hydrologic Function (Table 6)

The steep and moderate shoreline types cannot provide the reducing peak flows function because there is little or no floodplain area to dissipate higher flows. The channel at these locations is essentially all active channel; there is little or no access to overbank areas where flows can spread, and where fish can find refuge during peak events.

Similarly, the steep and moderate shoreline types cannot provide the lateral hyporheic flows function. Hyporheic flows are by definition saturated subsurface and surface sheet flows moving within and across floodplains to and from channels. These flows are often rich in chemical and biological materials. These flows cannot occur without floodplains.

Food Webs and Habitat Function (Table 7)

Habitat complexity does not exist at the steep shoreline type, and is limited along the moderate shoreline type due to lack of overbank areas, lack of structure in terms of in-channel wood and rock, and lack of riparian vegetation.

The gradual shoreline has woody plants and debris that provide habitat partitioning, and structure that is not present in the steep and moderate shorelines. Habitat partitioning allows greater numbers of fish to use a nearshore habitat area.

One function of key interest is habitat for anadromous fish. This function is provided throughout the shoreline but with considerable variation in terms of how well the function is provided. The moderate shoreline provides this function, while the steep shoreline does not provide this function at any significant level.

Table 5. Generalized Assessment of Water Quality Functions

Riverine Wetland Functions	Steep	Moderate	Gradual	Comments
Improving Water Quality				
Removing Nutrients	N	NS	P	**T 3&5:** Steep shoreline with riprap does not provide nutrient recycling **T 6&8:** Moderate shoreline with vegetation provides low level nutrient recycling. **Reference:** Gradual shoreline with extensive herbatious vegetation provides moderate level nutrient recycling.
Removing Fine Sediment	N	NS	P	**T 3&5:** Too steep to remove fine sediment. **T 6&8:** Moderate slope beach development shows that in general, sediment is retained. **Reference:** Gradual shoreline with extensive herbatious and woody vegetation provides moderate to high level sediment retention.
Removing Metals/Toxic Organics	N	NS	P	**T 3&5:** Riprap surfaces do not support this function. **T 6&8:** Moderate shoreline with woody debris and vegetation provides low level metals and toxics removal. **Reference:** Gradual shoreline with vegetation provides moderate level removal.
Moderating Water Temperature	NS	NS	P	**T 3&5:** Provides limited moderation of temperature due to offsetting inputs of shade and heat transfer from structures. **T 6&8:** Provides limited moderation of temperature due to offsetting inputs of shade and heat transfer from structures. **Reference:** This backwater slough can provide water temperature moderation with extensive shade but may also export warm water seasonally.

Key to Table abbreviations:
P=Performed
NS=Probably Not Performed at Any Significant Levels
N=Not Performed

Table 6. Generalized Assessment of Hydrologic Functions

Riverine Wetland Functions	Steep	Moderate	Gradual	Comments
Hydrologic				
Reducing Peak Flows	N	N	P	**T 3&5:** Location in or adjacent to channel does not provide this function. **T 6&8:** Location in or adjacent to channel does not provide this function. **Reference:** This backwater slough does provide flow reduction through off-channel storage.
Decreasing Downstream Erosion/Dissipating Erosive Forces	N	NS	P	**T 3&5:** Riprap may protect shoreline from erosive forces by deflecting flows, but shoreline is not deformable and little erosive force dissipation occurs. **T 6&8:** Willow and cottonwood recruitment and shallow sloping sandy beach provides deformable friction to reduce erosion downstream. **Reference:** Extensive woody vegetation provides anchoring and stability.
Recharging Groundwater	N	N	N	This function is not performed except at high stage levels in the Columbia River at any of the sites.
Lateral Hyporheic Flows	N	N	P	**T 3&5:** Location in or adjacent to channel does not provide this function. **T 6&8:** Active channel position does not provide this function. **Reference:** Lateral hyporheic flows occur within the slough area.
Floodplain Storage	N	N	P	**T 3&5:** Location in or adjacent to channel does not provide this function. **T 6&8:** Location in or adjacent to channel does not provide this function. **Reference:** This backwater slough does provide floodplain storage.
Key to Table abbreviations: P=Performed NS=Probably Not Performed at Any Significant Levels N=Not Performed				

Table 7. Generalized Assessment of Food Web and Habitat Functions

Riverine Wetland Functions	Steep	Moderate	Gradual	Comments
Food Webs and Habitat				
General Habitat	N	NS	P	**T 3&5:** Some large woody debris trapped by steel and concrete piles provides very limited cover and possible insect drop. Anadromous fish transport is probably a primary function. **T 6&8:** Large woody debris gets stranded on the shallow sand and gravel beach temporarily between flood events. Steel and concrete piles trap some large woody debris. Catkin and insect drop from Riparian trees provides some food for aquatic species. Transport and protection from predatory fish probably are the primary functions provided to anadromous fish. **Reference:** Riparian trees and LWD provide leaf litter, insect drop and habitat at various river stages.
Habitat Complexity*	N	N	P	**T 3&5:** Location in or adjacent to channel does not provide this function. **T 6&8:** Location in or adjacent to channel does not provide this function. **Reference:** The back beach area associated with this site recruits large woody debris and support riparian vegetation that increases habitat complexity and thereby its ability to support aquatic species.
Habitat Partitioning*	N	N	P	**T 3&5:** Location in or adjacent to channel does not provide this function. **T 6&8:** Location in or adjacent to channel does not provide this function. **Reference:** The back beach area associated with this site recruits large woody debris which partitions the aquatic habitat during high flow events thus providing increased functional habitat volume and opportunity for different species to coexist.

Table 7. – Continued

Riverine Wetland Functions	Steep	Moderate	Gradual	Comments
Food Webs and Habitat				
Off-channel Habitat Forming Process*	N	N	P	**T 3&5:** Location in or adjacent to channel does not provide this function. **T 6&8:** Location in or adjacent to channel does not provide this function. **Reference:** The backwater slough provides opportunity for flood flows to form and maintain habitat.
Off-Channel Habitat Areas*	N	N	P	**T 3&5:** Location in or adjacent to channel does not provide this function. **T 6&8:** Location in or adjacent to channel does not provide this function. **Reference:** The backwater slough provides salmonid rearing habitat and refugia during peak and high flow conditions.
Habitat for Invertebrates	N	NS	P	**T 3&5:** Very limited wood retention means that this function probably does not occur and any substantial level. **T 6&8:** Temporarily stranded and trapped large wood provides surfaces for invertebrates. **Reference:** Ample large wood and smaller debris provide many surfaces for invertebrates.
Habitat for Amphibians	N	N	P	**T 3&5:** Lack of food sources and cover with high-energy flows mean no amphibian usage. **T 6&8:** Too high-energy environment for meaningful amphibian usage. **Reference:** floodplain pools and slough provide amphibian habitat.
Habitat for Anadromous Fish	NS	P	P	**T 3&5:** Steep beach armored with riprap does not provide ideal habitat for salmonid fish. **T 6&8:** Shallow sandy beach provides good migration route and potential protection against predatory fish. Adjacent native trees provide some opportunity for insect drop and other potential food sources. **Reference:** Excellent off channel habitat and high floe refuge.

Table 7. – Continued

Riverine Wetland Functions	Steep	Moderate	Gradual	Comments
Food Webs and Habitat				
Underwater Light Environment	N	P	P	**T 3&5:** The design of the Port structures located between Transect 1 and 5 do not allow light penetration beneath the over-water structures. **T 6&8:** The design of the existing Port over-water structures allows light penetration. **Reference:** Generally good light penetration.
Habitat for Wetland-Associated Birds	NS	NS	P	**T 3&5:** Very limited willows provide some bird habitat. **T 6&8:** Willow and cottonwood recruitment provides some perching, and possible food sources for seed, fruit, and sap eaters. **Reference:** Riparian forest provides habitat for a range of species.
Habitat for Wetland-Associated Mammals	N	NS	P	**T 3&5:** Too little cover and food for mammal usage, except for rats, nutria, and an occasional raccoon. **T 6&8:** Willow and cottonwood recruitment provides some perching, and possible food sources for seed, fruit, and sap eaters. **Reference:** Riparian forest provides habitat for large and small mammals.
Plant Richness	N	NS	P	**T 3&5:** Very limited willow recruitment and extensive Himalayan blackberry patches and other weeds provide essential no plant richness. **T 6&8:** Willow and cottonwood recruitment provides fragment of native riparian vegetation, but a low level compared to reference site. **Reference:** Canopy, shrubs and ground layer coverage is good and invasives are limited.
Support for Food Webs	N	NS	P	**T 3&5:** No meaningful food web support. **T 6&8:** Willow and cottonwood recruitment provides some perching, and possible food sources for seed, fruit, and sap eaters. **Reference:** Good food web support.
Key to Table abbreviations: P=Performed NS=Probably Not Performed at Any Significant Levels N=Not Performed				*** Functions shown with asterisk are supplementary functions to those developed by Sheldon, et al.**

Improving Functions in Aquatic and Shoreline Zones

Numerous ecological functions are performed within the nearshore habitat and adjacent areas along the Port's developed shoreline to varying degrees as shown in Tables 5, 6, and 7. Key functions include:

1. Nutrient removal,
2. Sediment removal,
3. Reducing peak flows,
4. Lateral hyporheic flows,
5. Habitat complexity,
6. Habitat portioning, and
7. Anadromous fish habitat.

Generally the higher functioning areas, such as gradual and moderately sloped areas, perform most of these functions, and other functions, at moderate or better levels. The low functioning areas, including steep slopes, do not provide some of these functions or provide them at insignificant levels.

These functions are based on numerous physical and process components in the Lower Columbia River landscape. Several key features that appear to be associated with areas that perform more functions and perform them at higher levels are:

1. Presence of low gradient slopes and shallow water areas (in active channels and on floodplains),
2. Presence of sandy substrates,
3. Presence of overbank areas,
4. Presence of woody and herbaceous vegetation,
5. Presence of woody and other debris.

Nearshore habitat also includes the physical, chemical, and biological processes in the environment that supports salmonids and other species. These key features and processes influence flows of water, sediment, chemicals, and nutrients; the gain or loss of materials and features shaping shorelines; the opportunity for small plants and invertebrates to establish and maintain populations that can support fish, birds, and mammals. The lack or alteration of any of these components is likely to become a limiting factor to salmonid and other species populations.

This study has emphasized the spatial aspects of ecological functions and the physical and process components that build those functions. The connections, strong to weak, between areas that provide ecological functions in the landscape are important to maintaining and improving fish and wildlife populations. Spatially describing the varied width of the nearshore habitat is instructive for identifying existing constraints and potential future opportunities. The variations, or deficiencies, in ecological functions that currently exist along the Port's developed shoreline present potential opportunities to improve those functions where modifications can be made that are cost effective and compatible with operations.

The following are potential opportunities to modify existing conditions to add or increase features that support key ecological functions according to the broad function areas used in the analysis. Including physical components that support ecological functions with future Port developments may be very cost effective in some situations, especially when mitigation costs are fully considered.

Improving Water Quality Functions

Flatten slopes with sandy substrates where opportunities exist to create or extend shallow benches and shelves into the active channel. Shallow bench creation may be applicable to specific projects that impact shallow water habitat such as new barge slips or sheetpile walls. These potential features will need further analysis to assure that these features will be compatible with Port operations. Where appropriate, add woody and herbaceous vegetation to trap sediments that typically carry nutrients and chemicals

Improving Hydrologic Functions

There is probably little opportunity to reduce peak flows at any significant level. Adding floodplain storage is likely impractical and not cost effective. However, there appears to be opportunity to include overbank areas within the existing active channel by adding floodplain benches at approximately 15.4 feet CRD where compatible with Port operations. Historic flow patterns have likely been disturbed to the extent that hyporheic flows cannot be restored.

Improving Food Webs and Habitat Functions

There appear to be good opportunities to add habitat complexity along the Port shoreline. There would be overlap with features described previously, such as the shallow slopes and overbank areas. Key additions would be woody debris, artificial woody debris as concrete features, rock, woody vegetation, and herbaceous vegetation where compatible with Port operations. Adding these elements increases boundary roughness and hydraulic refugia for fish, habitat partitioning, cover, and food production. Adding woody vegetation contributes to woody debris recruitment to the channel. Opportunities also appear to exist for minor alterations of riprap slope protection to add small pockets of riparian hardwoods.

There may also be opportunities to modify existing in-water and over-water structures, and to add newer structures incorporating features that increase light penetration to the water column and thereby extending nearshore habitat. Where practical, these structures could alter predator–prey relationships favorably for anadromous fish.

Future Port development that can maintain, support, or enhance habitat components will streamline environmental permitting, avoid project delays, improve management of Port environmental assets, avoid piece-meal mitigation planning and assist with project budgeting.. Future shoreline development proposals that incorporate shallow slopes, sandy substrate materials, sediment and nutrient exchanges, woody debris, riparian vegetation, and allows light penetration and ecosystem interactions will help maintain and enhance fish and wildlife populations. The Port can continue its role as an economic engine and provide environmental stewardship by investigating opportunities to develop and modify its shoreline by including these habitat features.

Figure 7

Port of Vancouver USA

Natural Resources Inventory Management Plan

Landscape Level Examination

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

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Legend

- Port of Vancouver
- Floodplain

Wetland: Cowardin Class

- L1: Lacustrine Limnetic
- L2: Lacustrine Littoral
- PAB: Palustrine Aquatic Bed
- PEM: Palustrine Emergent
- PFO: Palustrine Forested
- PSS: Palustrine Scrub/Shrub
- PUB: Palustrine Unconsolidated Bottom
- PUS: Palustrine Unconsolidated Shore
- R1: Riverine Tidal
- R2: Riverine Lower Perennial
- R3: Riverine Upper Perennial

The wetland coverage was created by merging and dissolving seven digital NWI coverages including: Camas, Linnton, Mt. Tabor, Portland, Sauvie Island, Vancouver, and Washougal.

The Floodplain coverage was derived by reprojecting RLIS Lite and ClarkView coverages.

2000 DOQs are from Oregon Geospatial Data Clearinghouse. http://www.gis.state.or.us/data/DOQ_NAPP_2.html

4 0 4 8 12 Miles

N

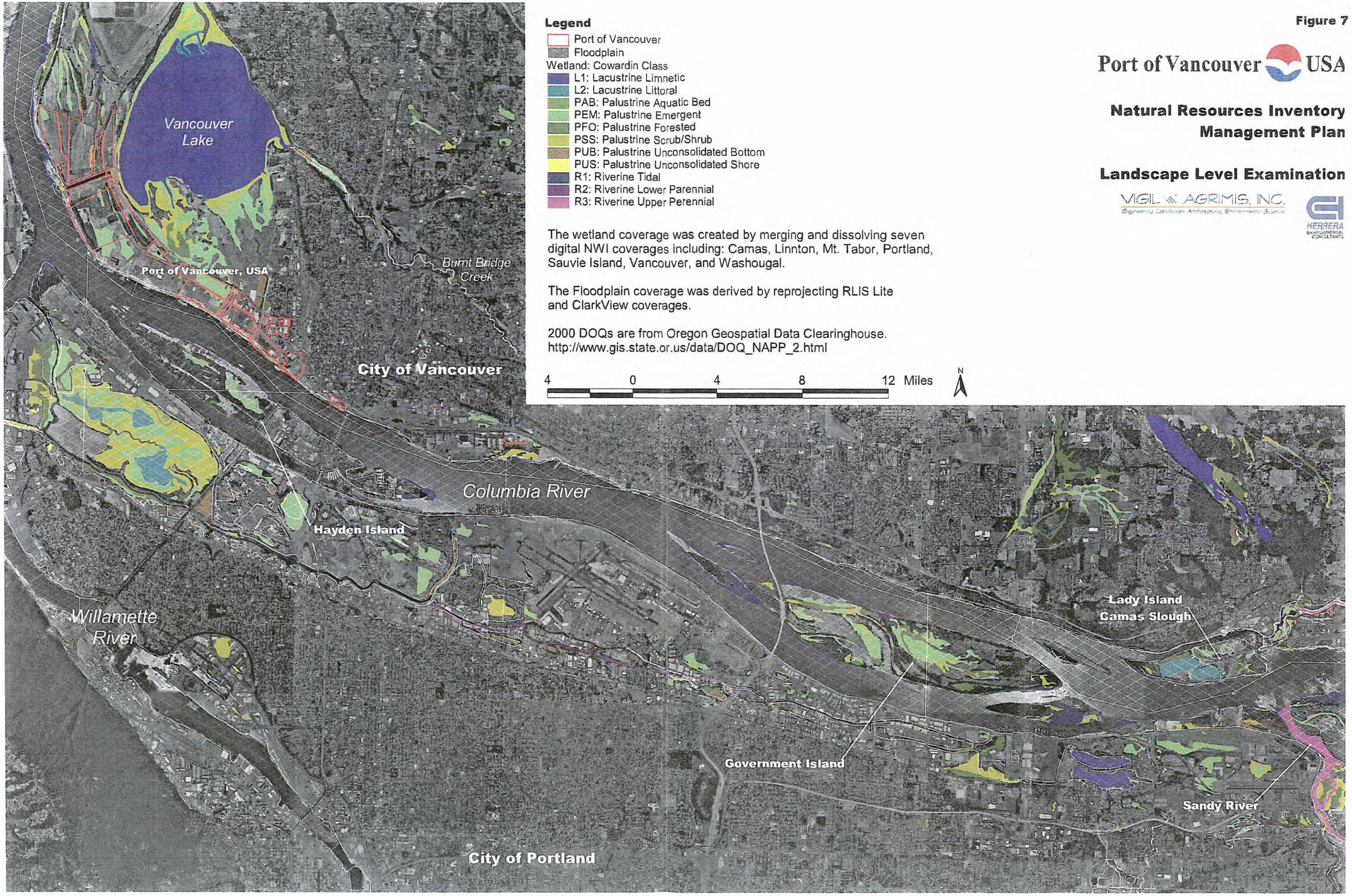


Figure 8

Port of Vancouver USA

Natural Resources Inventory Management Plan

Transect Locations

VGL AGRIMIS, INC.

HERRERA

LEGEND

T5 TRANSECT LOCATIONS

PROPERTY LINE

COLUMBIA RIVER NEARSHORE HABITAT REFERENCE TRANSECTS
NORTH OF THE FLUSHING CHANNEL

0 200 400 800 1600

NORTH

SCALE: 1" = 800'

PORT OF VANCOUVER DEVELOPED PROPERTIES
COLUMBIA RIVER NEARSHORE HABITAT TRANSECTS

0 200 400 800 1600

NORTH

SCALE: 1" = 800'

Figure 9

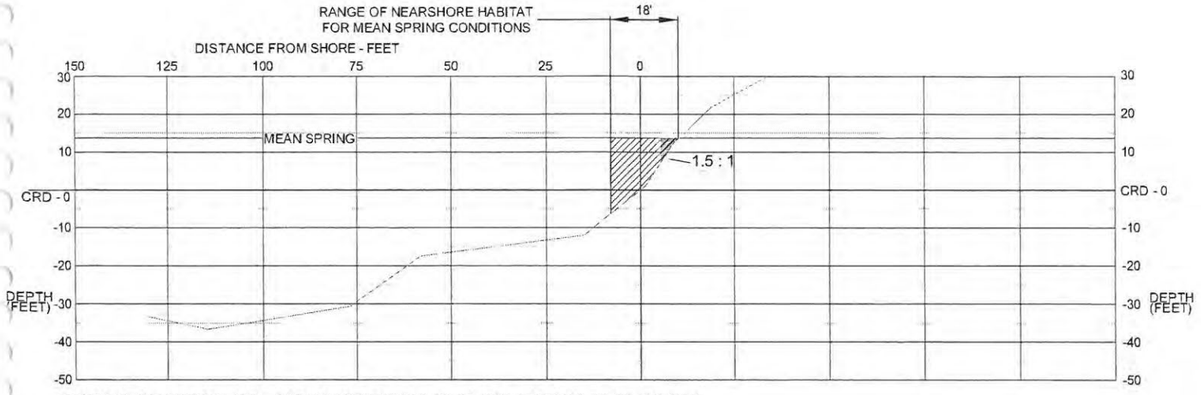
Port of Vancouver USA

Natural Resources Inventory Management Plan

Transect Cross-Sections Mean Spring Conditions

VIGIL AGRIMS, INC.
Engineering, Landscape Architecture, Environmental Science

HERRERA ENVIRONMENTAL CONSULTANTS

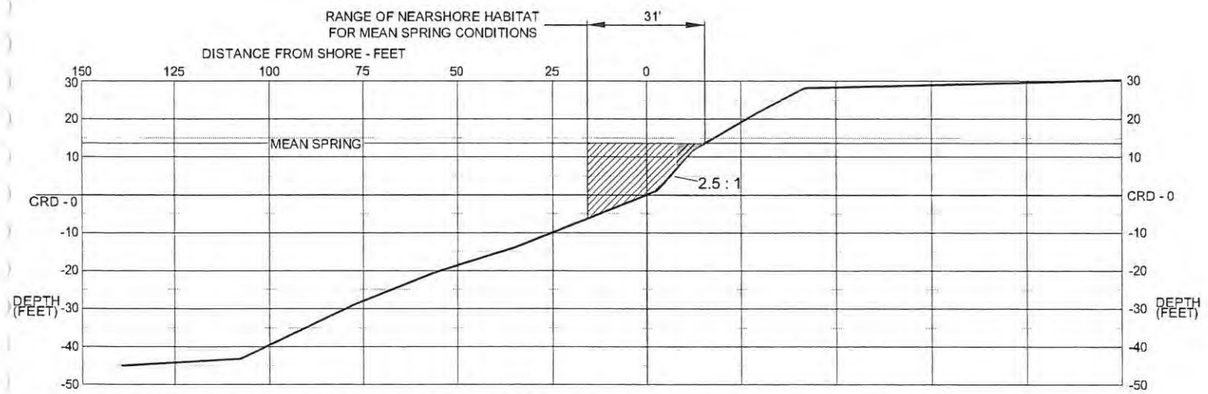


CROSS SECTION T3 - DOWNSTREAM END OF GRAIN ELEVATOR

HORIZONTAL & VERTICAL SCALE: 1" = 40'

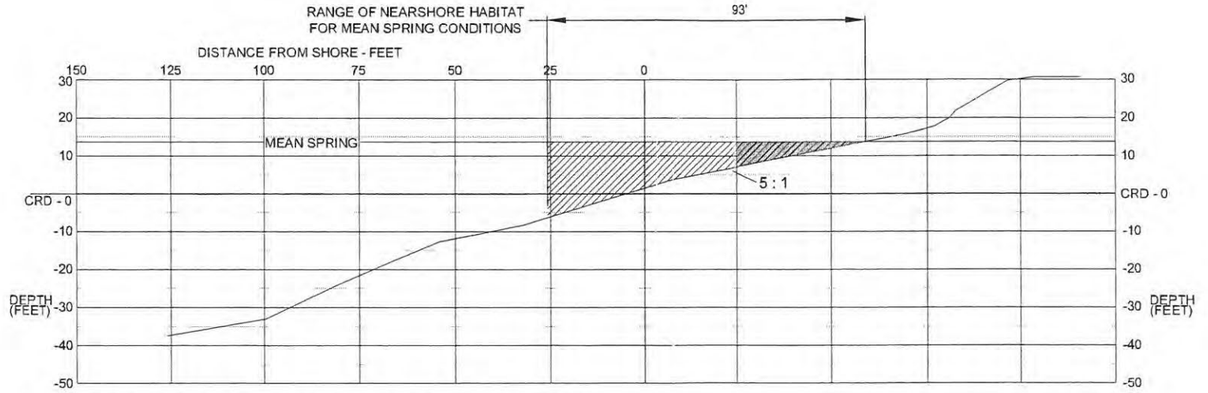
LEGEND

- NEARSHORE HABITAT (<20 FT DEPTH) DURING MEAN SPRING CONDITIONS
- HIGH QUALITY NEARSHORE HABITAT (<6.6 FT DEPTH) DURING MEAN SPRING CONDITIONS



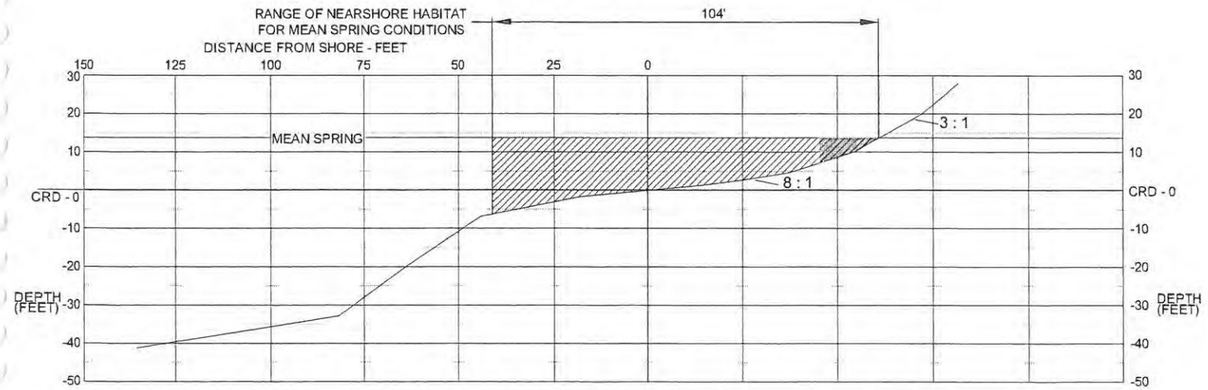
CROSS SECTION T5 - NEAR BERTH 8 AT TERMINAL 3

HORIZONTAL & VERTICAL SCALE: 1" = 40'



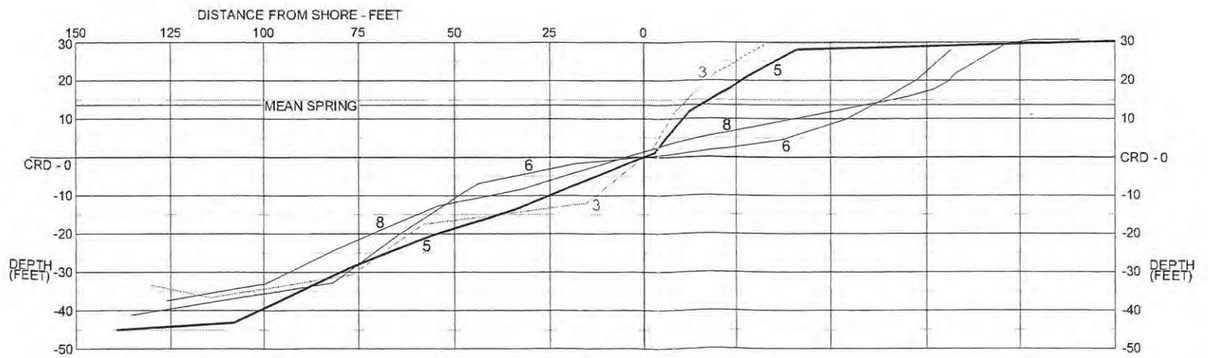
CROSS SECTION T8 - NEAR BERTH 13 AT TERMINAL 4

HORIZONTAL & VERTICAL SCALE: 1" = 40'



CROSS SECTION T6 - NEAR BERTH 9 AT TERMINAL 3

HORIZONTAL & VERTICAL SCALE: 1" = 40'



CROSS SECTIONS (T3, T5, T6, T8) - COMPARATIVE PLOTS

HORIZONTAL & VERTICAL SCALE: 1" = 40'

Figure 10

Port of Vancouver USA

Natural Resources Inventory Management Plan

Transect Cross-Sections Ordinary High Water Conditions

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Engineering, Landscape Architecture, Environmental Science

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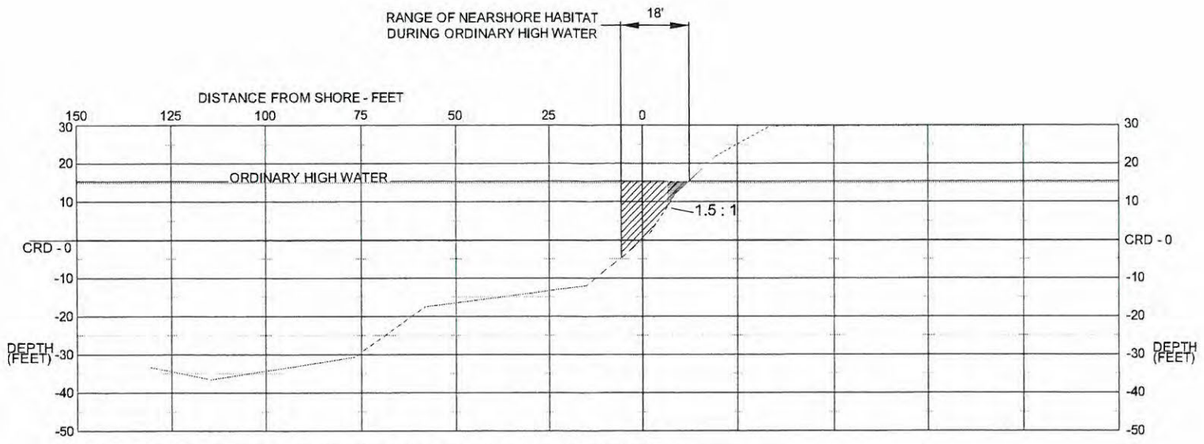


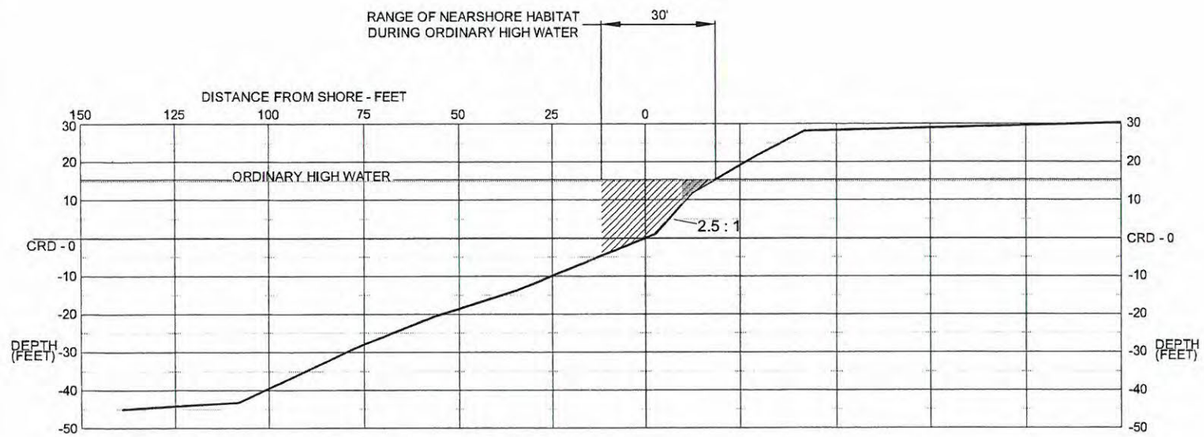
CROSS SECTION T3 - DOWNSTREAM END OF GRAIN ELEVATOR

HORIZONTAL & VERTICAL SCALE: 1" = 40'

LEGEND

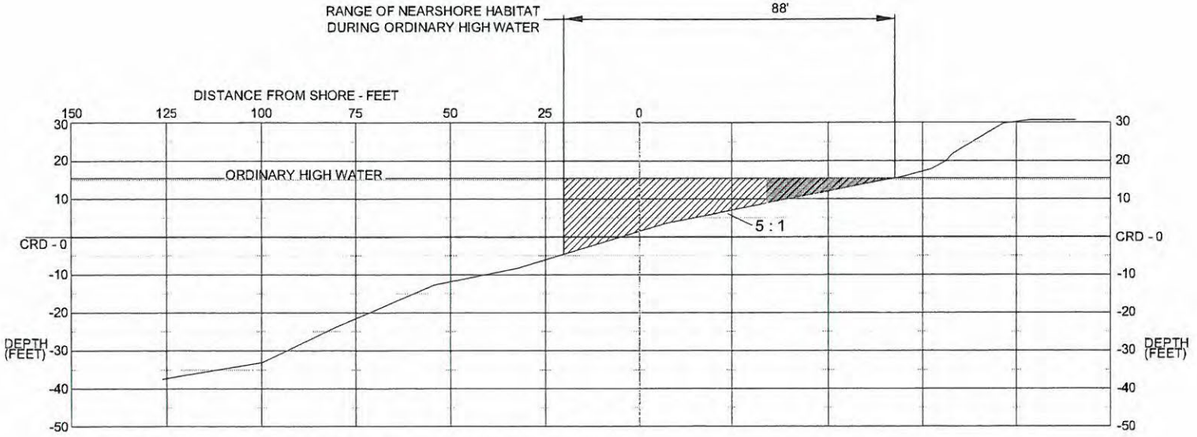
NEARSHORE HABITAT (<20 FT DEPTH) DURING ORDINARY HIGH WATER

HIGH QUALITY NEARSHORE HABITAT (<6.6 FT DEPTH) DURING ORDINARY HIGH WATER



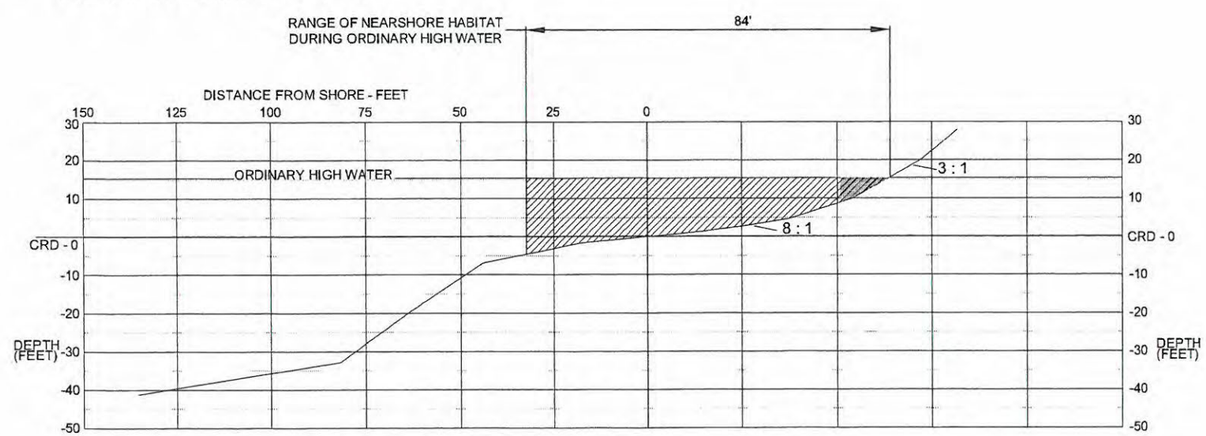
CROSS SECTION T5 - NEAR BERTH 8 AT TERMINAL 3

HORIZONTAL & VERTICAL SCALE: 1" = 40'



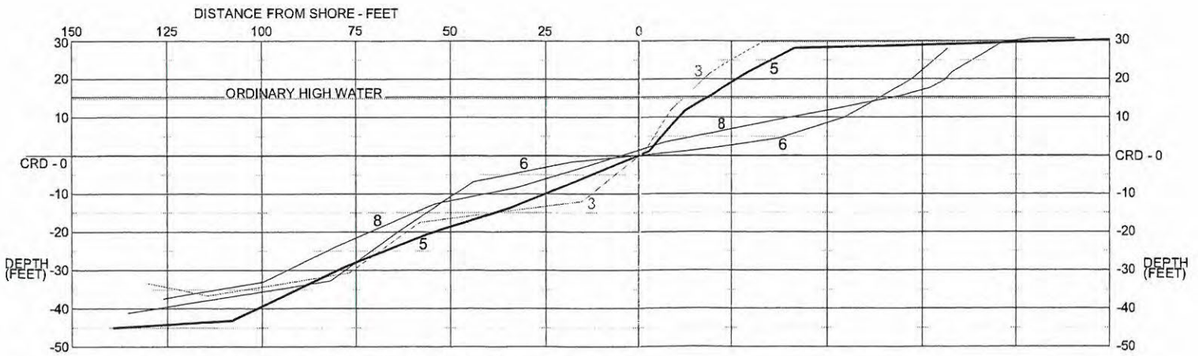
CROSS SECTION T8 - NEAR BERTH 13 AT TERMINAL 4

HORIZONTAL & VERTICAL SCALE: 1" = 40'



CROSS SECTION T6 - NEAR BERTH 9 AT TERMINAL 3

HORIZONTAL & VERTICAL SCALE: 1" = 40'



CROSS SECTIONS (T3, T5, T6, T8) - COMPARATIVE PLOTS

HORIZONTAL & VERTICAL SCALE: 1" = 40'

Figure 11

Port of Vancouver USA

Natural Resources Inventory Management Plan

Reference Cross-Sections Mean Spring Conditions

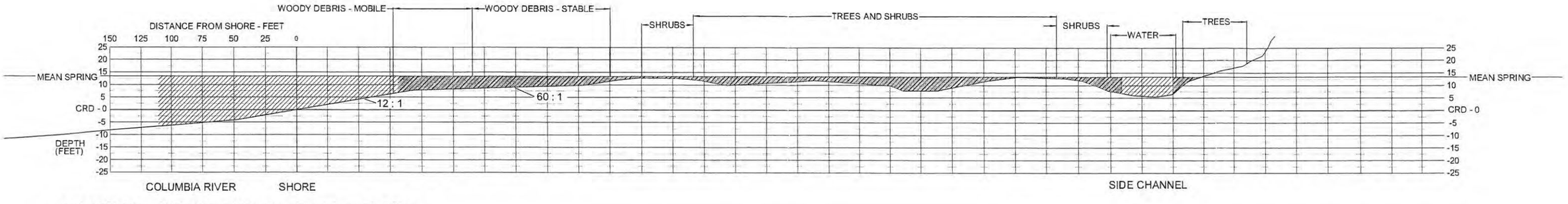
VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

HERRERA ENVIRONMENTAL CONSULTANTS

LEGEND

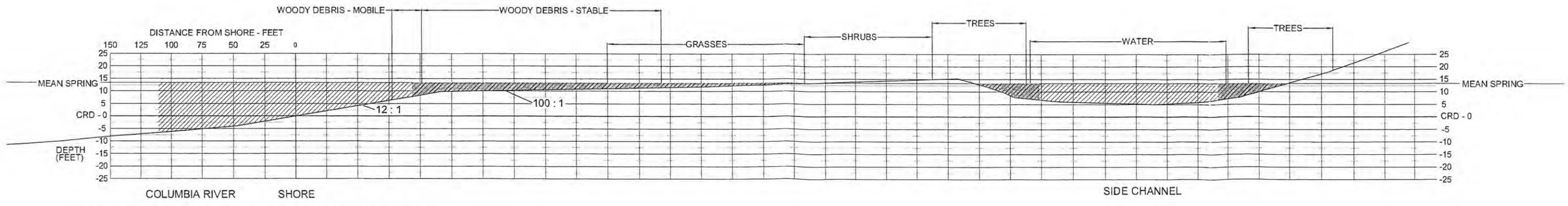
NEARSHORE HABITAT (<20 FT DEPTH) DURING MEAN SPRING CONDITIONS

HIGH QUALITY NEARSHORE HABITAT (<6.6 FT DEPTH) DURING MEAN SPRING CONDITIONS



REFERENCE CROSS SECTION R1 - REFERENCE SITE

HORIZONTAL SCALE: 1" = 80'
VERTICAL SCALE: 1" = 40'



REFERENCE CROSS SECTION R2 - REFERENCE SITE

HORIZONTAL SCALE: 1" = 80'
VERTICAL SCALE: 1" = 40'

Figure 12

Port of Vancouver USA

Natural Resources Inventory Management Plan

Reference Cross-Sections Ordinary High Water Conditions

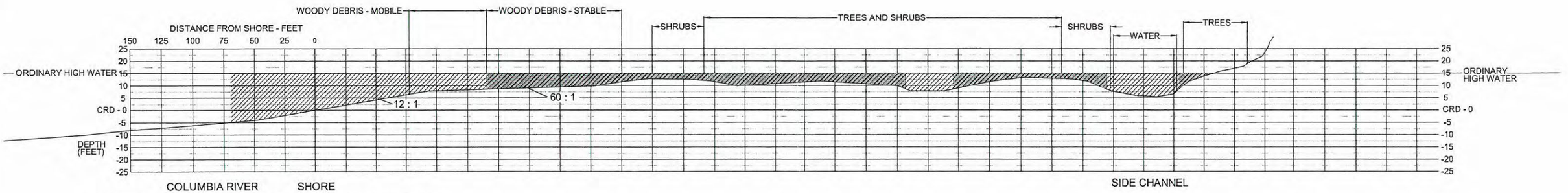
VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

HERRERA ENVIRONMENTAL CONSULTANTS

LEGEND

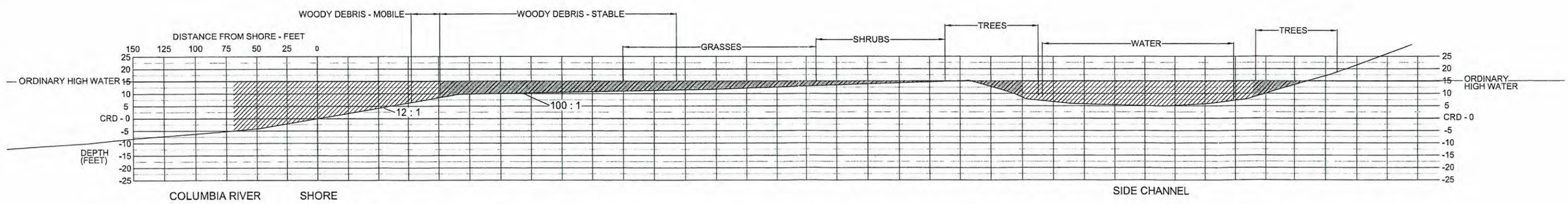
NEARSHORE HABITAT (<20 FT DEPTH) DURING ORDINARY HIGH WATER

HIGH QUALITY NEARSHORE HABITAT (<6.6 FT DEPTH) DURING ORDINARY HIGH WATER



REFERENCE CROSS SECTION R1 - REFERENCE SITE

HORIZONTAL SCALE: 1" = 80'
VERTICAL SCALE: 1" = 40'



REFERENCE CROSS SECTION R2 - REFERENCE SITE

HORIZONTAL SCALE: 1" = 80'
VERTICAL SCALE: 1" = 40'

Figure 13

Port of Vancouver USA

Natural Resources Inventory Management Plan

Approximate Extent of Nearshore Habitat

VIGIL AGRIMIS, INC.

HERRERA ENVIRONMENTAL CONSULTANTS

Legend

Port of Vancouver

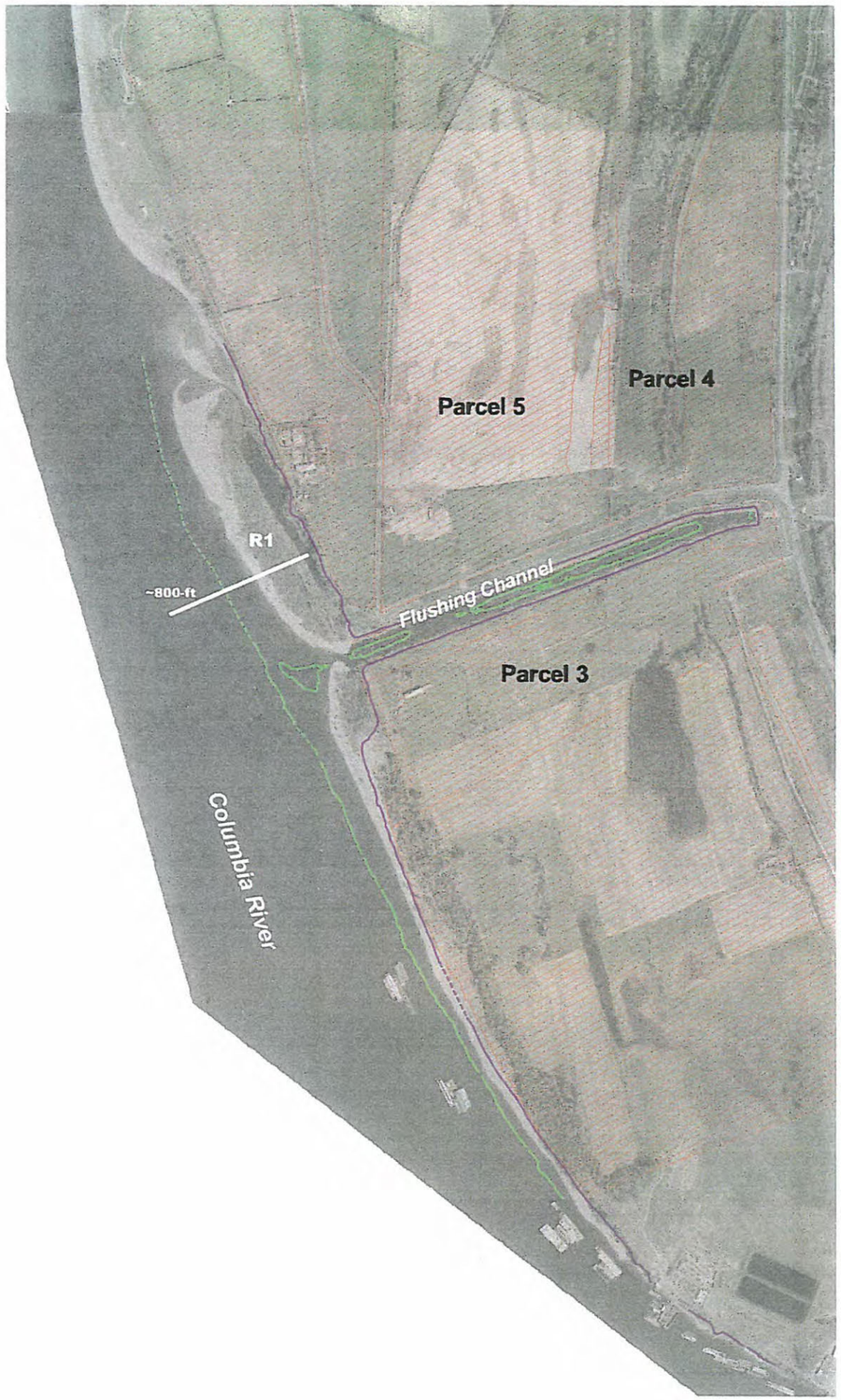
Range of Nearshore Habitat

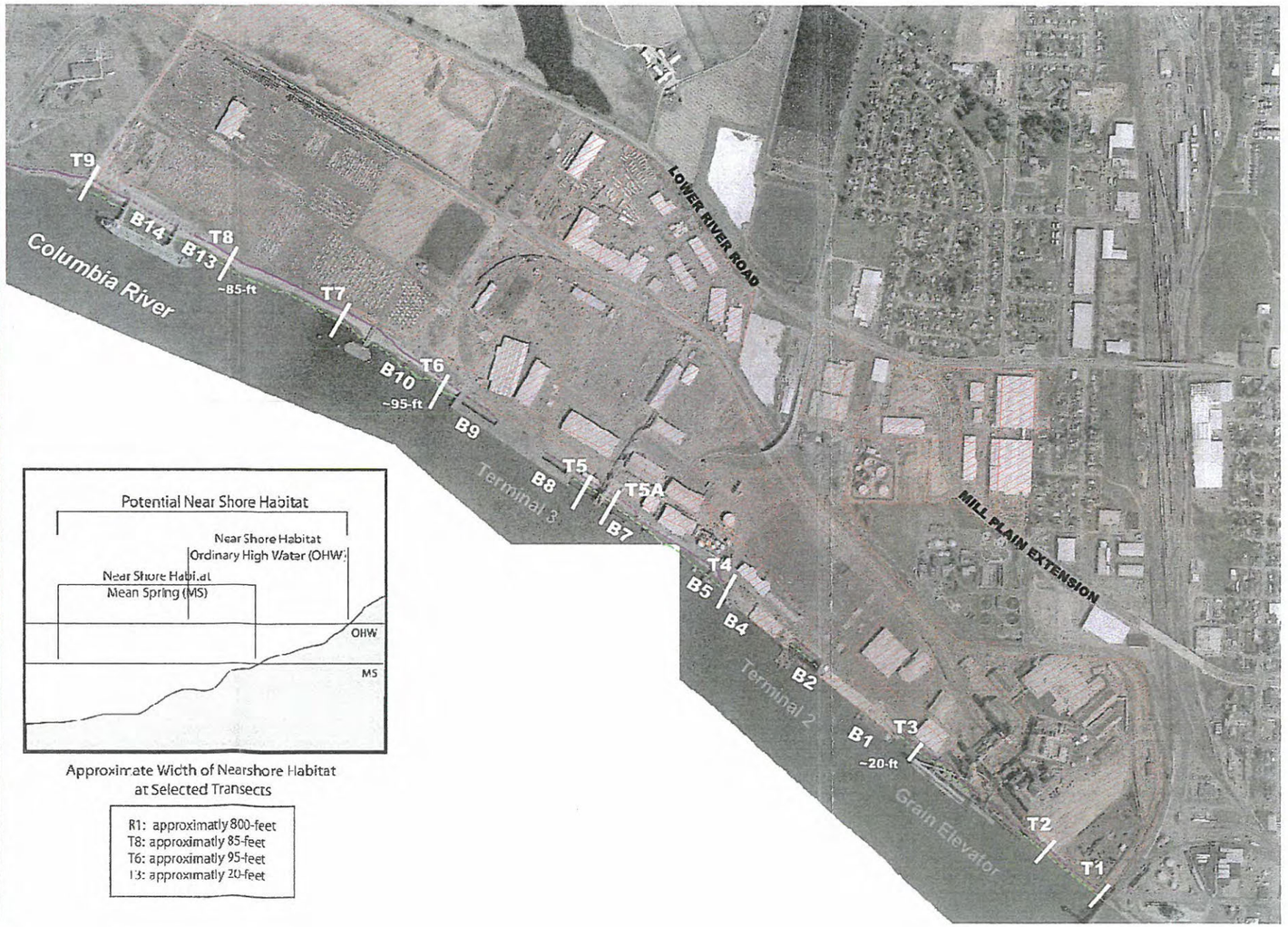
- Ordinary High Water: 16ft CRD
- Ordinary High Water: 16ft CRD (approximated)
- Mean Spring: -6ft CRD
- Mean Spring: -6ft CRD (approximated)

The -6-ft contour was approximated using bathymetry data provided by the Port in the Columbia River datum (CRD). The 16-ft contour was approximated using 2-ft contour interval data from ClarkView GIS. The vertical datum for these data is NGVD. The conversion between CRD and NGVD is 1.8-ft. To create this map product, land surface elevation was adjusted up 2-ft.
Air photo: 2002

1000 0 1000 2000 Feet

N





Approximate Width of Nearshore Habitat at Selected Transects

R1: approximatly 800-feet
T8: approximatly 85-feet
T6: approximatly 95-feet
T3: approximatly 20-feet

HABITAT MANAGEMENT PLAN

The habitat management plan provides a means to accommodate needed Port actions while managing Port environmental assets. This section applies location specific practices and treatments to minimize impacts and provide appropriate compensation for unavoidable impacts.

Development and Maintenance Activities and Natural Resources

Unavoidable impacts may be required for certain development projects or maintenance activities. These activities occur in the Aquatic, Shoreline and Land Zones. Activities that occur in the Land Zone are typically associated with structures and fills placed for to store materials associated with loading, offloading and other industrial activities. Activities that occur in the Shoreline and Aquatic Zone typically associated with development projects or maintenance activities include the construction of the structures and the implementation of related construction activities listed in Table 8.

Natural resources at the Port that could be impacted by development and redevelopment include nearshore habitat, riparian areas and wetlands. Figure 14 shows the zones and their relationship to the critical intersection areas and existing natural resources along the Port's developed shoreline.

Aquatic Zone

The Aquatic Zone includes both deepwater and shallow water areas. Aquatic areas that are greater than 20-feet deep are less important to salmonids. The shallow water area is equivalent in spatial extent to nearshore habitat. Areas within the shallow water areas that are less than 6.6-feet deep are especially valuable to juvenile salmonids.

The 1987 Corps of Engineers Wetlands Delineation Manual requires concurrent achievement of saturation, hydric soils, and hydrophytic vegetation criteria to meet the jurisdictional determination. Riparian wetlands, which are dominated by river flows below OHW, could be found in shallow water areas, such as the reference area downstream of the Flushing Channel.

Shoreline Zone

The Shoreline Zone is between OHW and top-of-bank. Riparian buffers are those streambank areas associated with the Columbia River that contribute woody debris, leaf litter, and insect drop directly to the river from trees and shrubs.

Land Zone

The Land Zone includes all land above top-of-bank. Some undeveloped areas remain. Based on the 1987 Corps of Engineers Wetlands Delineation Manual requirement, depressional wetlands may be found in the Land Zone. There are three existing wetlands on the Port's developed property (Table 9).

Table 8. Development and Maintenance Activities and Locations

Development/Maintenance Activity	Development/Maintenance Activity Location(s)			
	Aquatic		Shoreline	Land
	Deep	Shallow		
Shore Stabilization				
Bio-Engineering **or**		X	X	
Riprap		X	X	
Bulkheads				
Sheet Pile Wall **or**	X	X	X	
Concrete Seawall	X	X	X	
Dock Construction				
Pile Driving **and**	X	X	X	X
Decking Construction	X	X	X	X
T-Dock Construction				
Pile Driving **and**	X	X	X	
Decking Construction	X	X	X	
Dolphin Construction				
Pile Driving **and**	X	X		
Decking Construction	X	X		
Roll-on/Roll-off Dock Construction				
Pile Driving **and**	X	X		
Floating Dock				
Dock and Dolphin Maintenance				
Decking Removal **or**	X	X	X	
Decking Repair **or**	X	X	X	
Pile Removal **or**	X	X	X	
Pile Repair	X	X	X	
Berths				
Dredging **and**	X	X		
Dredge Material Placement				X
Infrastructure				
Roads and Rail Lines				X
Buildings and Storage				X

Figure 14. Developed Shoreline – Conceptual Cross-Section Existing Conditions

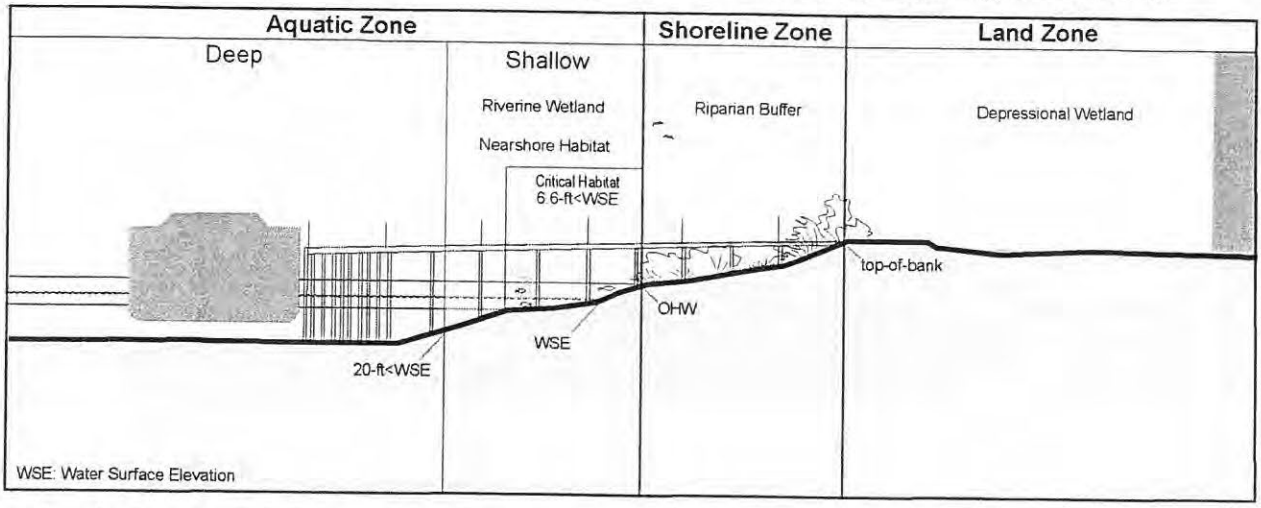


Table 9. Existing Wetland Locations

Wetland	Size (acres)	Vegetation	Category	Buffer	Type
Parcel 1A-NE	2.9	PEM	5	None Required	Natural Wetland
Parcel 1C	0.7	PFO	3	100-foot	Natural Wetland
Columbia Gateway Phase I	7.9	PFO, PSS, PEM	Replacement of 4	35-feet	Mitigation Site

Avoiding and Minimizing Impacts

Section 401/404, ESA and SEPA all require that alternatives be evaluated to illustrate that:

- Impacts are being avoided to the greatest extent practicable,
- Impacts are being reduced to the greatest extent practicable,
- Impacts that are neither avoidable nor reducible are compensated for.

Avoiding Impacts

Impacts can be avoided by:

- Changing the design footprint to avoid an impact.
- Not proceeding with a project.
- Proceeding with the project in a different location.

For impacts associated with construction activity, the timing or duration of the activity could be altered to avoid the impact.

Minimizing Impacts

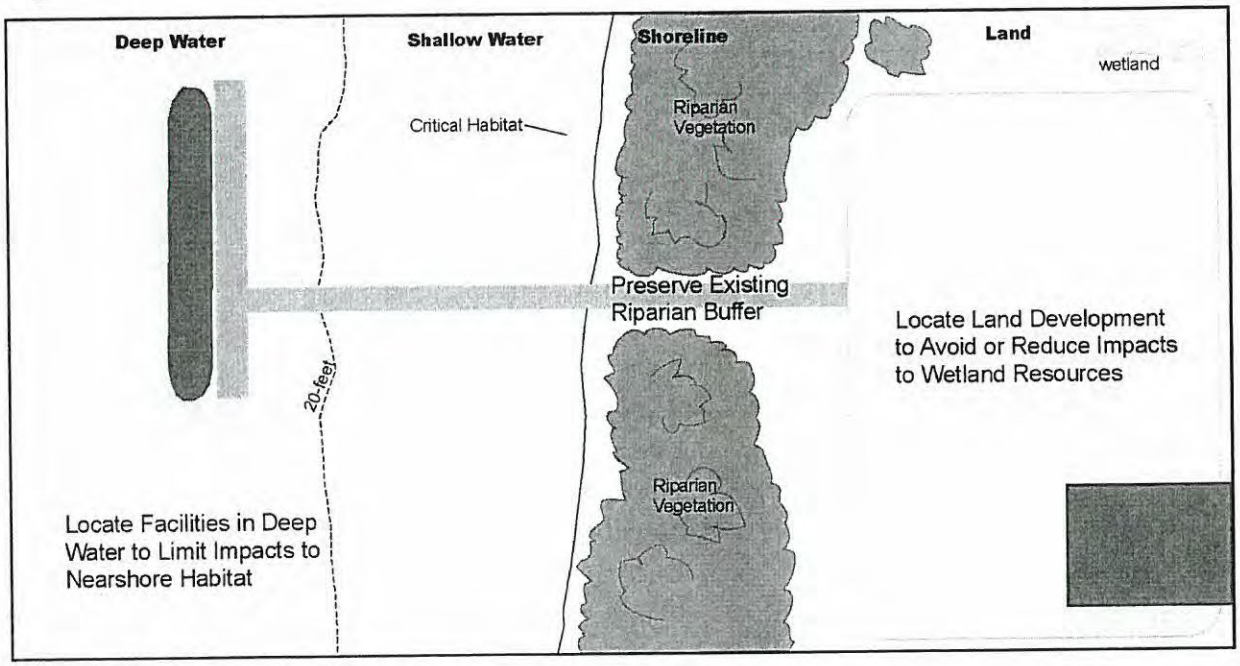
Federal regulations require that a minimization effort be undertaken when impacts can not be avoided outright. General guidance for minimizing impacts exists through a Programmatic Biological Opinion and Magnuson-Stevens Act Essential Fish Habitat Consultation for SLOPES. This guidance is provided by the Corps of Engineers and NOAA Fisheries for certain activities requiring Department of the Army permits. For the purpose of the NRIMP, proposed development and redevelopment impacts and mitigation are assumed to be generally consistent with the SLOPES agreement.

Options for minimizing impacts include changing the design of the project to reduce the project foot-print. Considering alternative design and construction methods to change the timing or limit the duration of the activity to minimize the impact. Typical strategies for minimizing impacts in ports include the use of clamshell dredging instead of vacuum dredging, using a bubble curtain to protect aquatic life from acoustic impacts associated with pile driving and adhering to established in-water-work windows.

The basic strategies for avoiding and minimizing impacts from Port development activities are conceptually diagrammed in Figure 15. Here the basic strategies include:

- Locating land development to avoid wetland resources.
- Minimizing impacts to riparian vegetation.
- Developing in deepwater instead of shallow water areas.

Figure 15. Strategies for Avoiding and Minimizing Impacts



Mitigating for Unavoidable Impacts

Unavoidable impacts to nearshore, wetland, and riparian resources require mitigation that is approved by federal, state, and local agencies. Following are 12 mitigation templates:

1. Adding riparian trees in groups,
2. Adding riparian shrubs in masses and managing invasive vegetation as needed,
3. Adding engineered wood as individuals or small groups.
4. Building engineering wood/concrete cribs for grade control and to accrete sand being transported along the shore,
5. Creating a floodplain bench behind engineered wood/concrete structures,
6. Using dredge sand fill to create gradual to moderate shorelines behind engineered wood/concrete structures,
7. Driving piles with steel lagging to establish grade control at or near the low water point,
8. Using the piles to add lagging (wood or steel channels) to create nearshore habitat,

9. Using dredge sand fill to create gradual to moderate shorelines behind engineered wood/concrete structures,
10. Providing light wells/steel grating over nearshore habitat created under structures,
11. Providing purple martin and/or bat boxes on piles.
12. Removing piles to below the level of existing substrate (2 feet) to reduce habitat used by predator species.

Wetlands

The replacement of wetland resources will be determined on a case-by-case basis depending of Department of Ecology guidance and City regulations.

Nearshore Habitat

Providing high quality function – either on-site in-kind or on-site/off-site out-of-kind – is the bottom line. The following section describes possible treatments for impacts to nearshore habitats.

Gradual Shorelines – Figure 16 describes three treatments (1, 2 and 3) that can be applied as mitigation for wetland, bank and in-water impacts in gradual shorelines. These treatment templates can be performed where gradual shorelines (12:1 and flatter slopes) are available for enhancement. Though gradual shoreline conditions do not exist at the developed Port these treatments can be used for off-site mitigation.

Vegetation selection will be subject to restrictions in terms of height, flowering characteristics, or other criteria due to adjacent Port uses and activities. New security requirements, mandated in the Marine and Transportation Security Act of 2002 and codified in 33 CFR Section 105, require facilities, including Ports to maintain clear zones of visibility around their entire boundary. The waterside boundary is of particular concern for potential terrorist activity.

Future mitigation projects within the developed Port, will need to consider security and operational requirements with respect to the installation of shrubs or tall vegetation along the shorelines or perimeter. In some cases there may be opportunities to install aquatic vegetation or groundcover if appropriate. For example, for a barge slip that requires shallow water habitat creation, aquatic vegetation might be planted within created shallow benched areas.

Moderate Shorelines – Figure 17 describes components of treatments (4, 5, 6 and 7) that can be applied as mitigation for wetland and riparian impacts in moderate shorelines where gradual slopes are not available or very limited for mitigation. In this case, shorelines are manipulated with structures to create habitat opportunities to compensate for proposed loss of existing nearshore and associated habitats. These treatment templates can be performed on moderate and steep shorelines to provide and enhance nearshore habitat for salmonids. A schematic crib detail is included in Appendix C.

Steep Shorelines – Figure 18 describes treatments (8, 9, 10 and 11) that can be applied as mitigation for aquatic and riparian impacts in steep shorelines associated with dock and pile construction using wide pile spacing.

Figure 19, a variation on the treatment in Figure 18, describes treatments (2, 8, 9 and 11) that can be applied as mitigation for aquatic and riparian impacts in moderate and steep shorelines associated with dock and pile construction using wide pile spacing. This example includes open water landward of the dock.

Figure 20, a variation on the treatment in Figure 18, describes treatments (8, 9, 10 and 11) that can be applied as mitigation for aquatic and riparian impacts in moderate and steep shorelines associated with dock and pile construction using dense pile spacing.

Figure 21 describes a treatment (12) that can be applied as out-of-kind mitigation for aquatic and riparian impacts in gradual, moderate and steep shorelines associated with a variety of construction impacts.

Figure 22, a variation on the treatment in Figure 21, describes a treatment (8, 9 and 12) that can be applied as a mitigation for aquatic and riparian impacts in gradual, moderate and steep shorelines associated with a variety of construction impacts.

Additional Details are included in Appendix C.

Spatial Distribution of Mitigation Treatments

The mitigation treatments discussed above were conceptually designed to fit into the three basic shoreline slope conditions found on Port property. Figure 23 illustrates the location of:

- Gradually sloped shoreline,
- Moderately sloped shoreline,
- Steeply sloped shoreline.

The steeply sloped areas are located on the southeastern shoreline between which is developed for deep draft ships. The moderately sloped shoreline extends northwest of this area to the end of the Alcoa facility. The gradually sloped area is further to the northwest, extending beyond the Flushing Channel, and currently includes Columbia Gateway Phase II.

A boat survey was completed by Port staff on May 10, 2004. This survey resulted in the identification of a number of locations for mitigation. Photographs from this survey are included in Appendix D. The results of this survey were combined with observations from the field work done to assess ecological functions and used to locate potential mitigation treatments on Port property.

Figures 24, 25 and 26 are a set of concept level maps that locate the mitigation treatments discussed in the previous section. Each map is focused on a different shoreline slope condition. These maps illustrate the potential areas available for the treatments. For example, creating nearshore habitat with piles (Figure 18) is possible only at an existing dock or where a new dock is to be built.

Figure 27 takes this one step further and identifies 17 specific locations for potential mitigation actions along the developed shoreline. These locations include: areas where invasive vegetation and debris can be removed, areas where old wooden piles can be removed or replaces, and areas where infrastructure can be relocated or removed. Any mitigation actions will need agency approval.

Mitigation Analysis

To the extent possible, mitigation treatment elements should address the water quality, hydrology, and habitat functions impacted by unavoidable impacts. Out-of-kind mitigation can be used to compensate for project impacts, but is not the approach generally preferred by regulatory agencies. However, there are instances when there are few if any alternatives.

Table 10 is a comparison of shoreline activities in the nearshore and deepwater area. The table describes anticipated impacts and proposed mitigation treatment templates to be used.

Table 11 is a generalized comparison of mitigation elements and relative cost and functionality for mitigation.

Cost information is presented in Appendix E. Costs vary greatly for the various mitigation treatments. Cost information, performance and extent to which a treatment has been tried must be considered when making decisions about appropriate impacts and compensatory mitigation.

Table 10. Functional Impacts of Activities and Mitigation Options

Activity	Affect on Functions			
	Water Quality Functions	**Hydrology Functions**	**Habitat Functions**	**Mitigation Template**
Shore Stabilization Construction				
Bio-Engineering **or**	May alter groundwater discharge patterns and thereby groundwater functions (e.g. water temperature moderation).	May reduce floodplain storage capacity by disconnecting the active channel form its floodplain Possible impairment of shoreline's ability to reduce downstream erosion (reduction in deformable friction elements from sandy beach and willow recruitment)	It may reduce floodplain connectivity and floodplain storage capacity by disconnecting the active channel from its floodplain. May degrade salmonid habitat, reducing food sources as well as habitat complexity and partitioning in areas where trees/vegetation are removed. Removal of shoreline trees/vegetation may also reduce potential habitat/food sources for birds and mammals. Reduced woody debris accumulation may also eliminate invertebrate habitat.	#s 1, 2, 3, 4, 5, 6
Riprap (new)	May alter groundwater discharge patterns and thereby groundwater functions (e.g. water temperature moderation).	May reduce floodplain storage capacity by disconnecting the active channel form its floodplain Possible impairment of shoreline's ability to reduce downstream erosion (reduction in deformable friction elements from sandy beach and willow recruitment)	It may reduce floodplain connectivity and floodplain storage capacity by disconnecting the active channel from its floodplain. May degrade salmonid habitat, reducing food sources as well as habitat complexity and partitioning in areas where trees/vegetation are removed. Removal of shoreline trees/vegetation may also reduce potential habitat/food sources for birds and mammals. Reduced woody debris accumulation may also eliminate invertebrate habitat. Will likely disrupt normal stream flows thus creating hydraulic shadows where predatory fish may prey upon juvenile salmonids.	#s 1, 2, 3, 4, 5, 6, 7
Riprap (maintenance)	Same as above	Continues impairment of shoreline's ability to reduce downstream erosion	Continues loss of riparian trees and reduced woody debris accumulation	
Bulkhead Construction				
Sheet Pile Wall **or** Concrete Seawall	Potential temporary water quality degradation if the proper conservation measures and BMPs are not implemented.	**Shallow Only** No Significant Adverse Impact. **Deep Only** May disrupt normal stream flows thus creating hydraulic shadows, providing an advantage to predatory fish.	May degrade anadromous fish habitat, reducing food sources and the effect of habitat partitioning in areas where trees/vegetation are removed. Light reduction to the underwater environment may also result, potentially providing an advantage to predators of anadromous fish. Effects would be limited to the immediate area of the sheet pile installation. Short-term impacts could include construction noise and light reduction from increased turbidity, both of which may provide an advantage to predatory fish. May degrade anadromous fish habitat, reducing food sources and the effect of habitat partitioning in areas where trees/vegetation are removed.	#s 1 - 10
Dock Construction				
Pile Driving **and** Decking Construction	**Shallow Only** May interfere with the removal of nutrients, metals, and toxic organics from the water column, especially in areas where removal of vegetation or woody debris occurs.	**Shallow and Deep** Piles associated with dock structures can disrupt the normal stream flows thus creating hydraulic shadows where predatory fish (i.e. Northern pike minnow) prey upon juvenile salmonids. **Shallow Only** If vegetation removed, may affect the ability of the shoreline to reduce downstream erosion.	**Shoreline Only** Removal of shoreline trees/vegetation may also reduce potential habitat/food sources for birds and mammals. Reduced woody debris accumulation may also eliminate invertebrate habitat. **Shallow Only** May degrade anadromous fish habitat, reducing food sources and the effect of habitat partitioning in areas where trees/vegetation are removed. **Shallow and Deep** Also may create hydraulic shadow and reduce light penetration to the underwater environment, creating a potential advantage for predators of anadromous fish.	#s 1, 2, 3, 9, 10, 12

Table 10. Functional Impacts of Activities and Mitigation Options - Continued

Activity	Affect on Functions			
	Water Quality Functions	**Hydrology Functions**	**Habitat Functions**	**Mitigation Template**
T-Dock Construction				
Pile Driving **and** Decking Construction	No Significant Adverse Impact.	May disrupt normal stream flows thus creating hydraulic shadows where predatory fish may prey upon juvenile salmonids.	**Shoreline Only** Removal of shoreline trees/vegetation may also reduce potential habitat/food sources for birds and mammals. Reduced woody debris accumulation may also eliminate invertebrate habitat. **Shallow Only** May degrade anadromous fish habitat, reducing food sources and the effect of habitat partitioning in areas where trees/vegetation are removed. **Shallow and Deep** May create eddies and reduce light penetration to the underwater environment, creating a potential advantage for predators of anadromous fish.	#s 10, 11, 12
Dolphin Construction				
Pile Driving **and** Decking Construction	No Significant Adverse Impact.	May disrupt normal stream flows thus creating eddies where predatory fish may prey upon juvenile salmonids.	May create eddies and reduce light penetration to the underwater environment, creating a potential advantage for predators of anadromous fish.	#s 10, 11, 12
Roll-on/Roll-off Dock Construction				
Pile Driving **and** Floating Dock	No Significant Adverse Impact.	May disrupt normal stream flows thus creating eddies where predatory fish may prey upon juvenile salmonids.	May create eddies and reduce light penetration to the underwater environment, creating a potential advantage for predators of anadromous fish.	
Dock and Dolphin Maintenance				
Decking Removal **or**	Potential temporary water quality degradation if the proper conservation measures and BMPs are not implemented. May reduce the presence of metals/toxic organics from the water column with removal of treated wood piles.	No Significant Adverse Impact.	May reduce the presence of woody debris (trapped by piles), thus impacting fish habitat by reducing cover from predatory fish. Reduction in woody debris may also eliminate invertebrate habitat.	#s 3, 4, 12
Decking Repair **or**	No Significant Adverse Impact.	No Significant Adverse Impact.	No Significant Adverse Impact.	
Pile Removal **or**	No Significant Adverse Impact.	No Significant Adverse Impact.	Short-term impacts could include construction noise and light reduction from increased turbidity, both of which may provide an advantage to predatory fish.	
Pile Repair	No Significant Adverse Impact.	No Significant Adverse Impact.	Short-term impacts could include construction noise and light reduction from increased turbidity, both of which may provide an advantage to predatory fish. May disrupt normal stream flows thus creating eddies, providing an advantage to predatory fish.	
Berths				
Dredging **and**	Potential temporary water quality degradation if the proper conservation measures and BMPs are not implemented.	No Significant Adverse Impact.	Short-term turbidity increases will reduce light penetration to the underwater environment, potentially providing an advantage to predatory fish.	
Dredge Material Placement	Potential temporary water quality degradation if the proper conservation measures and BMPs are not implemented.	May disrupt normal stream flows creating eddies where predatory fish may prey upon juvenile salmonids.	Same as above	#s 2, 3, 4, 5, 6, 7, 8, 9

Table 11. Preliminary Cost Estimate

#	Mitigation Element	Cost	Functionality
1	Add riparian hardwoods in clusters of 3-9	$5k -$10k	Tried and True
2	Add riparian shrubs in drifts/masses of 20-50	$5k -$15k	Tried and True
3	Add engineered wood individually or in small groups at approximately 200-foot on-center	$10k -$60k	Tried and True
4	Add engineered wood/concrete debris grade control	$60k -$600k	Modification of Tried and True
5	Create floodplain bench, adding riparian hardwoods, shrubs, and/or engineered wood as appropriate	$40k - $100k	Tried and True
6	Use dredge sand fill (applied to gradual/steep slopes)	$10k - $20k	Tried and True
7	Use piles or batter wall to create shallow water aquatic habitat	$100k - $200k	Modification of Tried and True
8	Add steel lagging to create shallow water aquatic habitat	$100k - $200k	Experimental
9	Add dredge sand fill (pier areas)	$10k - $20k	Modification of Tried and True
10	Provide light wells	$10k - $40k	Modification of Tried and True/ Experimental
11	Provide bird and bat boxes	$1k<	Tried and True
12	Remove piles	$40k - $400k	Tried and True

DISCUSSION AND CONCLUSIONS

The purpose of the NRIMP is to provide the Port with a flexible planning tool focused on the developed shoreline. The NRIMP addresses the full range of redevelopment and maintenance activities in aquatic, shoreline and land areas. The NRIMP focuses on critical intersections between natural resources and Port activities to provide a toolbox for the Port to use in adopting a proactive approach to regulatory permitting. This approach will:

- Streamline the environmental permitting process,
- Avoid project delays by identifying appropriate mitigation/conservation options early in the project development process,
- Improve management of Port environmental assets,
- Avoid piece-meal mitigation planning,
- Assist with budget process for facility improvements by providing cost estimates to implement mitigation options,
- Meet or exceed local, state and federal agency requirements for comprehensive resource protection.

The NRIMP reviewed Port activities, and natural resources within three zones: Aquatic, Shoreline and Land. The NRIMP concluded that likely redevelopment and maintenance activities within the Port's developed shoreline could include:

- Shore stabilization,
- Bulkhead construction,
- Dock and dolphin construction and maintenance,
- Construction activities associated with open and warehouse storage facilities and
- Dredging.

Natural resources within the Port's developed shoreline include:

- Riparian buffers and
- Nearshore salmonid habitat.

The shallow-water aquatic area and shoreline were identified as the areas of greatest conflict between activities and resources.

An inventory was conducted to determine the extent, quality, functions and values of the natural resources within the developed Port. The shoreline was broken down into three slope categories (gradual, moderate and steep) based on the data collected in the field. The categories were based on the slope because this variable is directly related to the amount of nearshore habitat available to salmonids as well as the frequency and duration of its availability. Functional assessment of water quality, hydrologic and food webs and habitat was highest on the gradually sloping shoreline and lowest on the steeply sloping shoreline. The grain elevator and Berth 2 (Terminal 2) fall into the Steep category. Berths 4 to 14 (Terminals 2, 3 and 4) fall into the Moderate category. There are no areas in the developed shoreline in the Gradual category.

Section 401/404, ESA, and NEPA all require that alternatives be evaluated as part of the permitting process to illustrate that:

- Impacts are being avoided to the greatest extent practicable,
- Impacts are being reduced to the greatest extent practicable,
- Impacts that are neither avoidable nor reducible are compensated for.

Federal regulations require that a minimization effort be undertaken when impacts can not be avoided outright. For the purpose of the NRIMP, proposed development and redevelopment impacts and mitigation are assumed to be generally consistent with the SLOPES agreement which provides general guidance for minimizing impacts exists through a Programmatic Biological Opinion and Magnuson-Stevens Act Essential Fish Habitat Consultation.

The NRIMP provides a mitigation template for use when impacts are unavoidable. The mitigation template is a tool for assisting project managers assess project impacts and for determining appropriate mitigation. It must not be viewed as a "cookbook", but rather as a guide to facilitate project development that supports vital economic development with least impact to natural resources.

Site constraints make it challenging to always match impacts to functions with equivalent mitigation. In some instances, on-site in-kind mitigation can be achieved. In others, multiple treatment elements could potentially be used for on-site/off-site out-of-kind mitigation. Regardless of the approach, improving the quality of existing habitat is the driver. Habitat quality can be improved by enhancing existing functions or by adding functions that are not currently provided.

The NRIMP presents numerous opportunities to provide mitigation treatments for unavoidable impacts to natural resources in nearshore and shoreline areas. These range form low-cost tried and true treatment elements to high-cost and sometimes experimental treatment elements. They include:

- Adding riparian hardwoods in clusters,
- Adding riparian shrubs in drifts/masses,
- Adding engineered wood individually or in small groups,
- Adding engineered wood/concrete debris grade control,
- Creating floodplain benches,
- Using dredge sand fill to enhance shoreline areas,
- Using sheet pile or batter wall to create shallow water aquatic habitat,
- Adding steel lagging to create shallow water aquatic habitat,
- Adding dredge sand fill to pier areas,
- Providing light wells in dock structures,
- Providing bird and bat boxes,
- Removing pilings and debris,
- Removing invasive vegetation.

Many of these elements can be incorporated into a redevelopment project at the design phase, in essence making the project self-mitigating. To ease the permitting process project design should attempt to include mitigating elements when possible. Examples of self-mitigating projects include the docks and piers shown in Figures 18 and 19. There may be impacts

where shorelines can be modified by treatments as shown in Figures 16, 17, and 18 as self-mitigating projects.

By first understanding potential impacts associated with redevelopment and maintenance activities, measures can then be taken to avoid, reduce and finally compensate for natural resources impacts. Integrating infrastructure design, permitting and mitigation design from project inception can be effective in increasing cost effectiveness and conserving important natural resources. The NRIMP facilitates this approach to integrated design.

Figure 16

Port of Vancouver USA

Natural Resources Inventory Management Plan

Gradually Sloping Shoreline Treatments

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

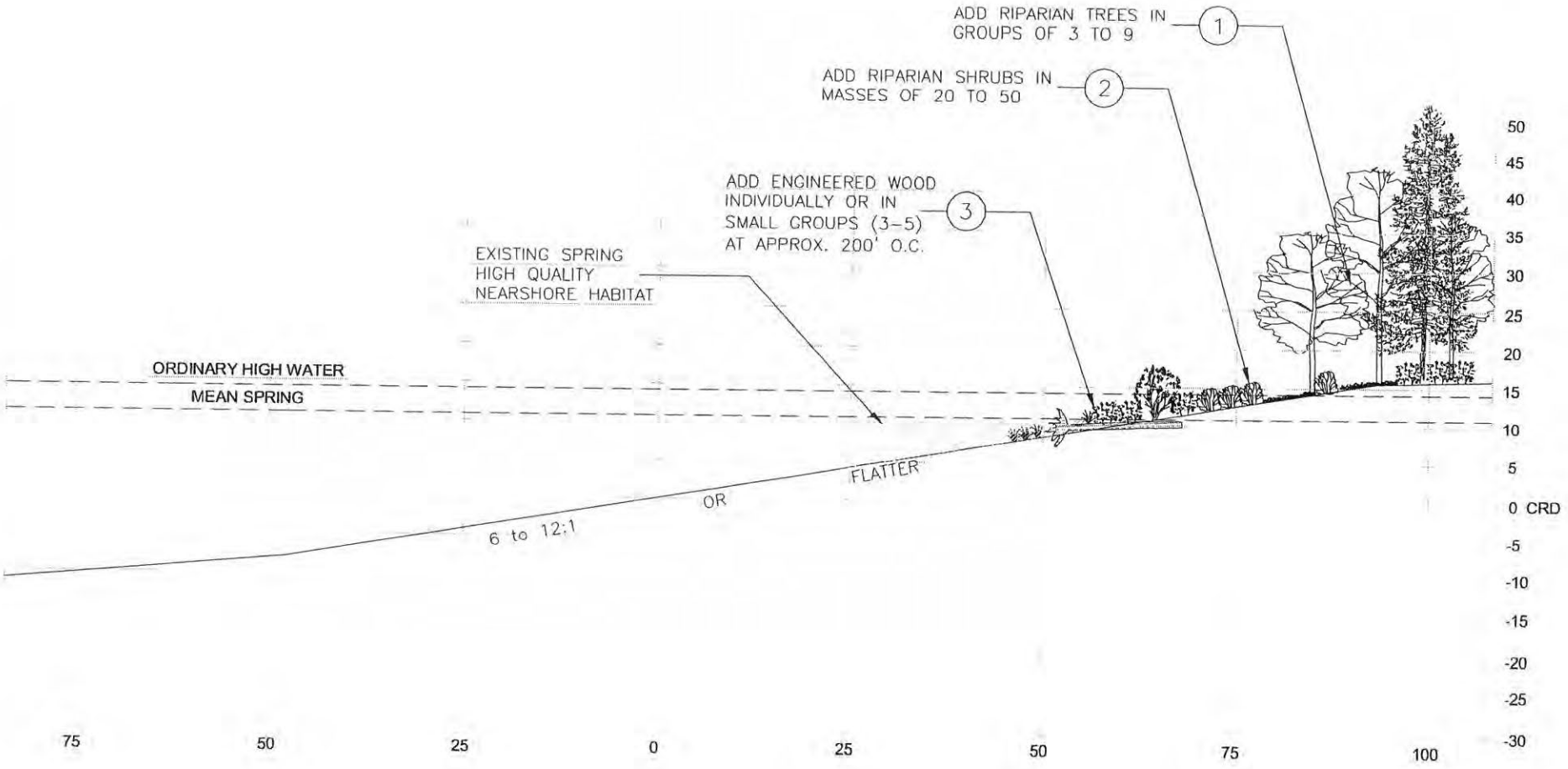


Figure 17

Port of Vancouver USA

Natural Resources Inventory Management Plan

Moderately Sloping Shoreline Treatments

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

HERRERA

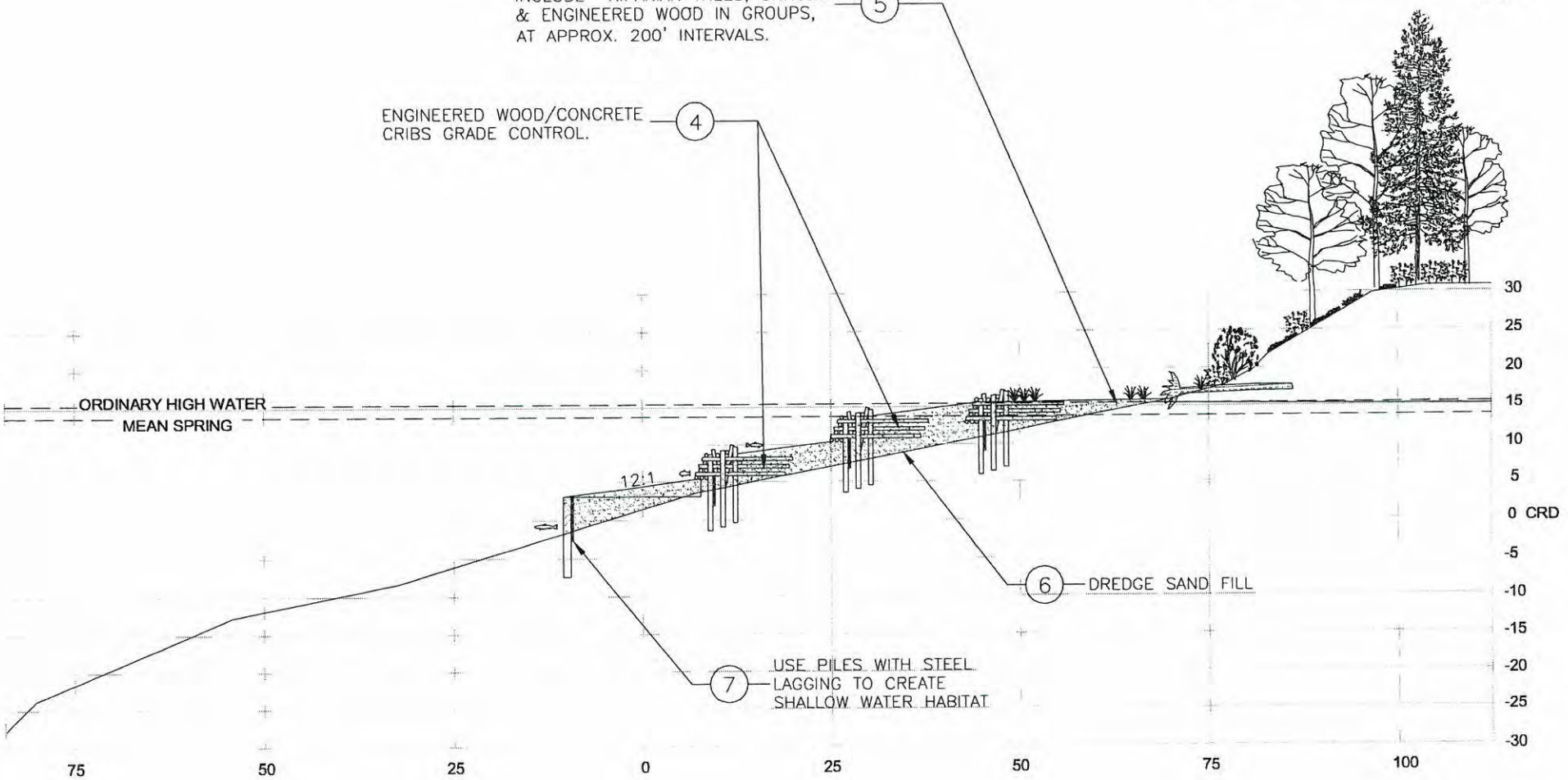


Figure 18

Port of Vancouver USA

Natural Resources Inventory Management Plan

Steeply Sloping Shoreline Treatments with Piles

VIGIL AGRIMIS, INC.
Engineering Landscape Architecture Environmental Science

HERRERA

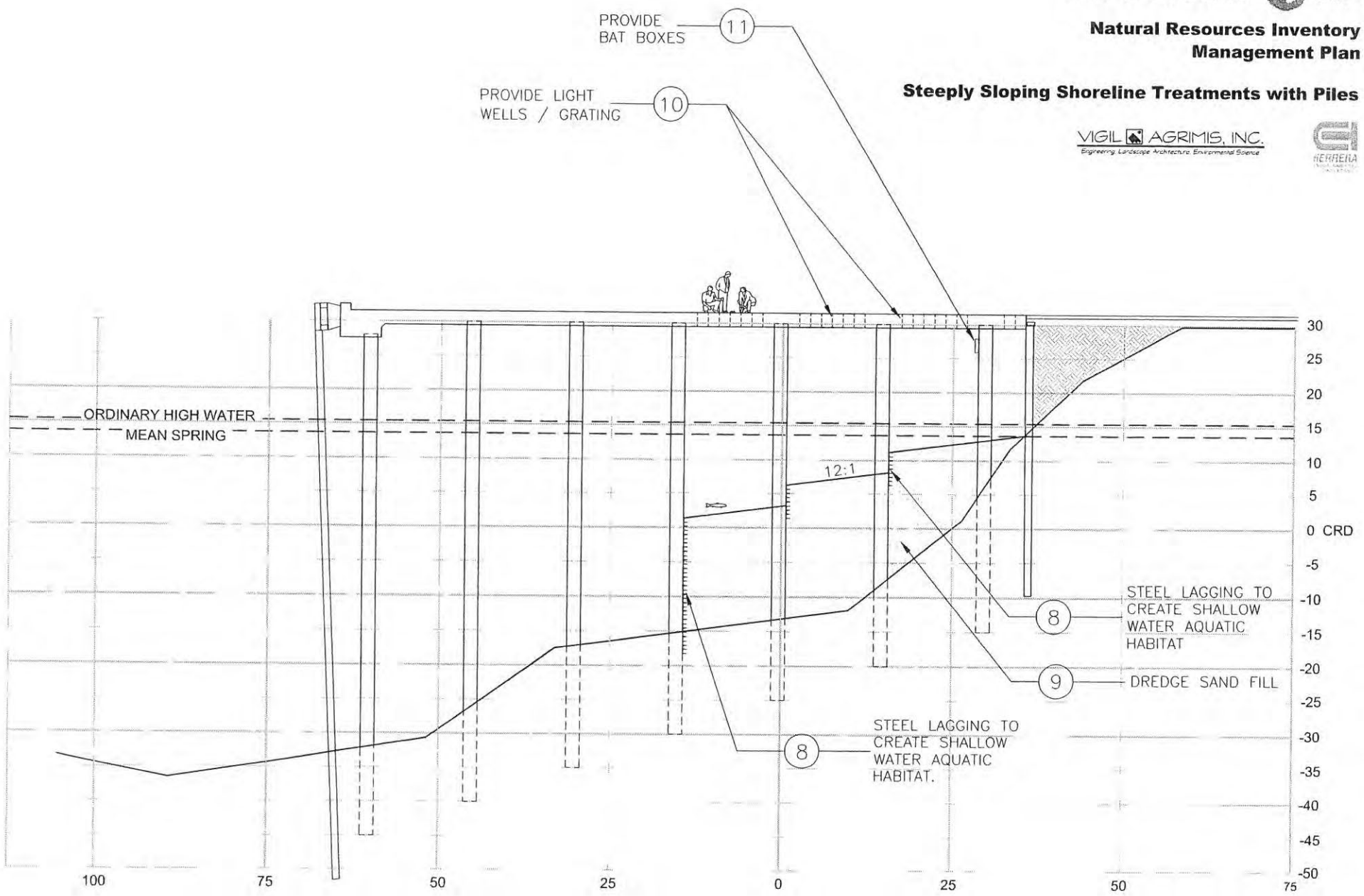


Figure 19

Port of Vancouver USA

Natural Resources Inventory Management Plan

Steeply Sloping Shoreline Treatment with Piles and Open Water

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

KERRBIA

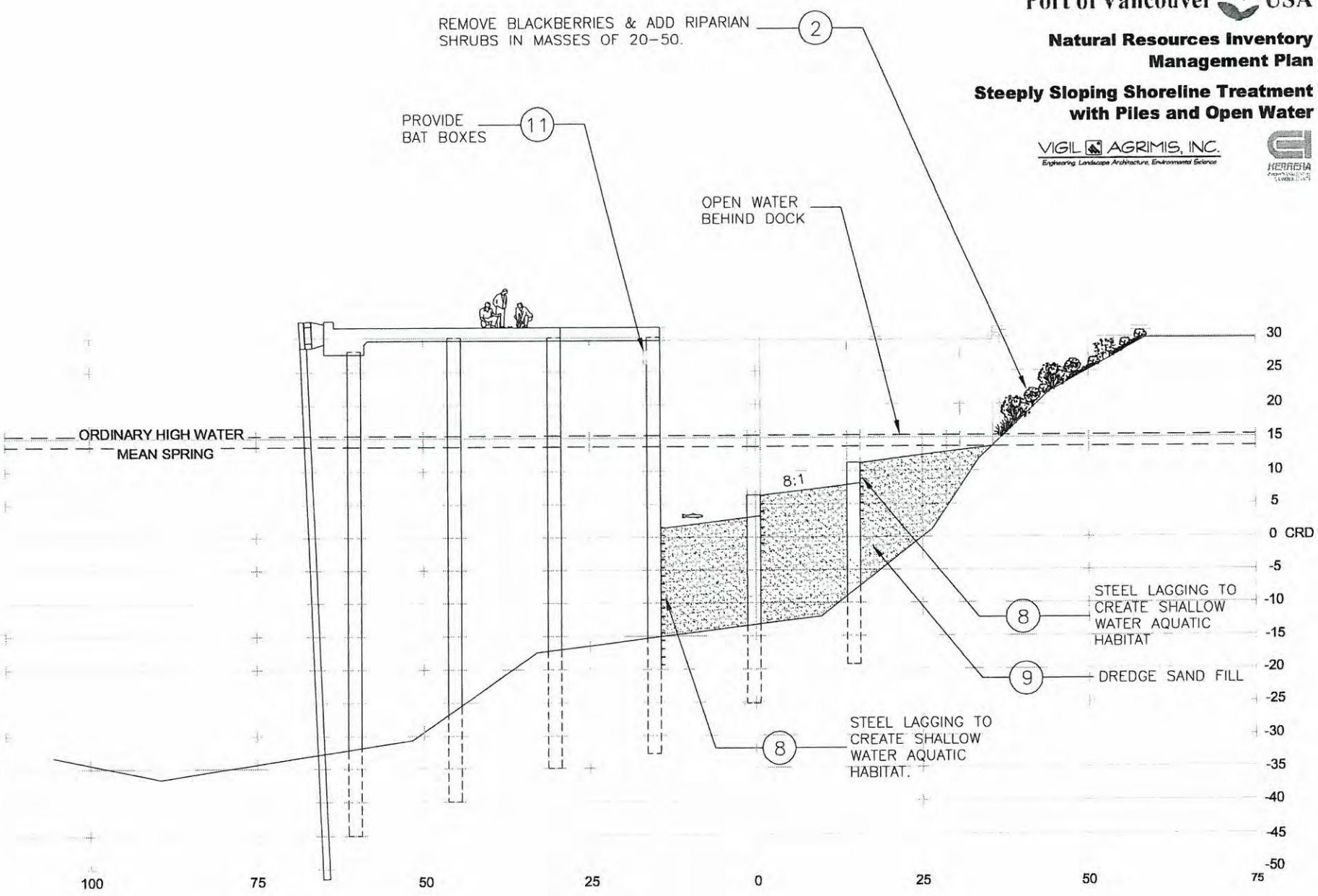


Figure 20

Port of Vancouver USA

Natural Resources Inventory Management Plan

Steeply Sloping Shoreline Treatments with Dense Piles

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

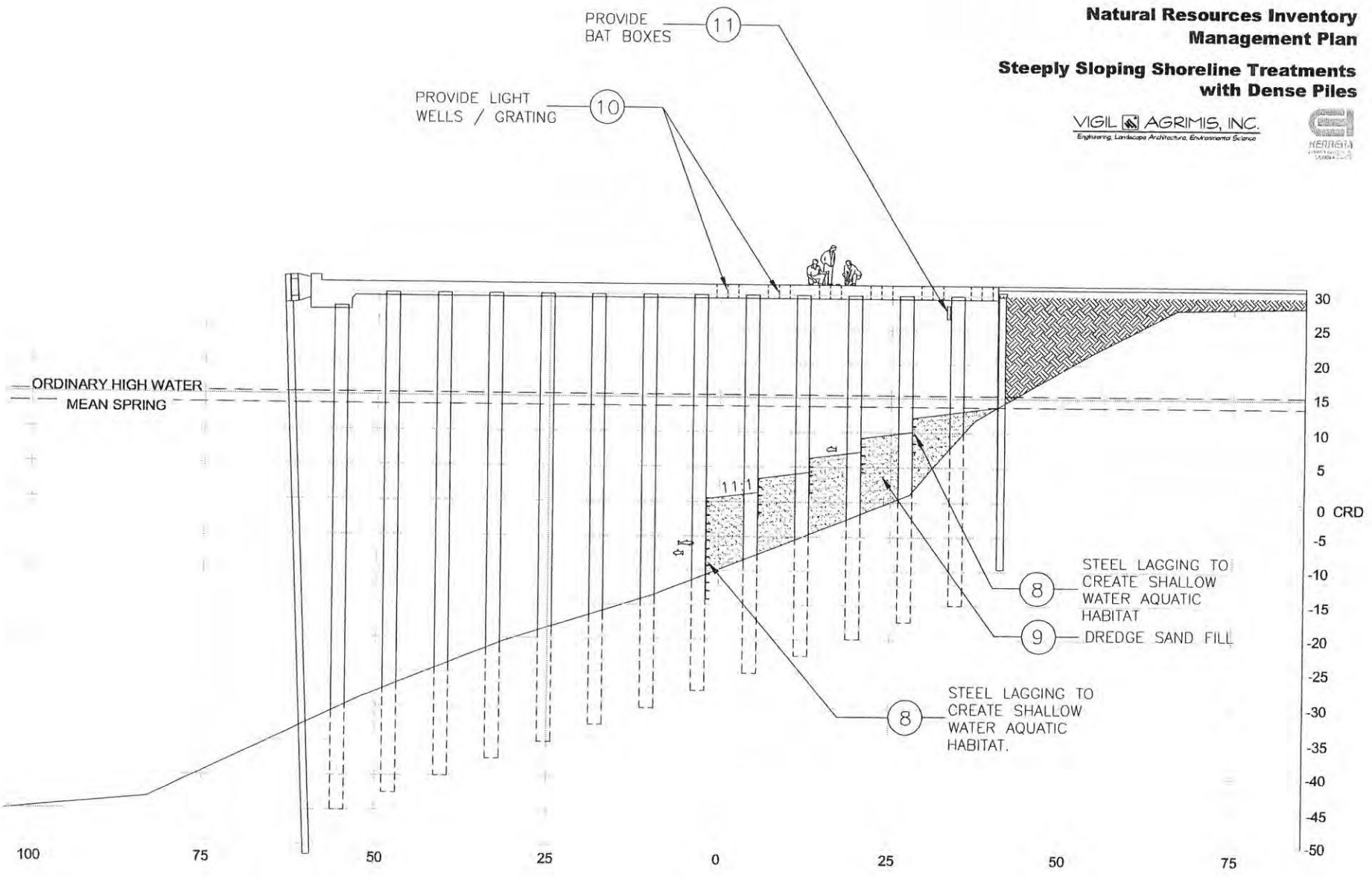


Figure 21

Port of Vancouver USA

Natural Resources Inventory Management Plan

Steeply Sloping Shorelines Treatments with Pile Removal

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

HERRERA

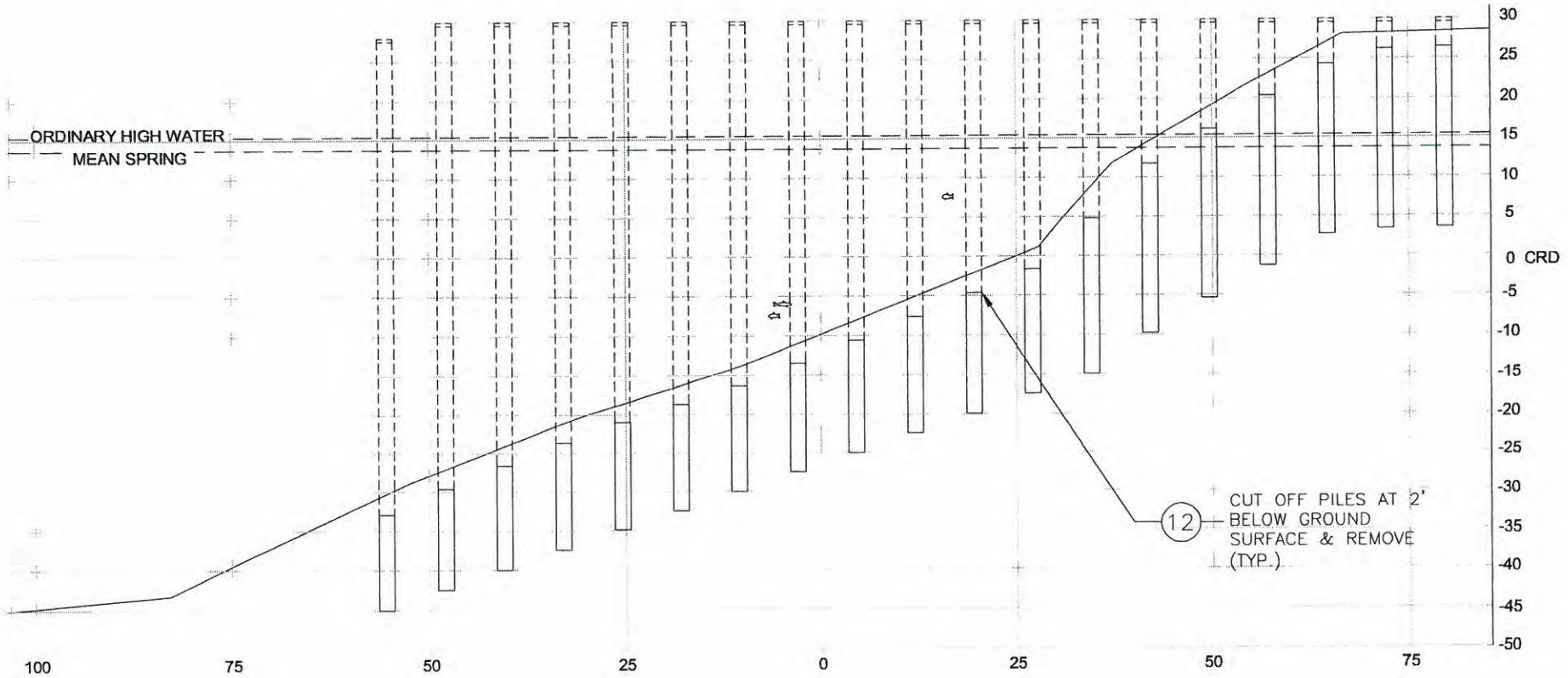


Figure 22

Port of Vancouver USA

Natural Resources Inventory Management Plan

Steeply Sloping Shoreline Treatments with Partial Pile Removal

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

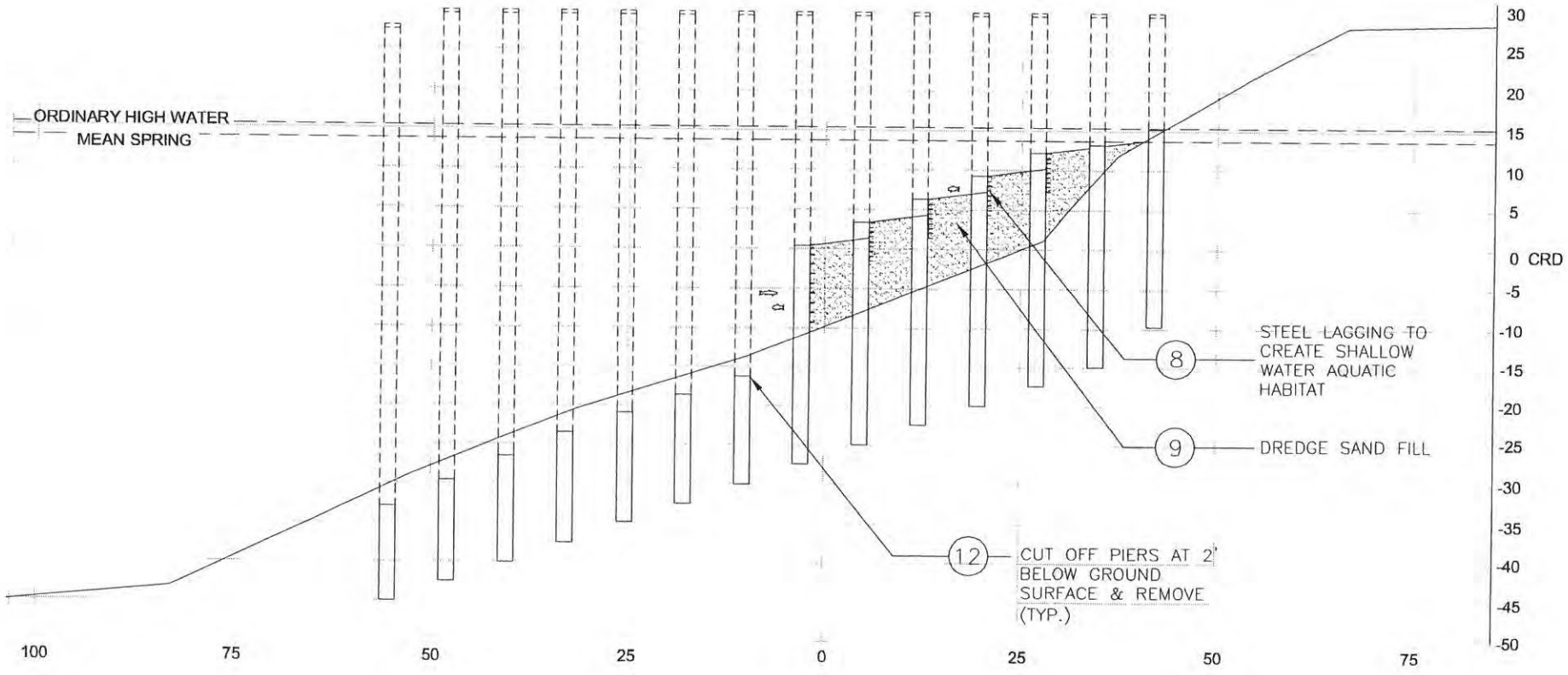


Figure 23

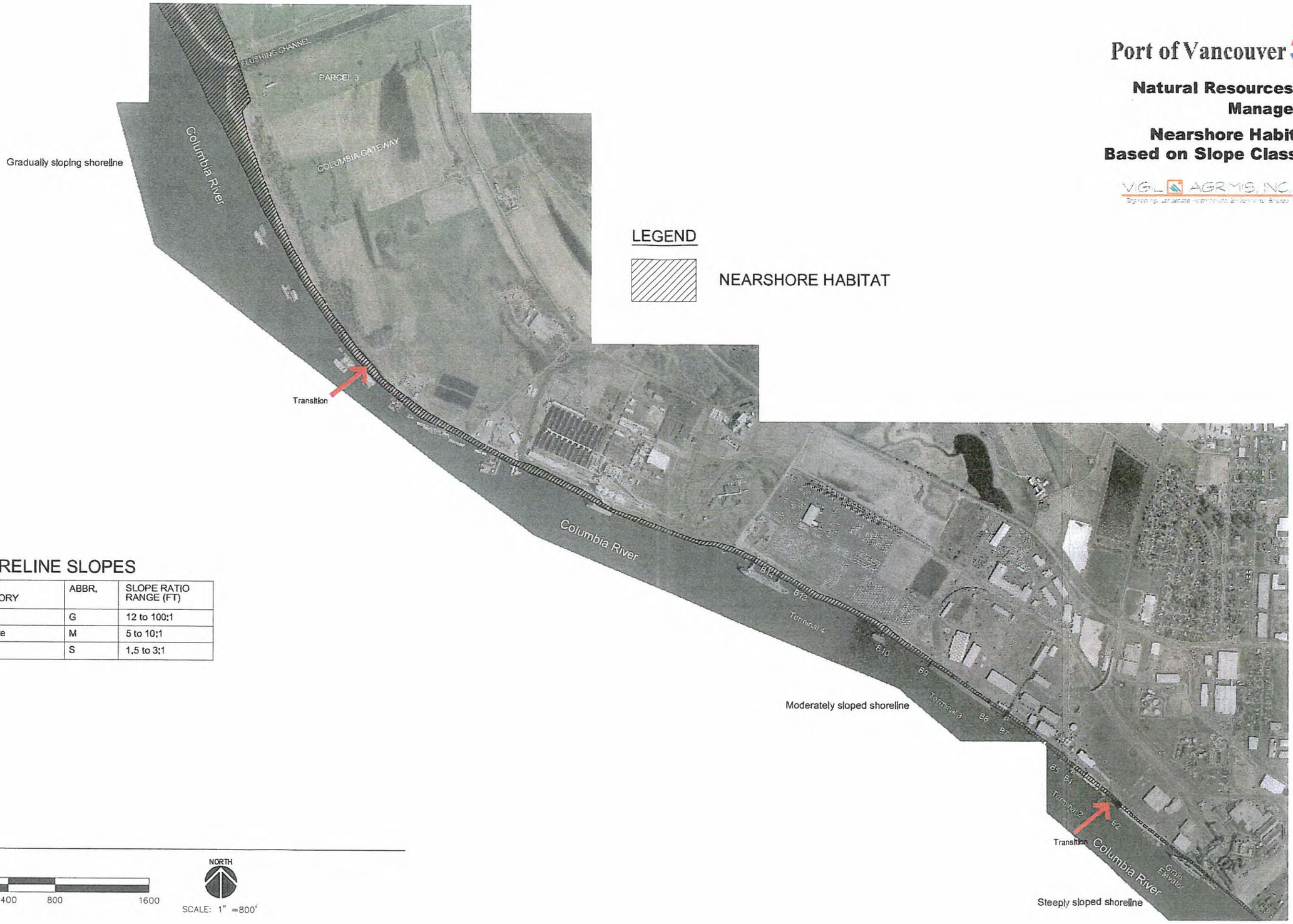
Port of Vancouver USA

Natural Resources Inventory Management Plan

Nearshore Habitat Extent Based on Slope Classifications

VGL AGRMS, INC

HERRERA ENVIRONMENTAL CONSULTANTS



SHORELINE SLOPES

SLOPE CATEGORY	ABBR.	SLOPE RATIO RANGE (FT)
Gradual	G	12 to 100:1
Moderate	M	5 to 10:1
Steep	S	1.5 to 3:1

0 200 400 800 1600

NORTH

SCALE: 1" =800'

Figure 24

Port of Vancouver USA

Natural Resources Inventory Management Plan

Gradually Sloped Shoreline

VIGIL AGRIMIS, INC.

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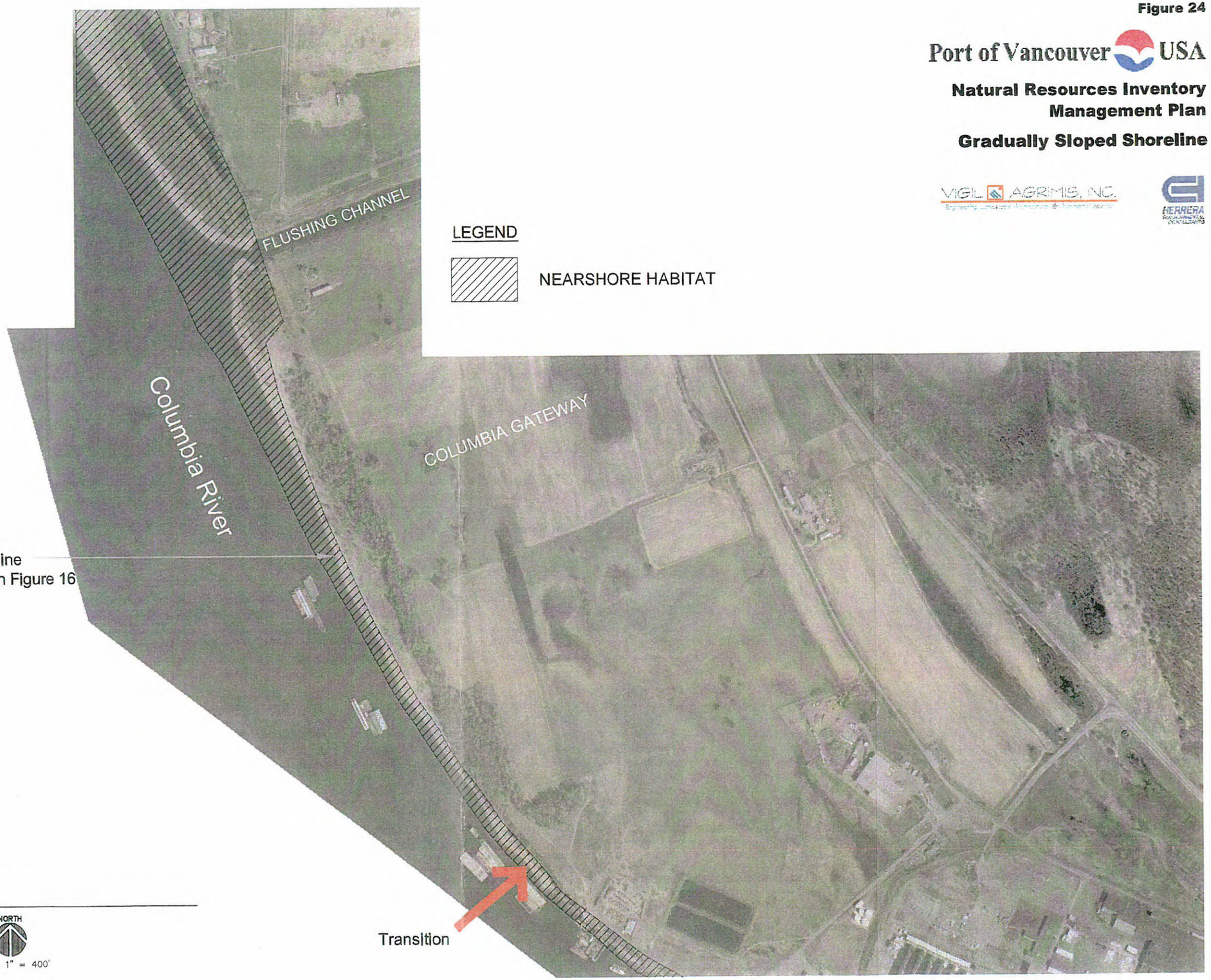

Figure 25

Port of Vancouver USA

Natural Resources Inventory Management Plan

Moderately Sloped Shoreline

VIGIL AGRIMIS, INC

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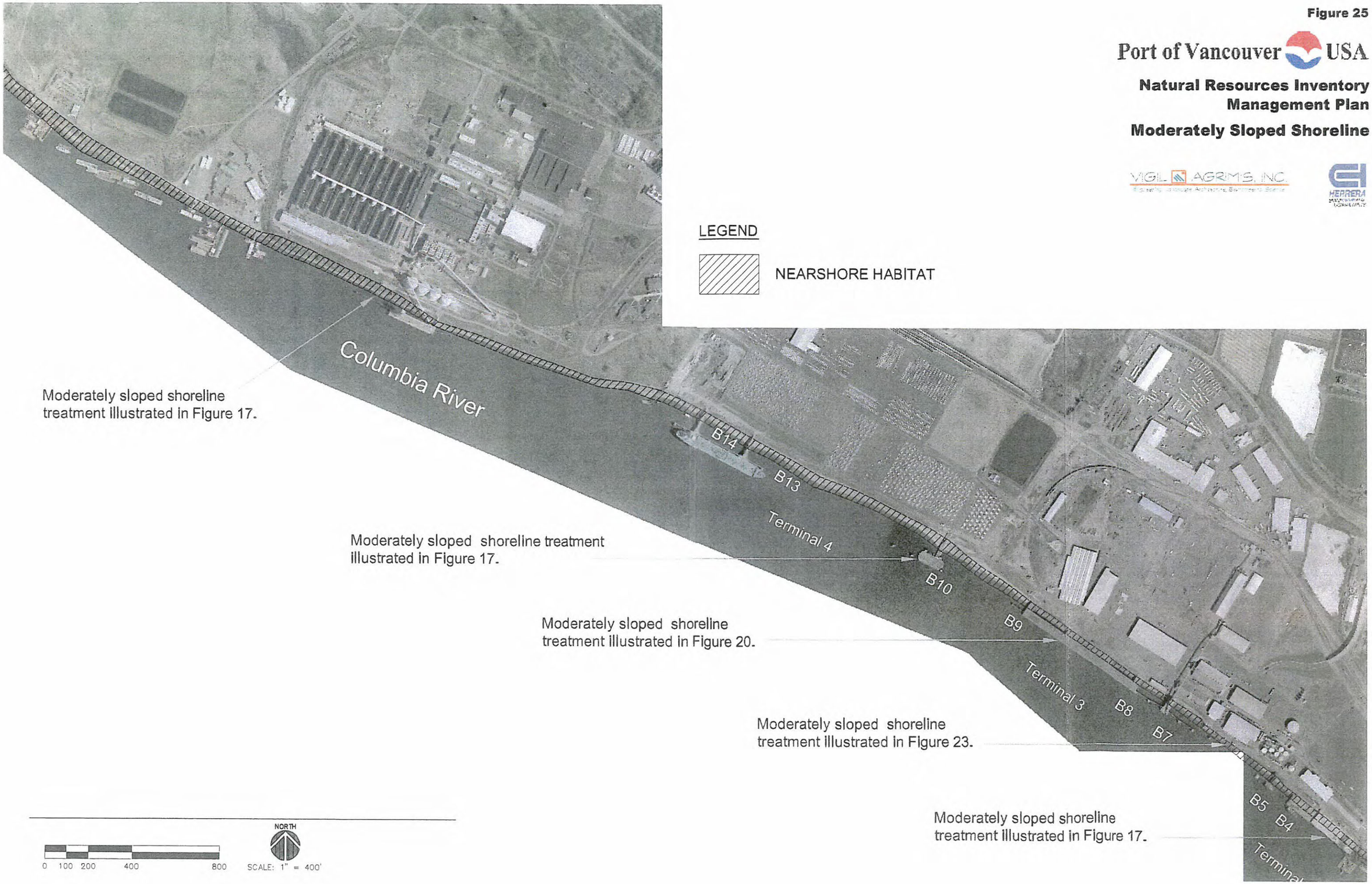


Figure 26

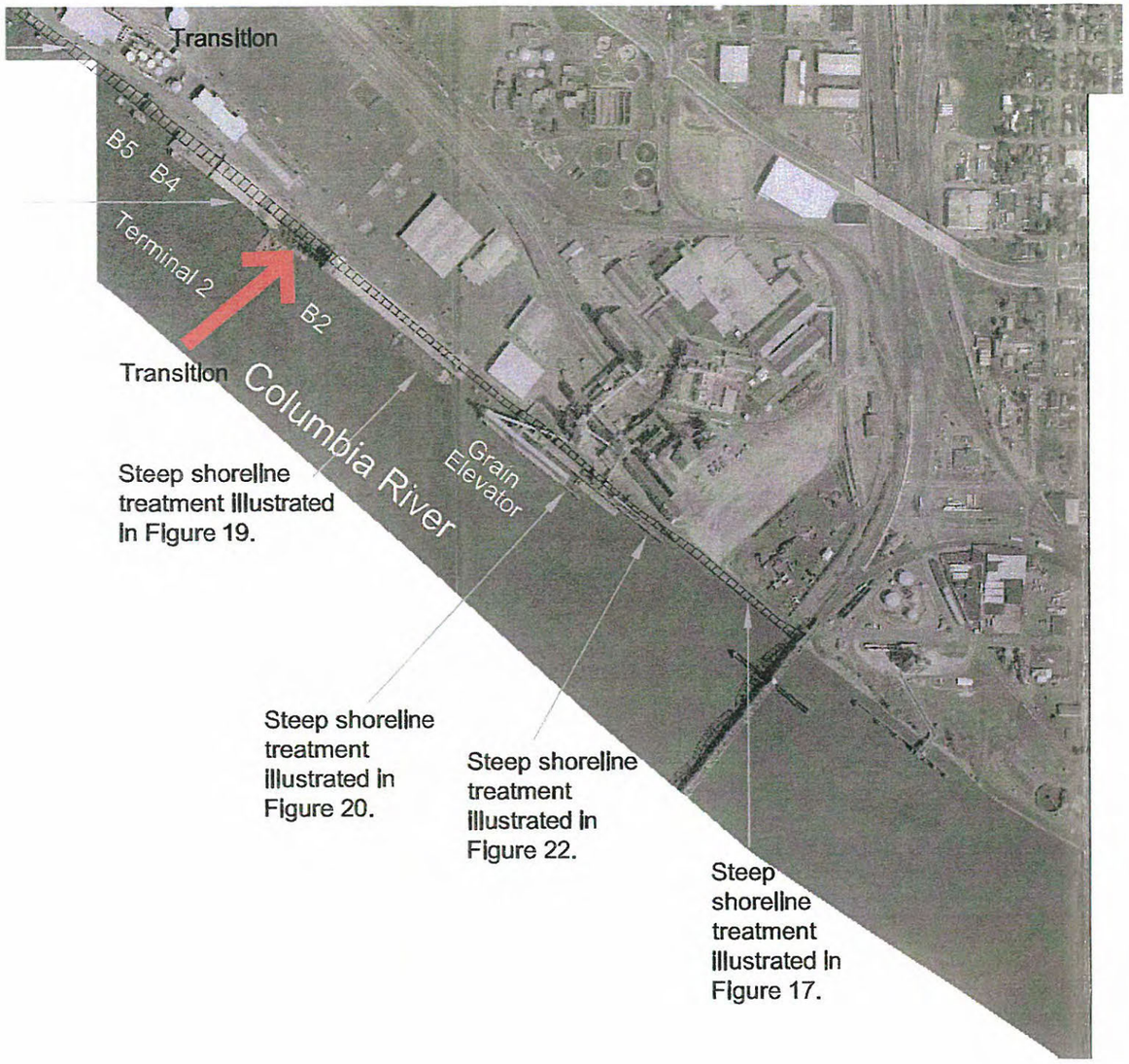
Port of Vancouver USA

Natural Resources Inventory Management Plan

Steeply Sloped Shoreline

VGL AGRMS, INC

HERRERA



LEGEND

NEARSHORE HABITAT

0 100 200 400 800

NORTH

SCALE: 1" = 400'

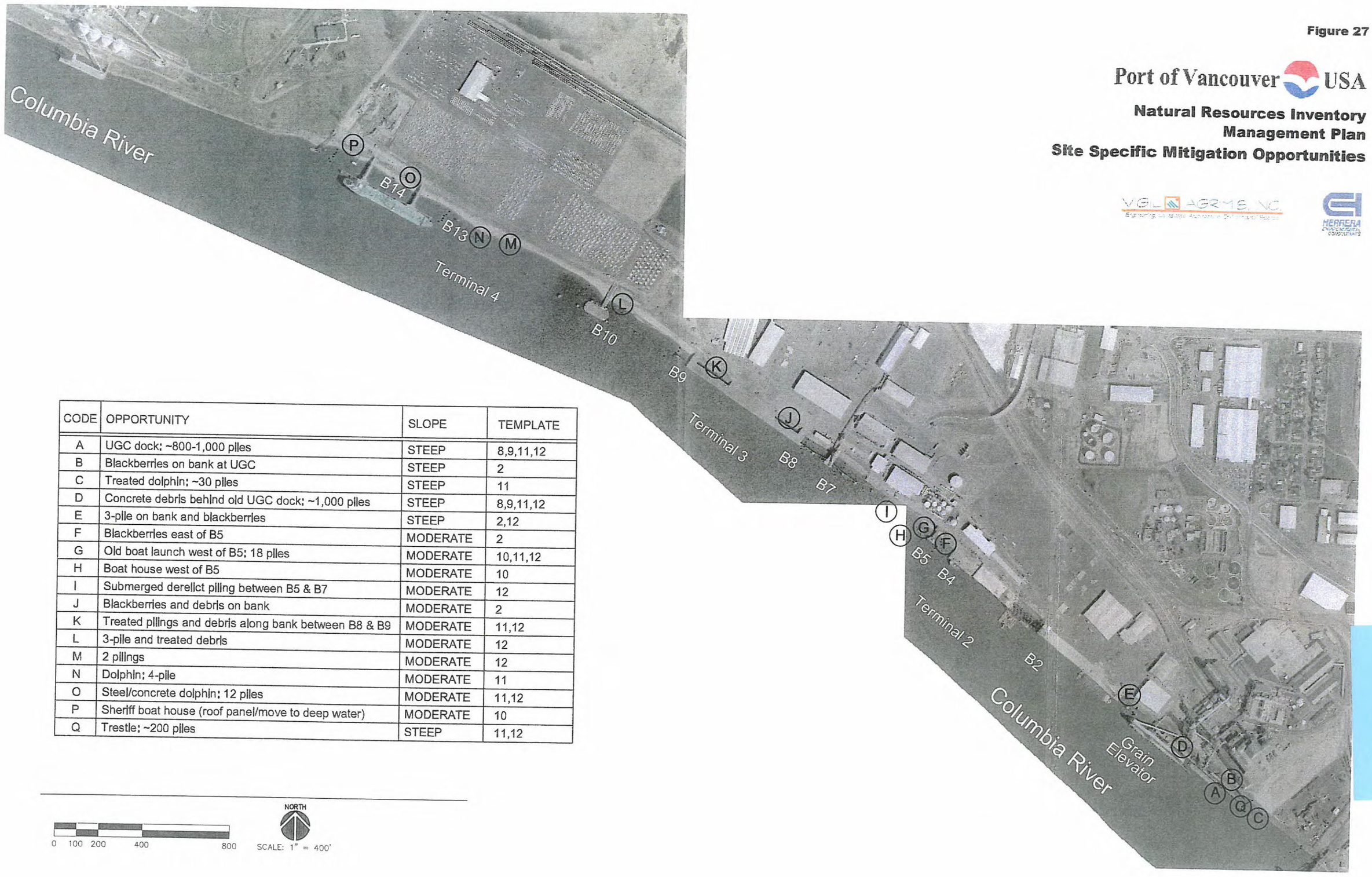
Figure 27

Port of Vancouver USA

Natural Resources Inventory
Management Plan
Site Specific Mitigation Opportunities

VGL AGRMS, INC.

HERRERA ENVIRONMENTAL CONSULTANTS



CODE	OPPORTUNITY	SLOPE	TEMPLATE
A	UGC dock: ~800-1,000 plles	STEEP	8,9,11,12
B	Blackberries on bank at UGC	STEEP	2
C	Treated dolphin: ~30 plles	STEEP	11
D	Concrete debris behind old UGC dock: ~1,000 plles	STEEP	8,9,11,12
E	3-plle on bank and blackberries	STEEP	2,12
F	Blackberries east of B5	MODERATE	2
G	Old boat launch west of B5: 18 plles	MODERATE	10,11,12
H	Boat house west of B5	MODERATE	10
I	Submerged derelict piling between B5 & B7	MODERATE	12
J	Blackberries and debris on bank	MODERATE	2
K	Treated plllngs and debris along bank between B8 & B9	MODERATE	11,12
L	3-plle and treated debris	MODERATE	12
M	2 plllngs	MODERATE	12
N	Dolphin: 4-plle	MODERATE	11
O	Steel/concrete dolphin: 12 plles	MODERATE	11,12
P	Sheriff boat house (roof panel/move to deep water)	MODERATE	10
Q	Trestle: ~200 plles	STEEP	11,12

0 100 200 400 800

NORTH

SCALE: 1" = 400'

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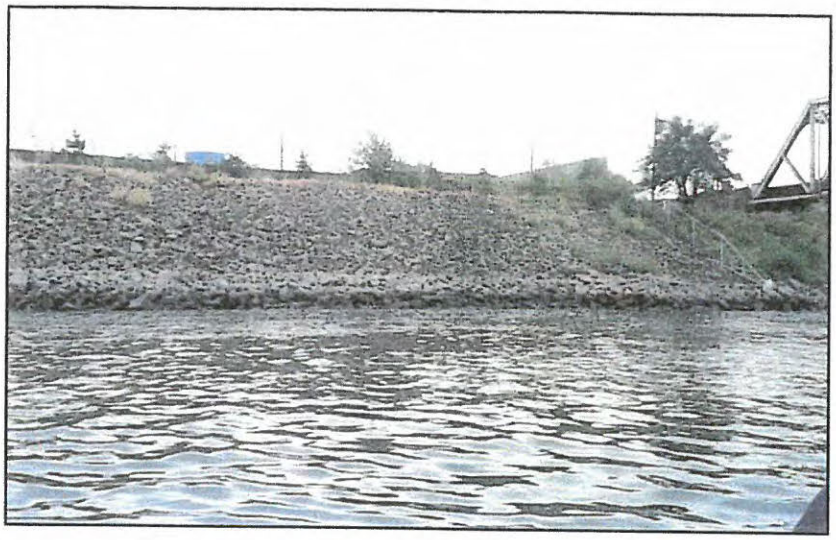
Appendix A: Field Inventory Photographs

Transect No. 1



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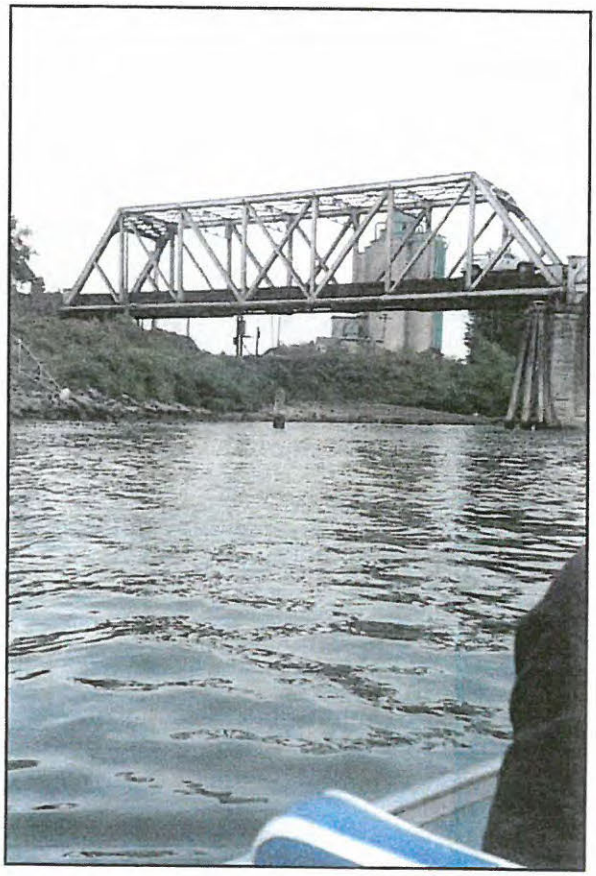

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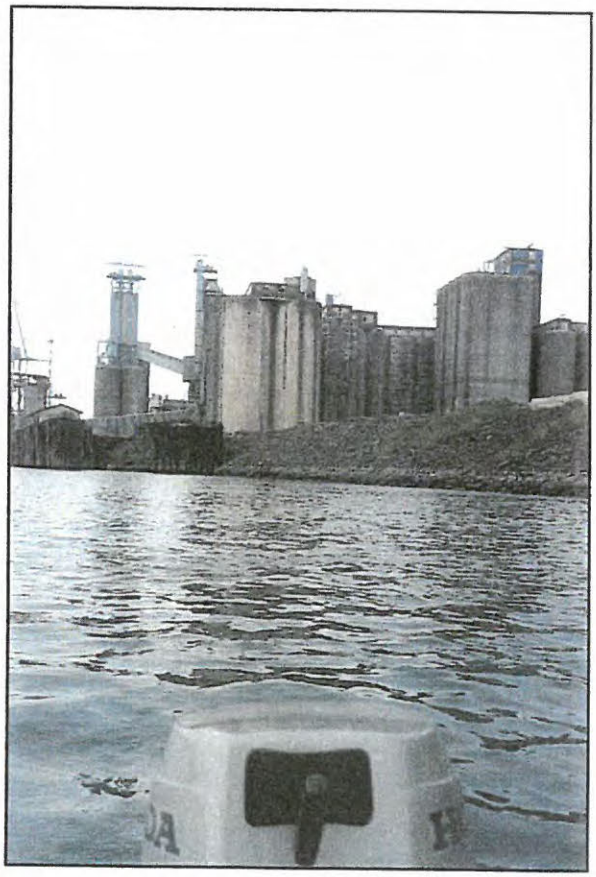

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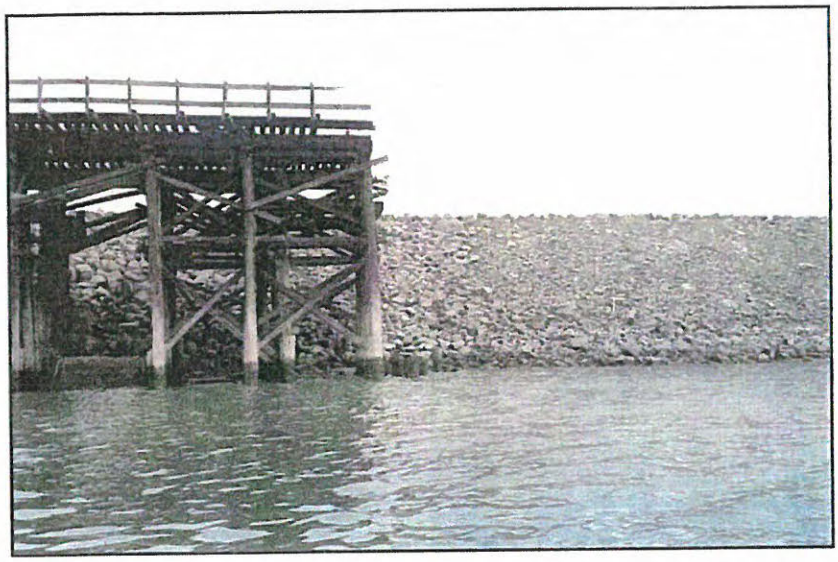

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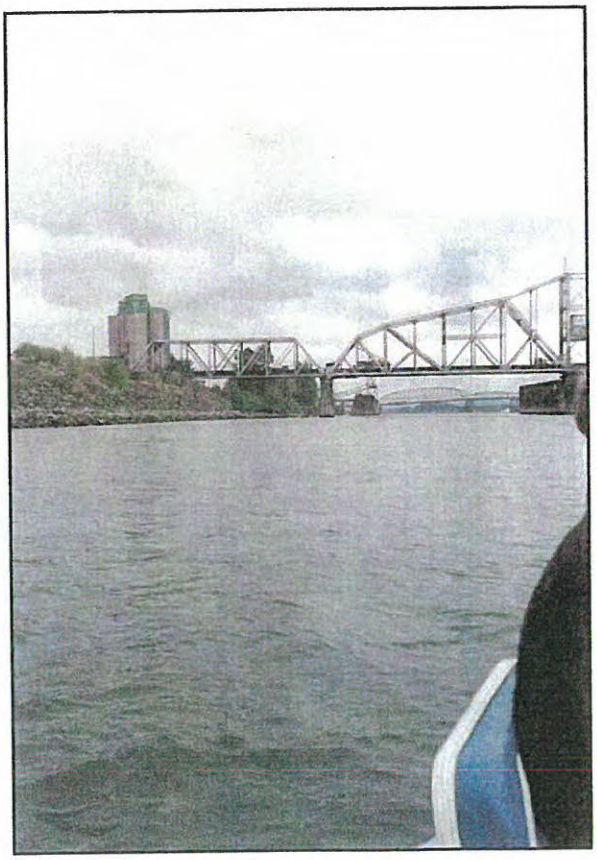

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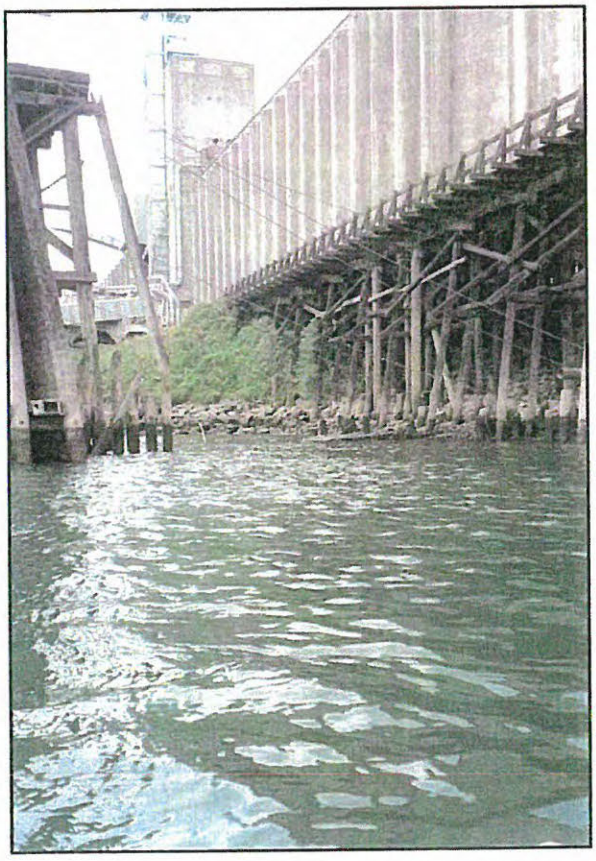

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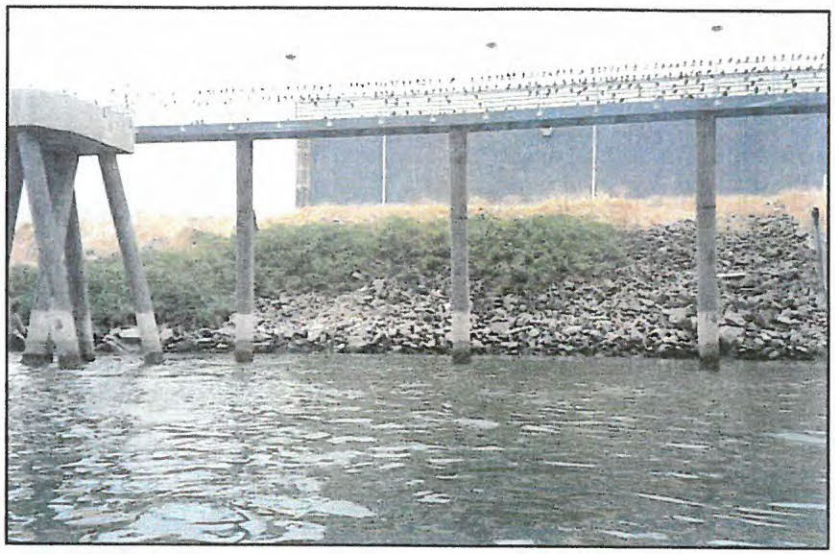

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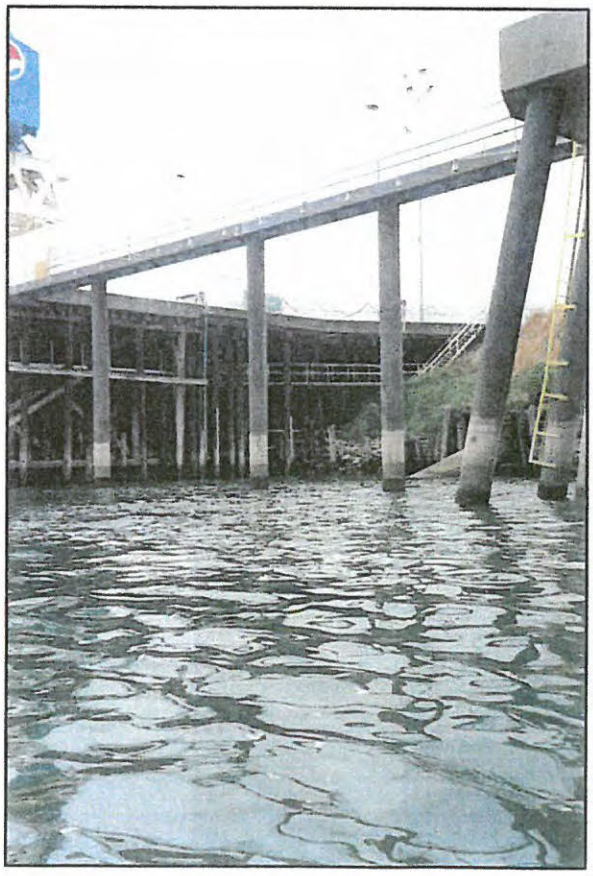

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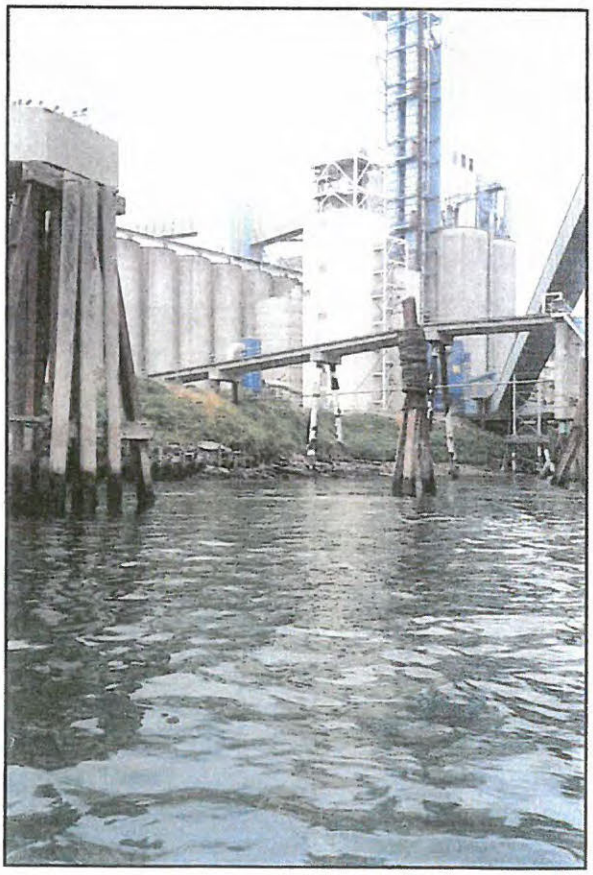

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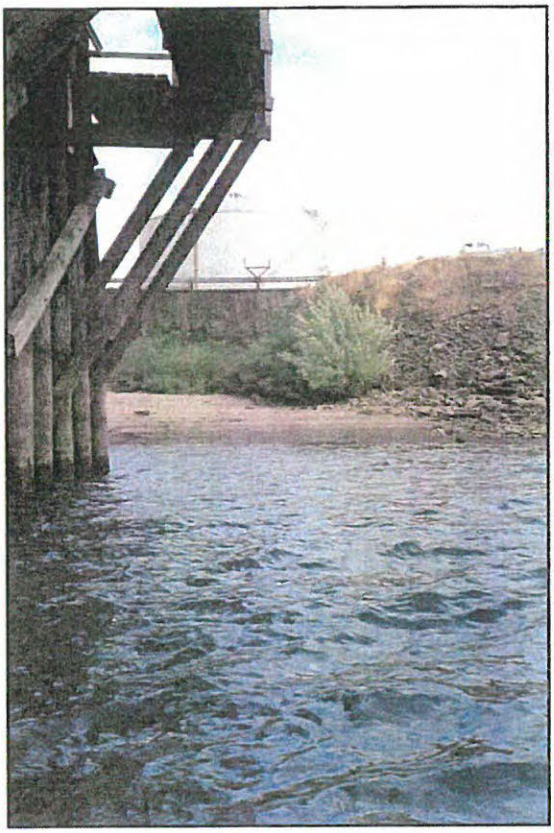

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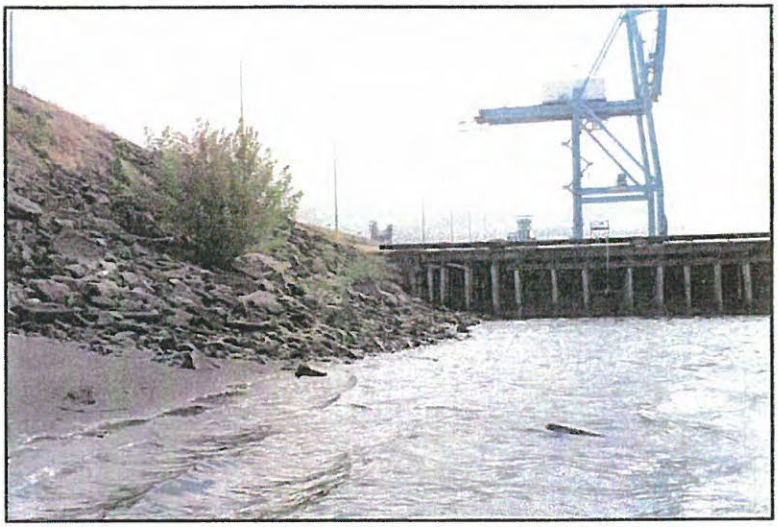
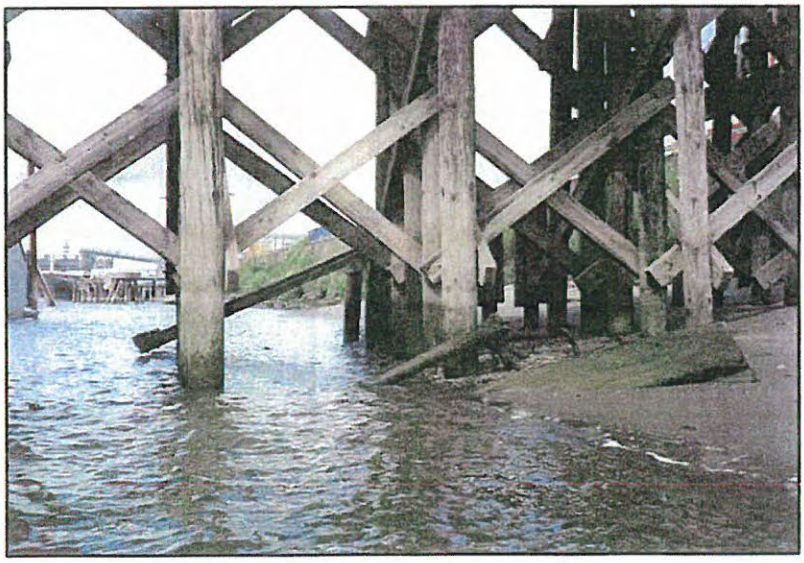


Upstream View



Downstream View

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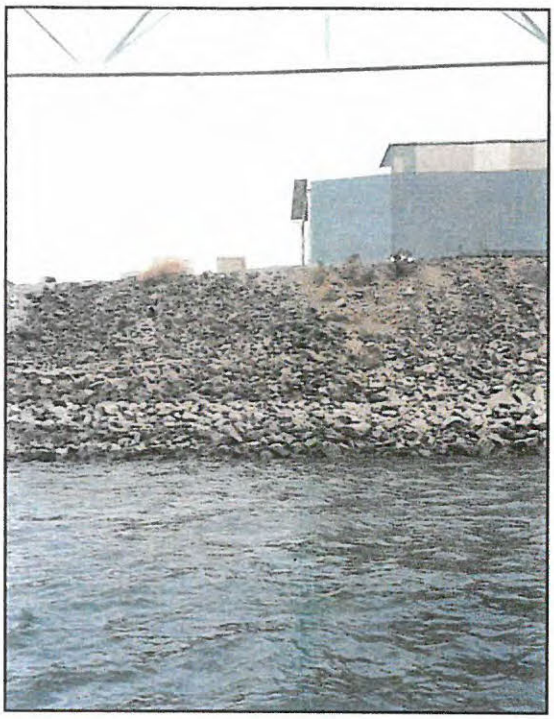

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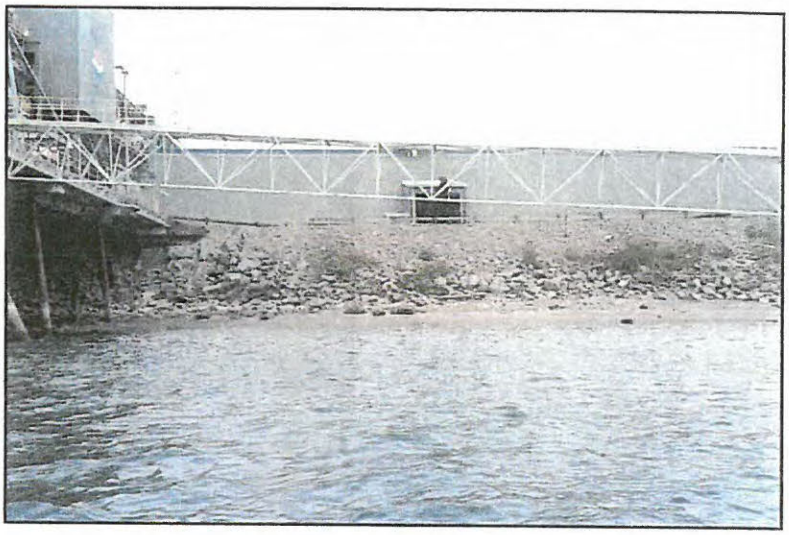

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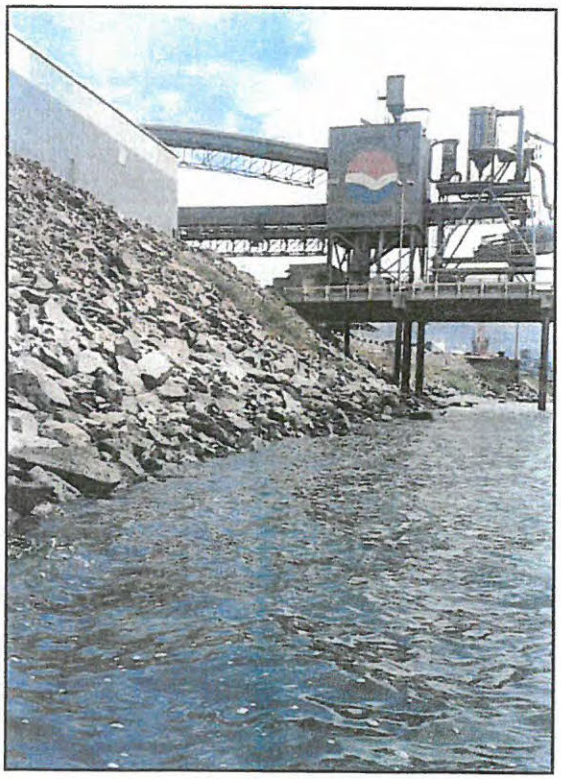
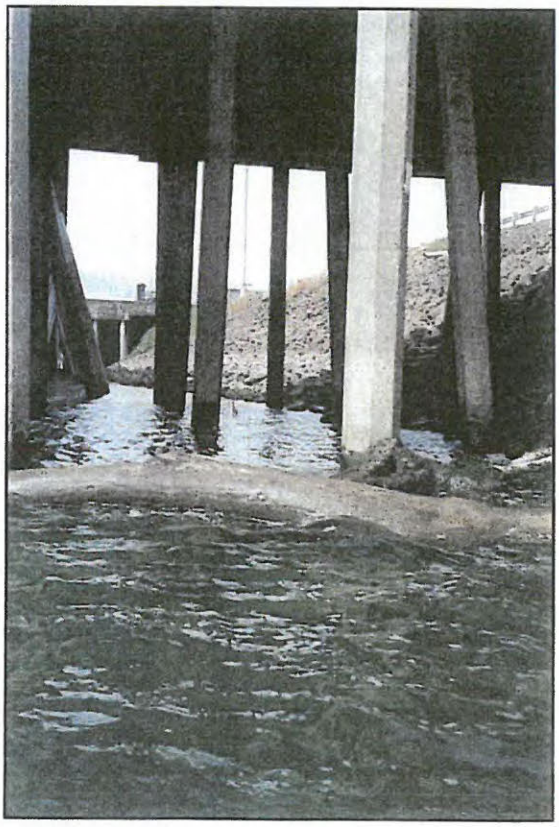


Upstream View



Downstream View

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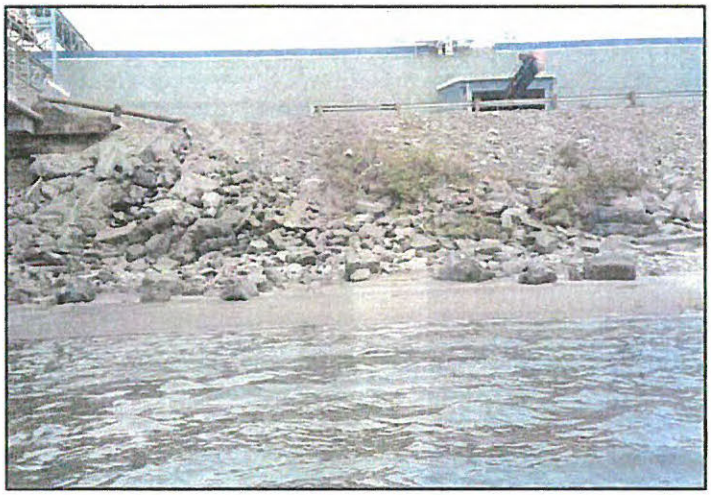

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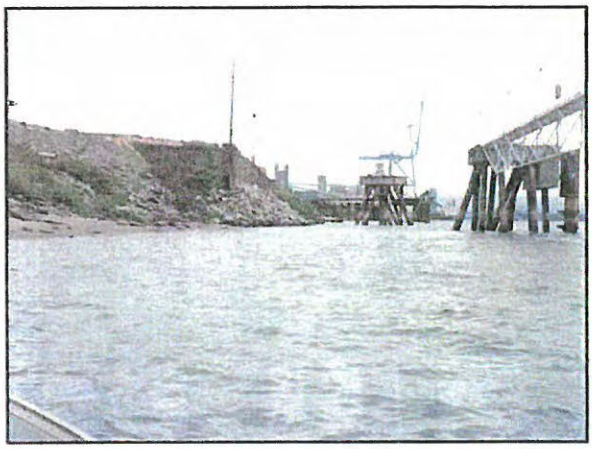

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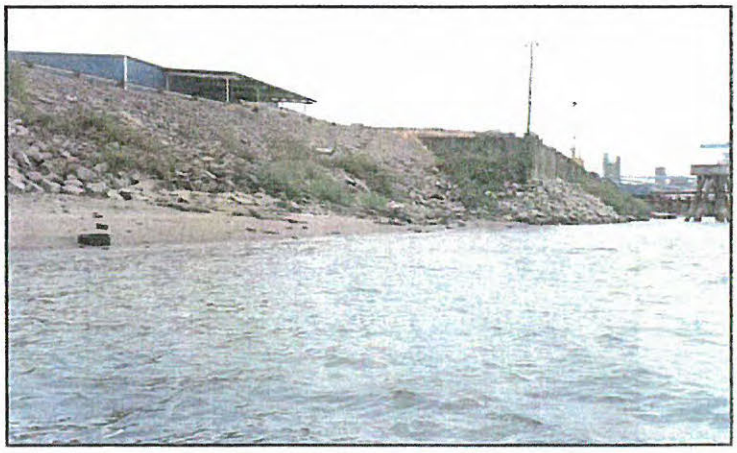

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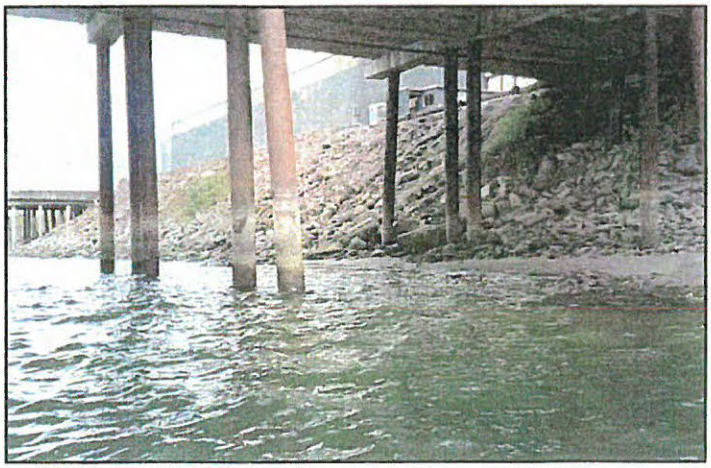

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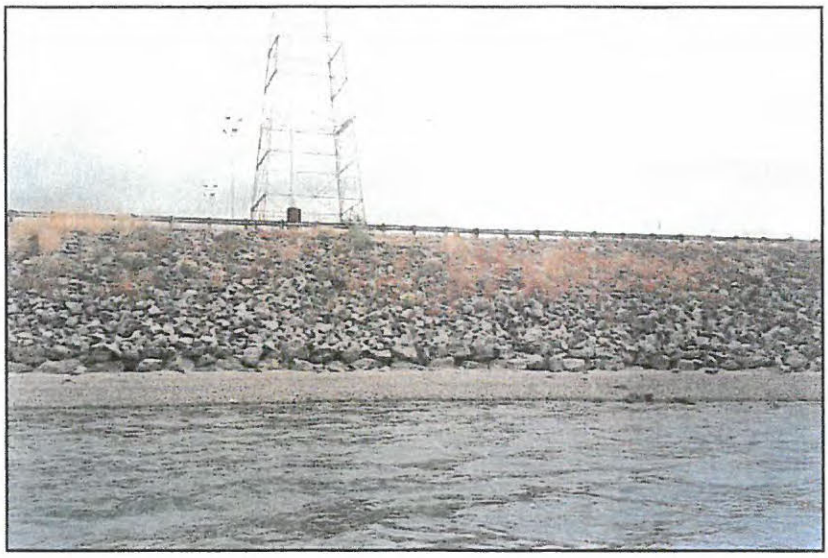

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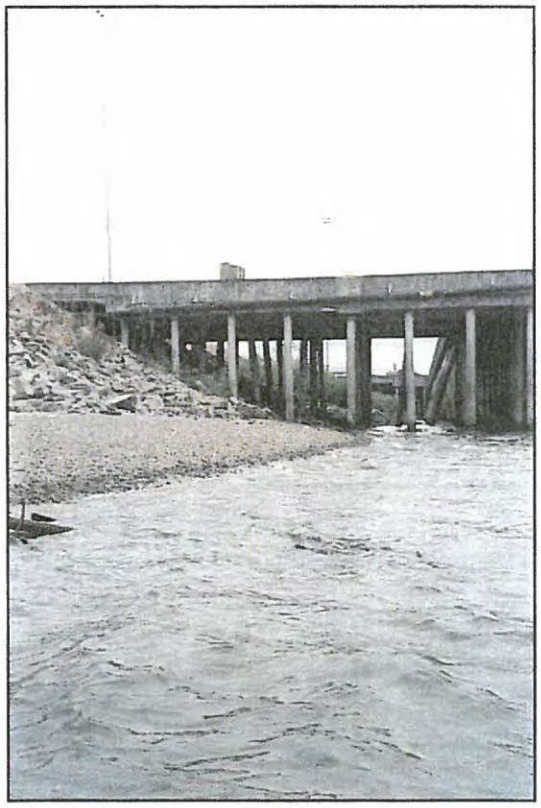

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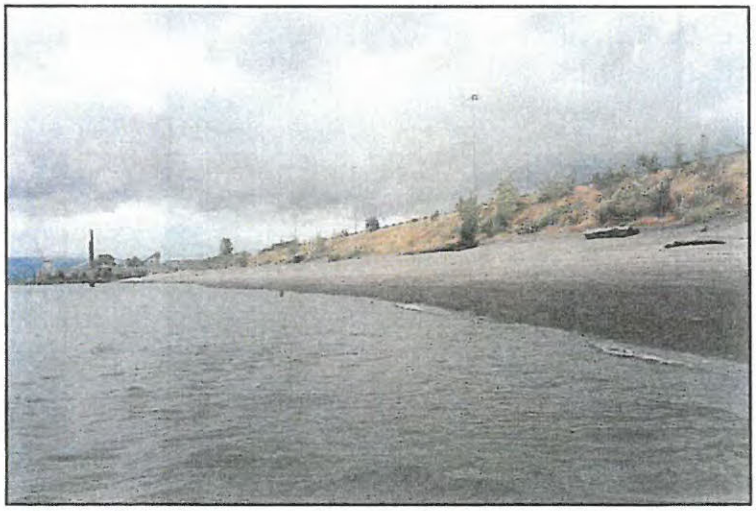

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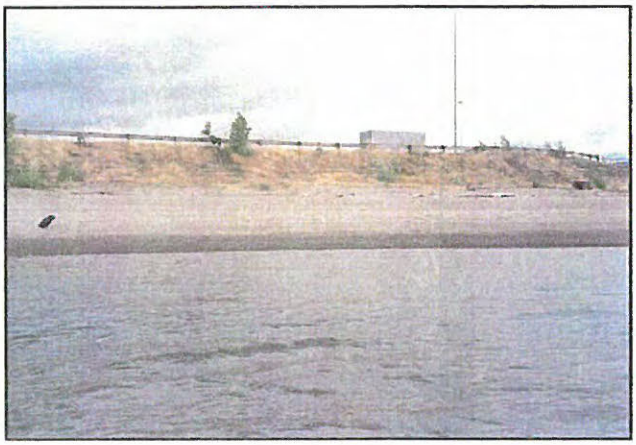

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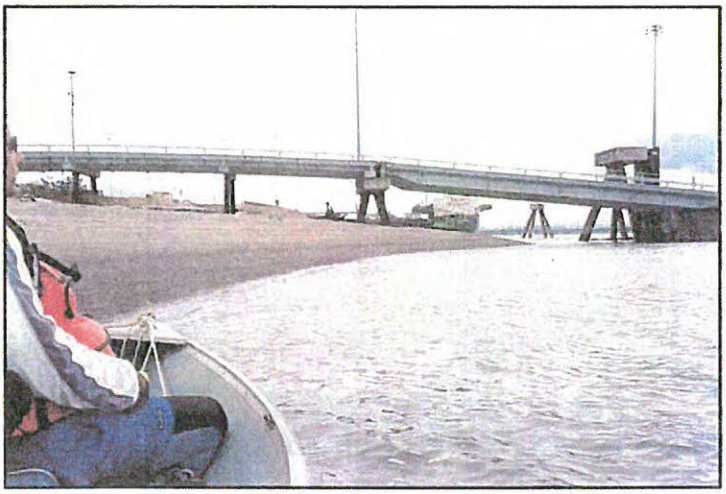

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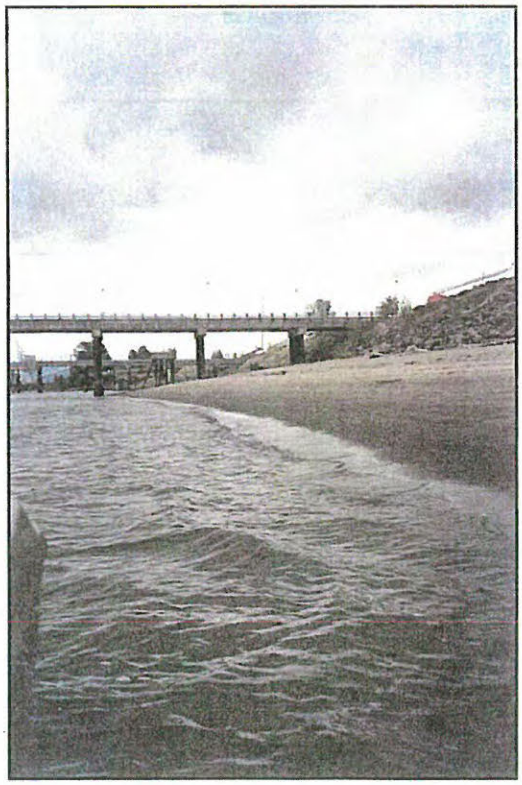

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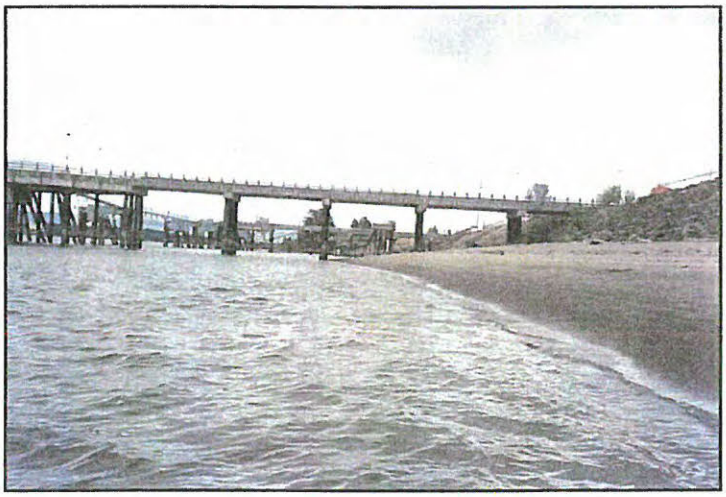

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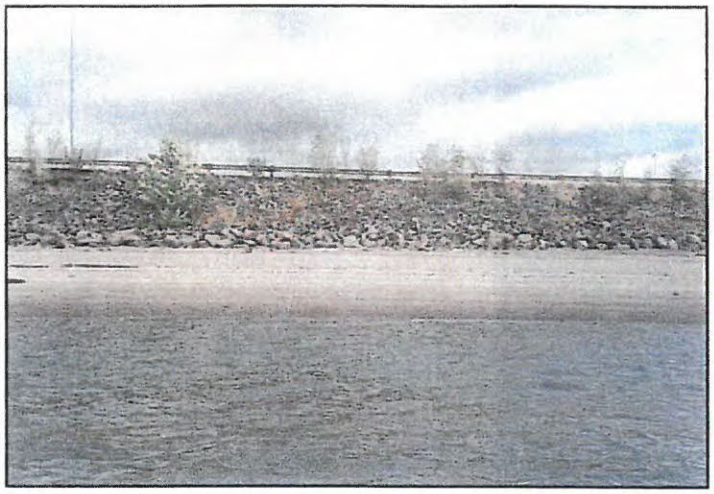

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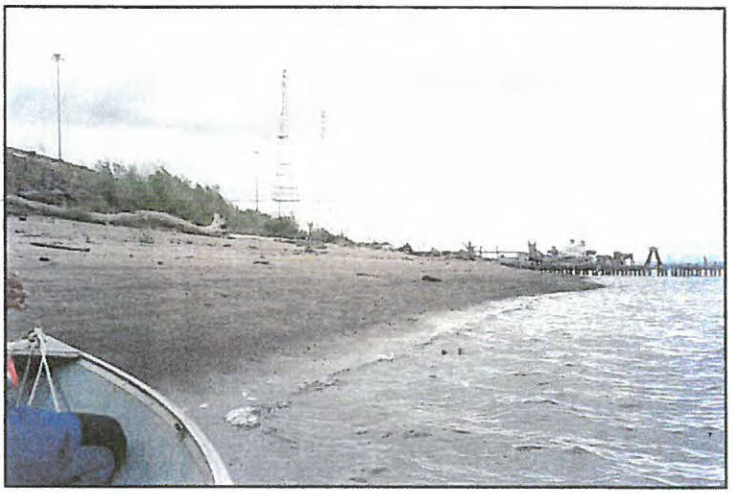

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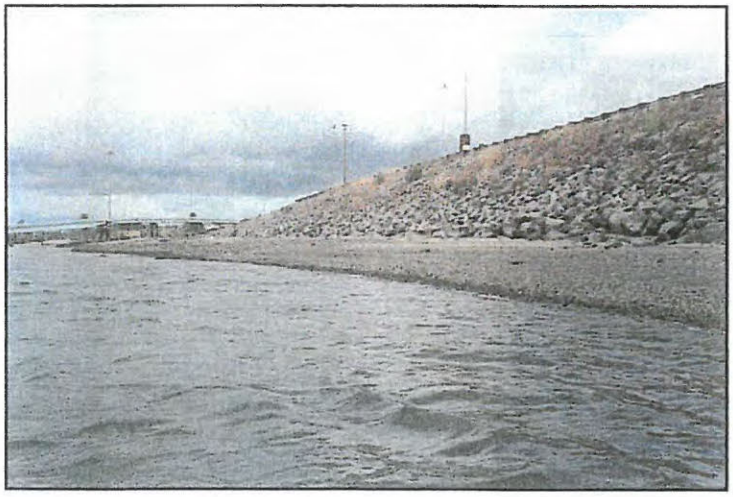

Downstream View

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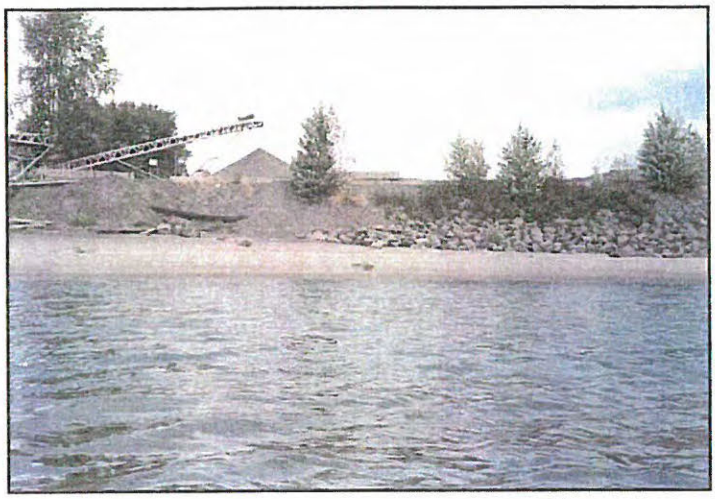

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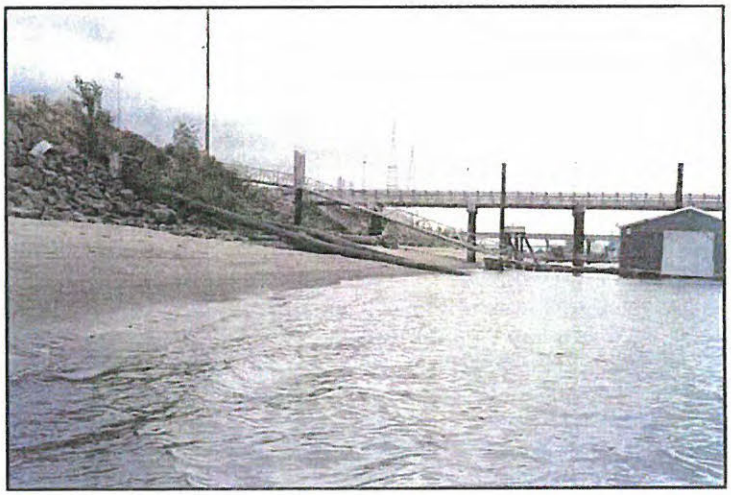

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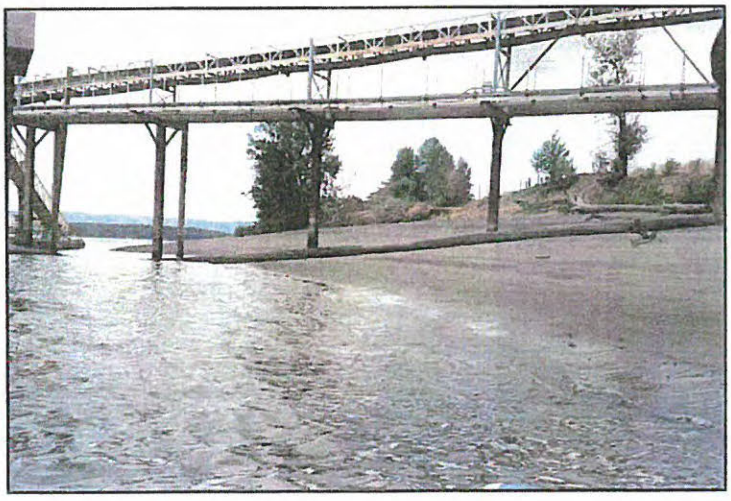
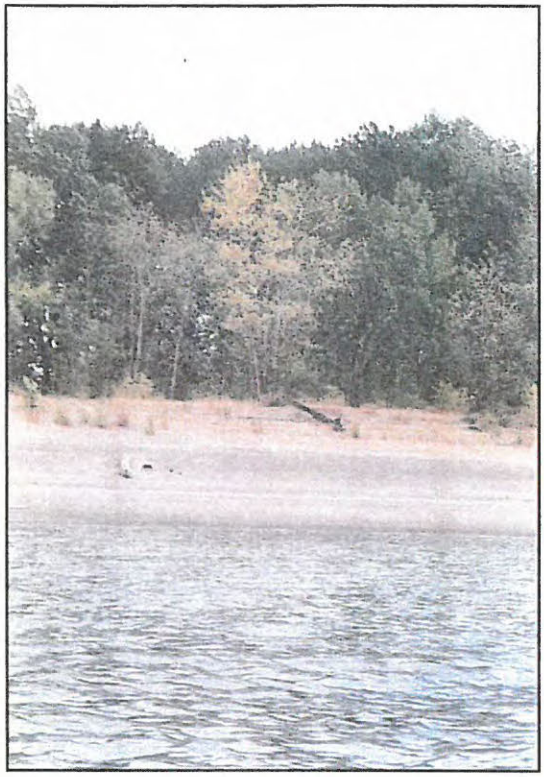


Downstream View

Transect Reference



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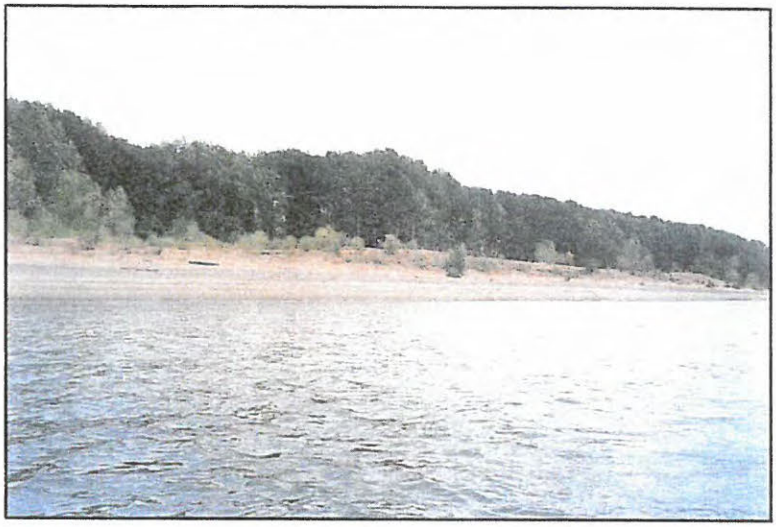
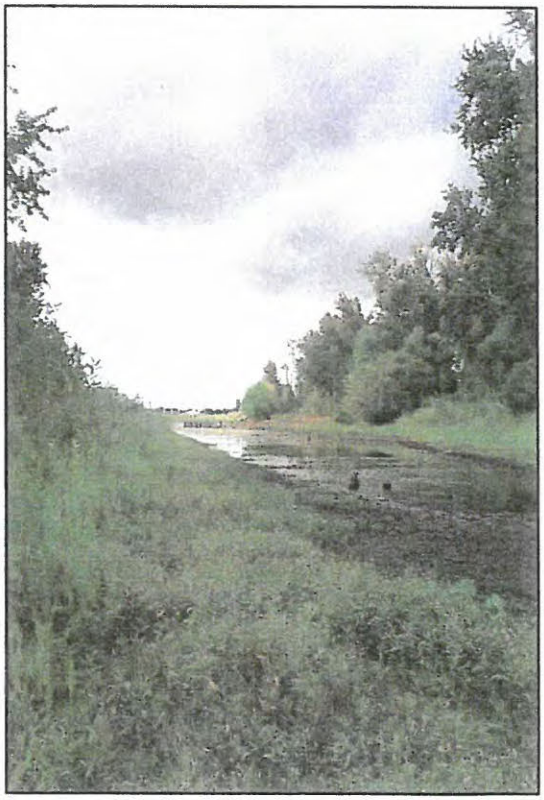


Upstream View

Downstream View



Downstream View

Appendix B: Statistical Analysis of Slope Breaks

Statistical Analysis of Slope Breaks

We compared the dominant shoreline types to determine whether a statistically significant difference exists in nearshore habitat quantity between shoreline types identified as steep, gradual, and uniformly shallow. The statistical analysis consisted of a one-way ANOVA and a Tukey Honestly Significant Difference test. Table 1 presents the results of the statistical analyses for the dominant shoreline types including steep (S), moderate (M), and gradual (G) shorelines. This table compares the shoreline types against each other.

Table 1. Shoreline Statistical Analysis

	p-Value[a]	Shoreline Type (1 = S, 2 = M, 3 =G)[b]		
		Lowest Mean		Highest Mean
2-Yr Width	**0.0002**	1	2	3
2-Yr Unit Habitat Volume	**0.0003**	1	2	3
2-Yr High Quality Width	**<0.0001**	1	2	3
2-Yr High Quality Volume	**0.0001**	1	2	3
Mean Spring Width	**0.0013**	1	2	3
Mean Spring Volume	**0.0078**	1	2	3
Mean Spring High Quality Width	**0.0216**	1	2	3

[a] Values in bold indicate a significant differences exist ($\alpha = 0.05$) between shoreline types based on the results from a one-way ANOVA.
[b] Values connected by a single unbroken line are not significantly different based on the results from a Tukey honestly significant difference (HSD) test.
S – Steep
M – Moderate
G – Gradual

Table 1 shows that there are clear statistical differences between the Reference Site and both the developed shoreline types across flow regimes based on two statistical tests. The statistical test results are important because they confirm the field observations that there is a clear difference in the amount and quality of nearshore habitat between the Reference Site and the developed Port shoreline. The moderate shoreline type found at portions of the developed Port shoreline appear to be transitional between the steep riprap bank sections that provide little nearshore habitat and the Reference Site that provides gradual nearshore habitat that may be similar to historic conditions. It is important to point out that the small sample size (two values per shoreline type) may skew the results to diminish the difference between the moderate and the steep shoreline type.

Appendix C: Design Details

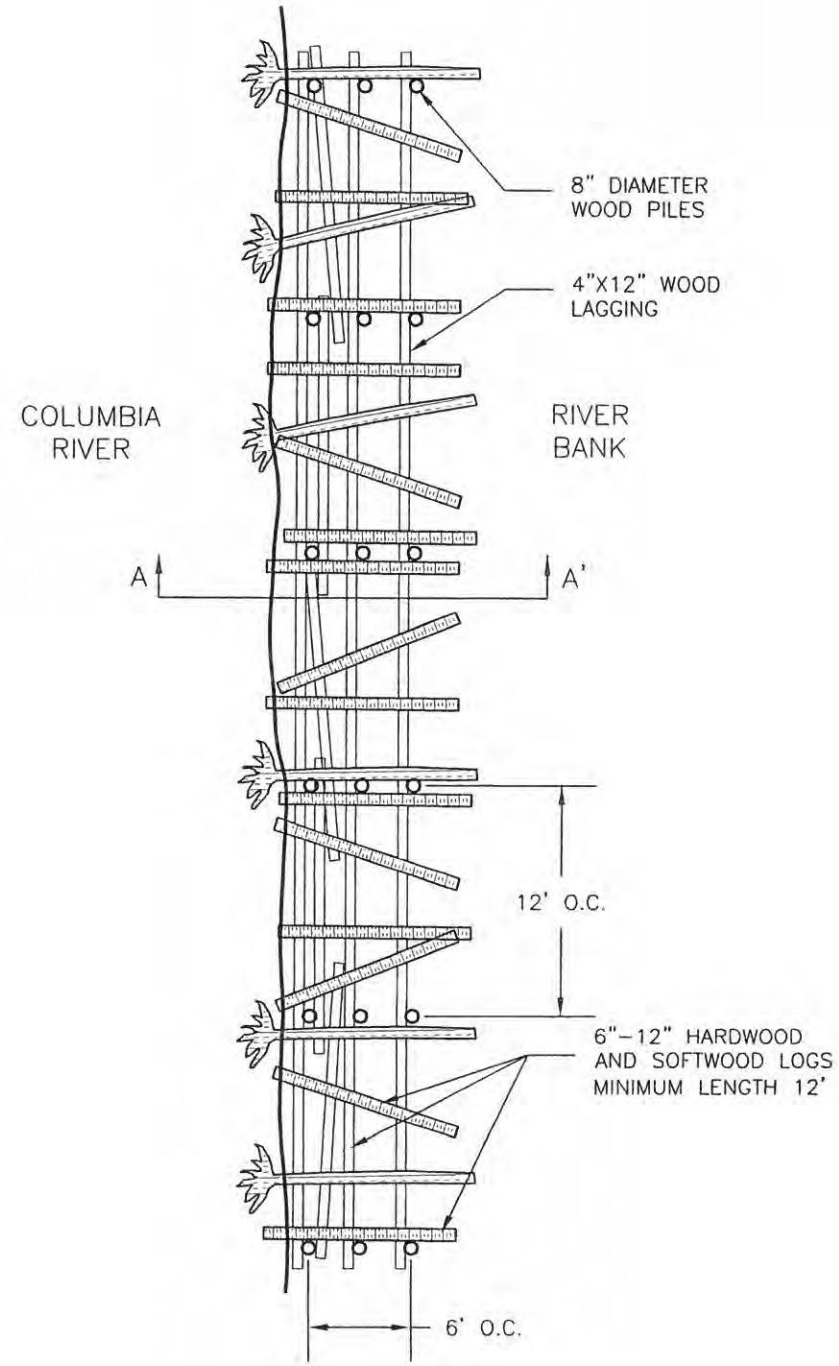
Figure 1

Port of Vancouver USA

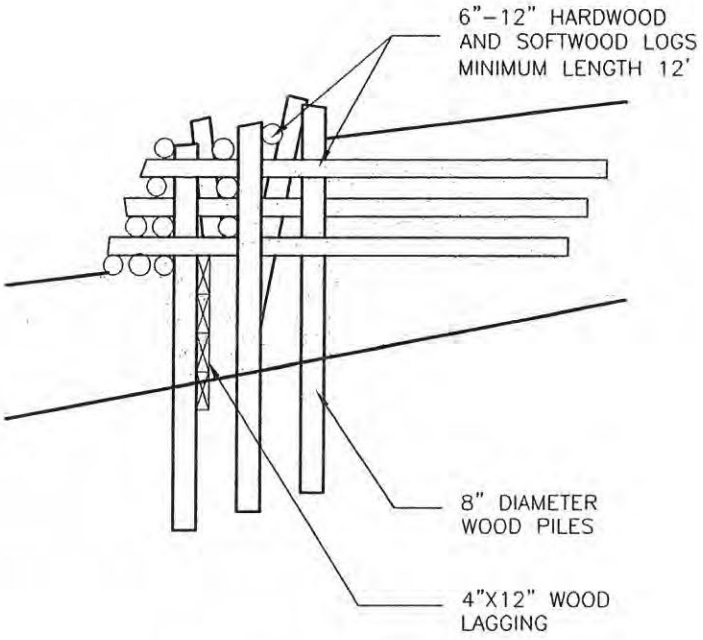
Natural Resources Inventory Management Plan

Schematic Crib Details

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science



CRIB WALL PLAN



SECTION A – A'

Figure 2

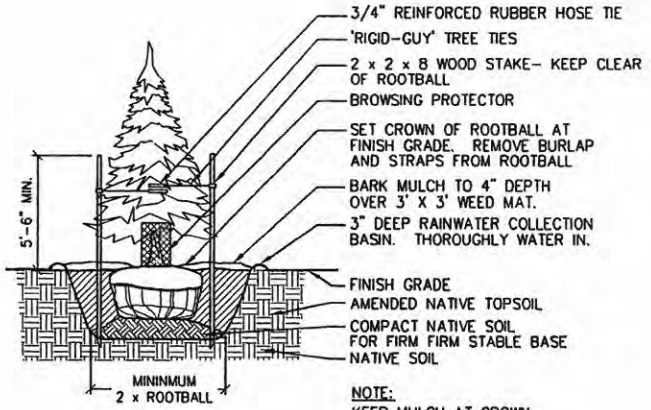
Port of Vancouver USA

Natural Resources Inventory Management Plan

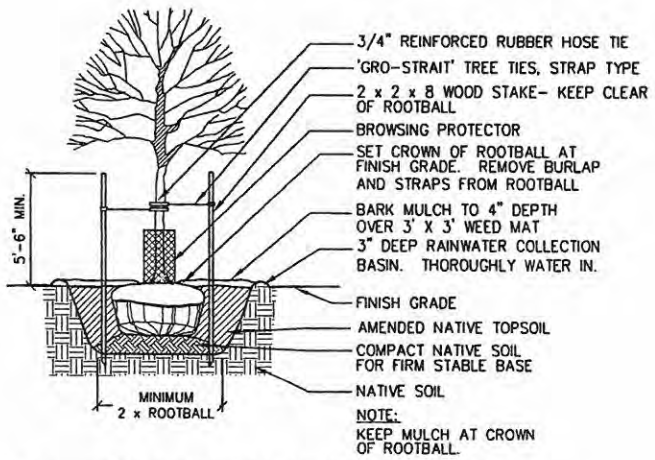
Woody Plant & Wetland Planting Details

VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

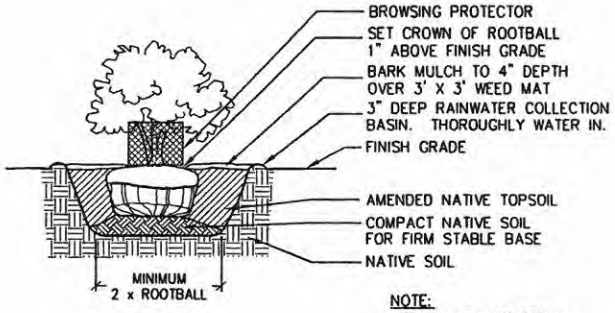
HERRERA



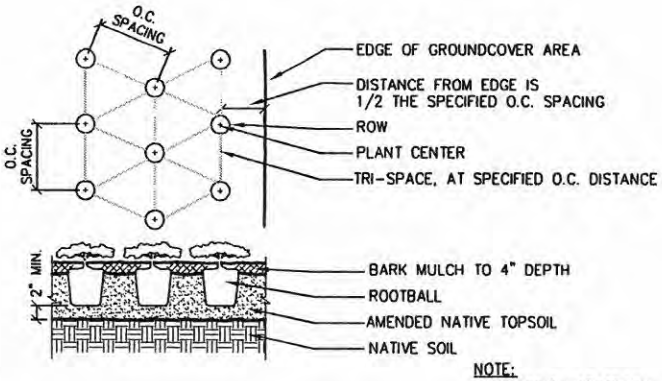
1A EVERGREEN TREE PLANTING
SCALE: NTS



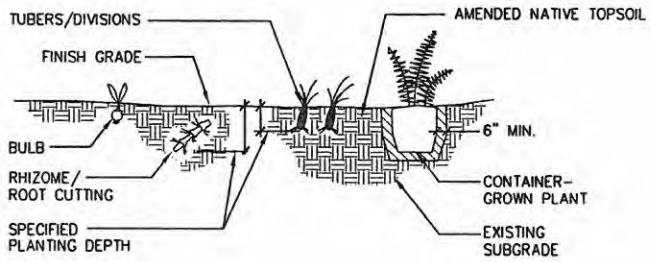
1B DECIDUOUS TREE PLANTING
SCALE: NTS



1C CONTAINER SHRUB PLANTING
SCALE: NTS



1D GROUNDCOVER PLANTING
SCALE: NTS



1E WETLAND / HERBACEOUS PLANTING DETAIL
SCALE: NTS

Figure 3

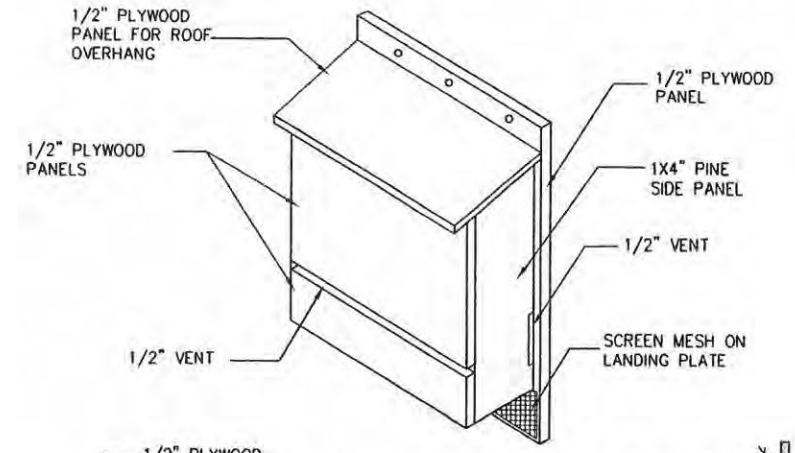
Port of Vancouver USA

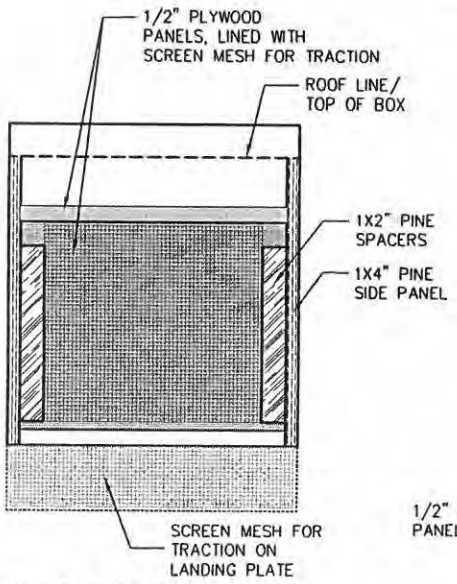
Natural Resources Inventory Management Plan

Habitat Details

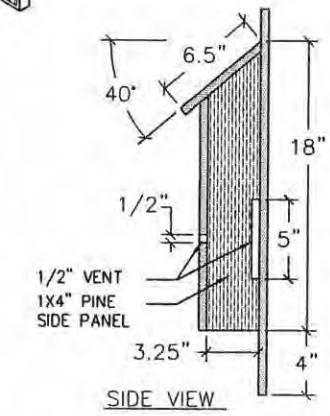
VIGIL AGRIMIS, INC.
Engineering, Landscape Architecture, Environmental Science

HERRERA

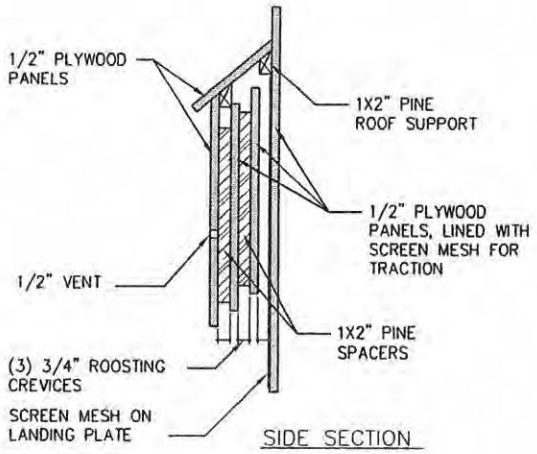




FRONT SECTION



SIDE VIEW



SIDE SECTION

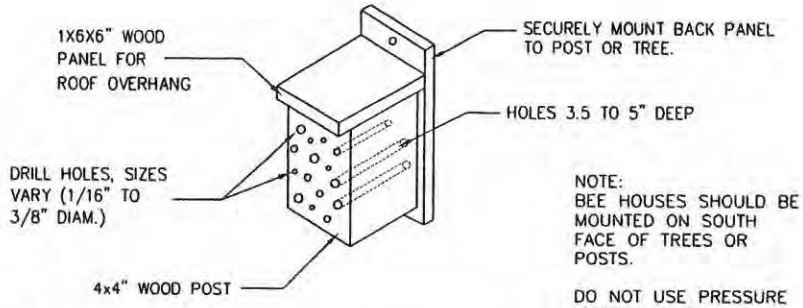
NOTE:
BAT HOUSES SHOULD BE MOUNTED ON SOUTH FACE OF TREES OR POSTS.

DO NOT USE PRESSURE TREATED WOOD.

SEAL JOINTS WITH SILICONE CAULK. DO NOT USE GLUE.

PAINT EXTERIOR OF BOXES WITH A MINIMUM OF TWO COATS LATEX PAINT (DARK GREY, BROWN, OR GREEN)

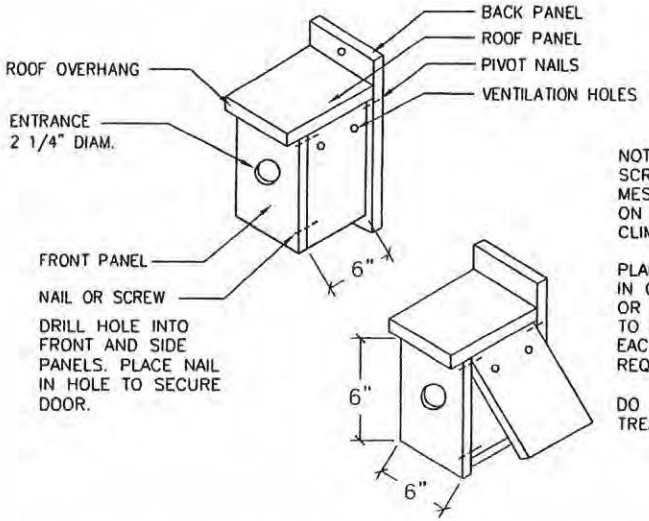
2A BAT BOX
SCALE: NTS



NOTE:
BEE HOUSES SHOULD BE MOUNTED ON SOUTH FACE OF TREES OR POSTS.

DO NOT USE PRESSURE TREATED WOOD.

2B BEE BOX
SCALE: NTS



NOTE:
SCRATCH WOOD OR AFIX WIRE MESH BELOW ENTRANCE HOLE ON BOTH SIDES TO PROVIDE CLIMBING TRACTION.

PLACE PURPLE MARTIN HOUSES IN GROUPS OF 5 OR MORE, OR PROVIDE ONE STRUCTURE TO HOUSE 6-9 FAMILIES, WITH EACH UNIT MEETING THE SIZE REQUIREMENTS AS NOTED.

DO NOT USE PRESSURE TREATED WOOD.

2C BIRD NESTING BOX – PURPLE MARTIN
SCALE: NTS

Figure 4

Port of Vancouver USA

Natural Resources Inventory Management Plan

Bioengineering Bank Treatments

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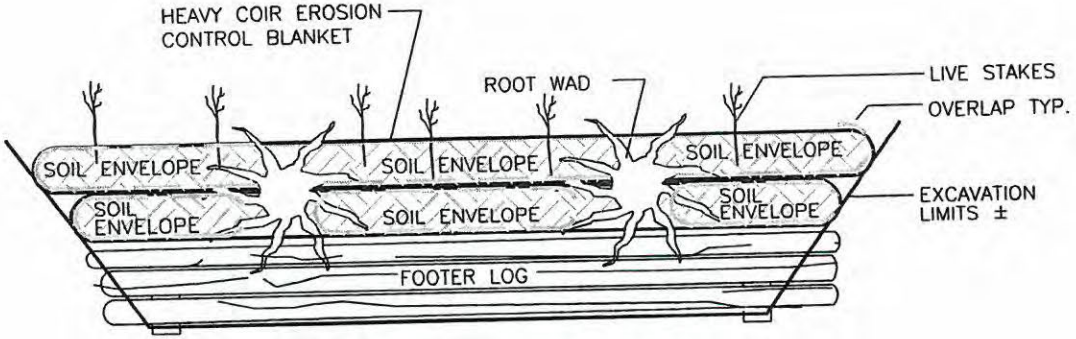
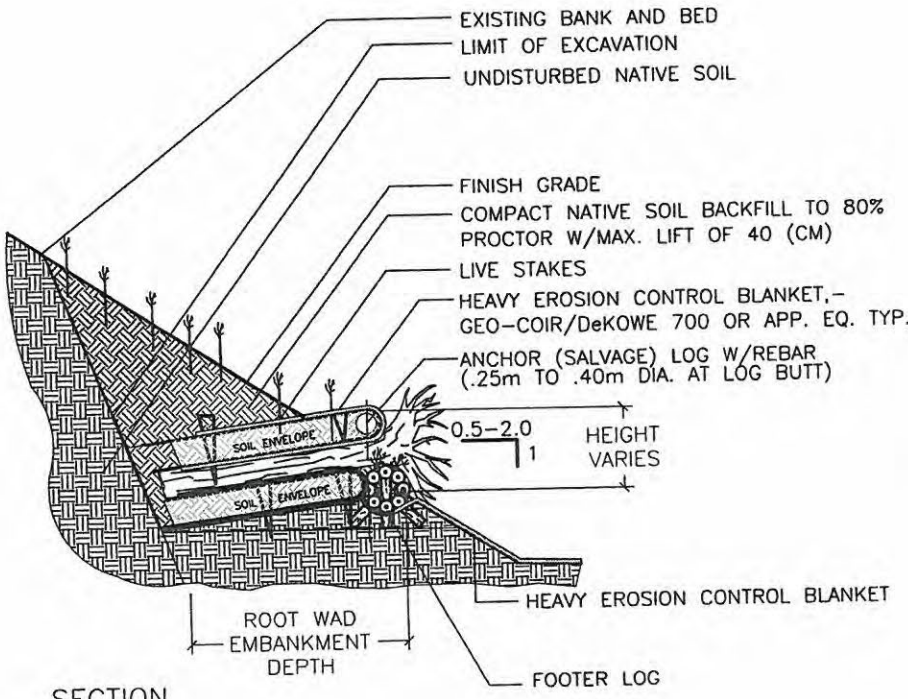
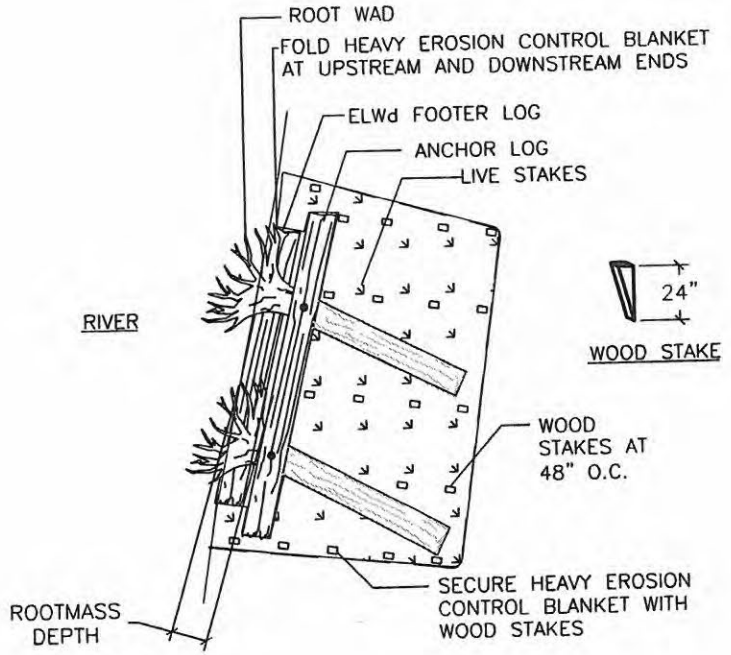
HERRERA



ELEVATION



SECTION



NOTES:

1. ROOT WAD TO PROTRUDE INTO CHANNEL THE DEPTH OF THE ROOTMASS AS MEASURED FROM EXISTING CHANNEL BANK
2. BATTER ROOT WAD (0.5-2.0:1) TO MATCH EXISTING CHANNEL BANK
3. CUT LIVE STAKE END TO A POINT FOR EASIER INSTALLATION
4. TRIM OFF BRANCHES FROM LIVE STAKE W/ CLEAN CUTS

PLAN

Port of Vancouver USA

Natural Resources Inventory Management Plan

Erosion Control Details

VIGIL AGRIMIS, INC.
Engineering Landscape Architecture Environmental Science

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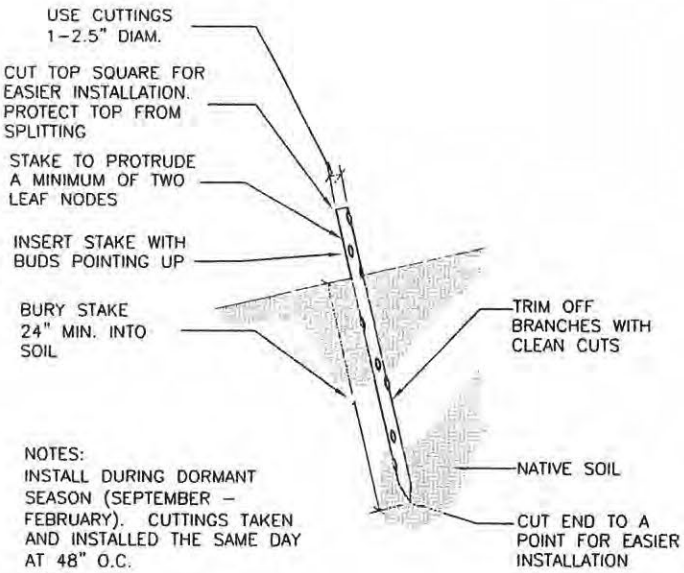
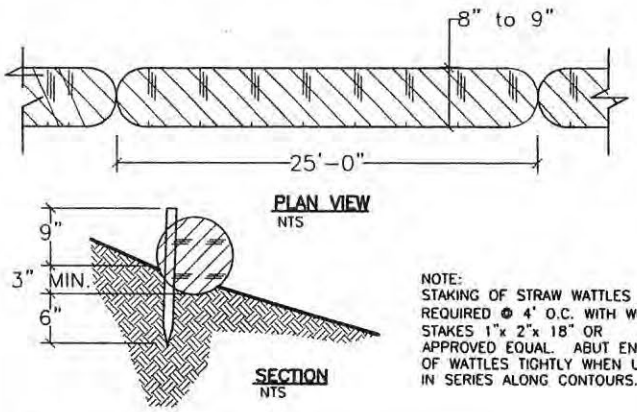


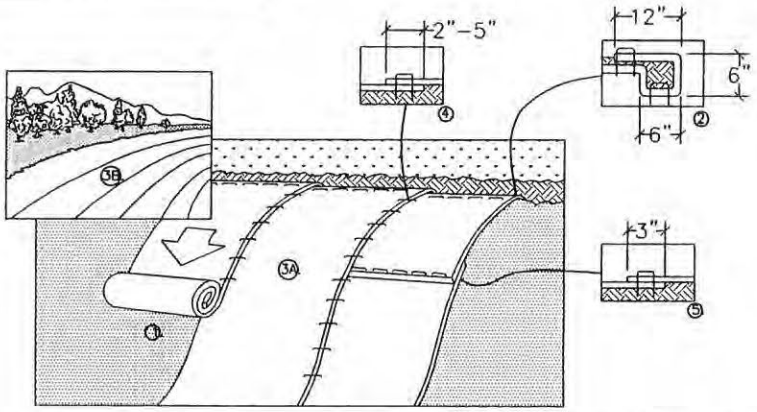
NOTES:
INSTALL DURING DORMANT SEASON (SEPTEMBER – FEBRUARY). CUTTINGS TAKEN AND INSTALLED THE SAME DAY AT 48" O.C.

3A LIVE STAKE DETAIL
SCALE: NTS



NOTE:
STAKING OF STRAW WATTLES REQUIRED @ 4' O.C. WITH WOOD STAKES 1"x 2"x 18" OR APPROVED EQUAL. ABUT ENDS OF WATTLES TIGHTLY WHEN USED IN SERIES ALONG CONTOURS.

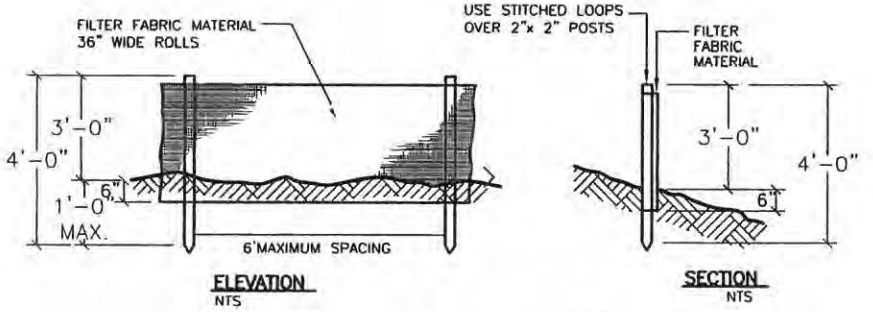
3C STRAW WATTLE
SCALE: NTS



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30cm) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30cm) APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH MINIMUM 6" (10cm) OVERLAP.
5. CONSECUTIVE BLANKETS SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH MINIMUM 6" (15cm) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30cm) APART ACROSS ENTIRE BLANKET WIDTH.

NOTE:
1. IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15cm) MAY BE NECESSARY TO PROPERLY SECURE THE BLANKETS.
2. INSTALL PRODUCT IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

3D EROSION CONTROL BLANKET ON SLOPE
SCALE: NTS



NOTES:
1. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
2. 2"x 2" FIR, PINE OR STEEL FENCE POSTS. INSTALL ON UP HILL SIDE OF SLOPE.
3. STITCHED LOOPS TO BE INSTALLED UPHILL SIDE OF SLOPE.
4. COMPACT ALL AREAS OF FILTER FABRIC TRENCH.

3B SEDIMENT FENCE
SCALE: NTS

Figure 6

Port of Vancouver USA

Natural Resources Inventory Management Plan

Dolphin / Fender Pile Treatments

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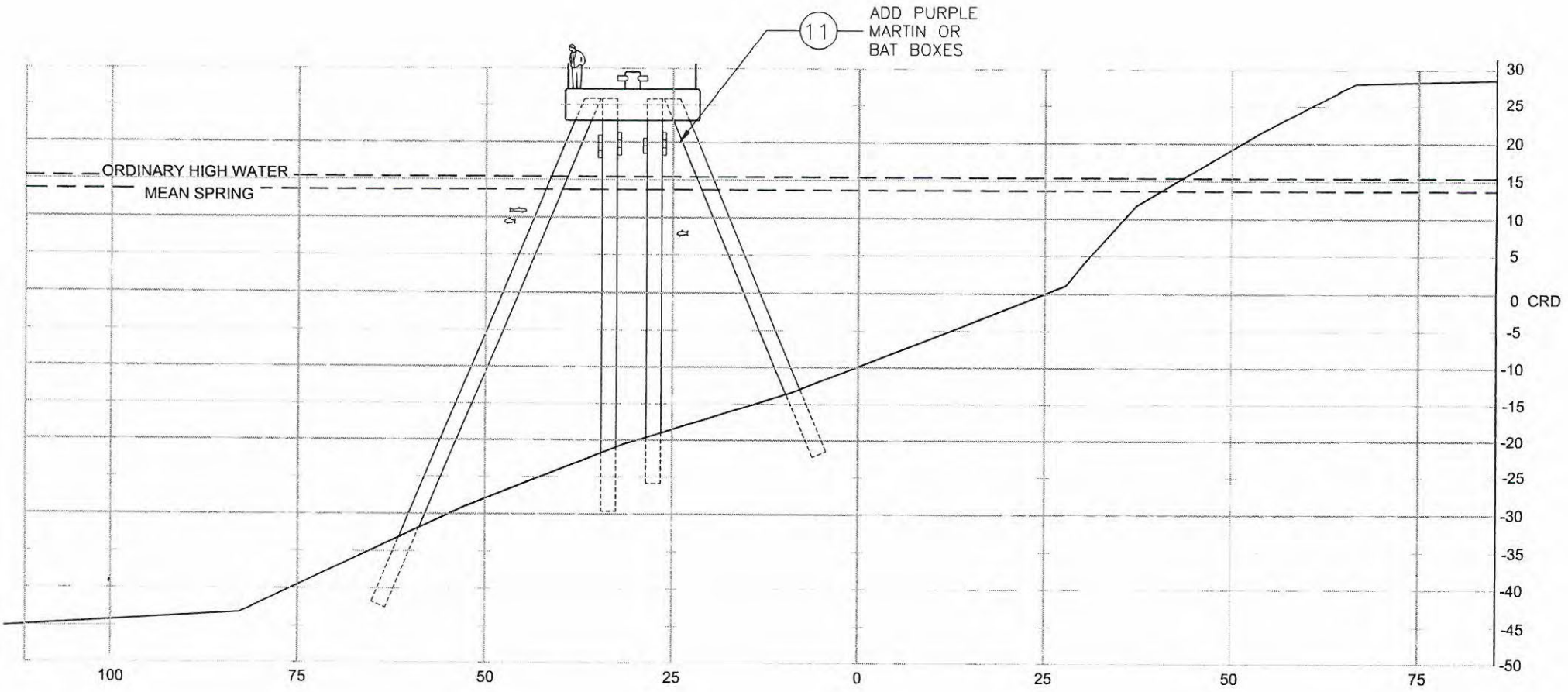
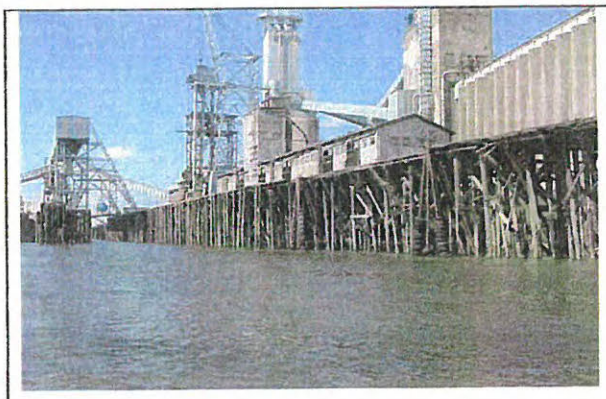
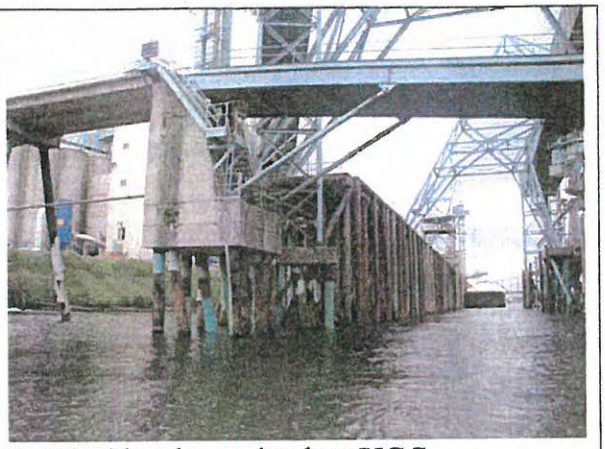


Appendix D: Mitigation Survey Photographs

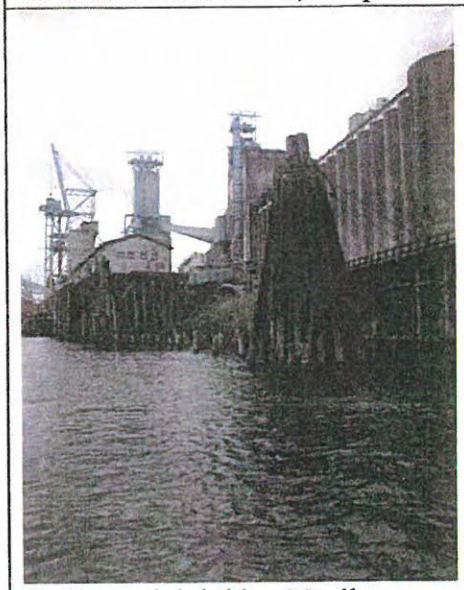
(Port Staff Boat Survey May 10, 2004)



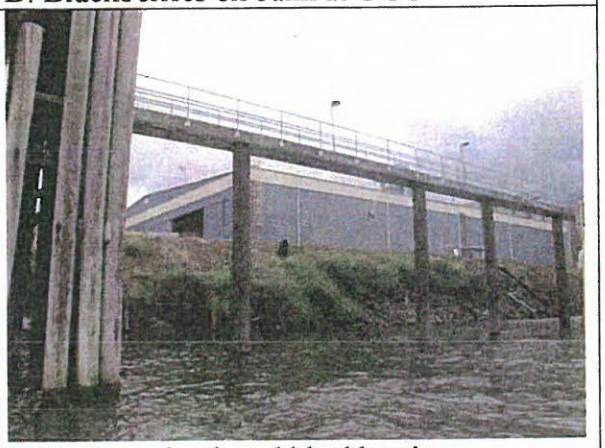
A: UGC Dock: 800-1,000 piles



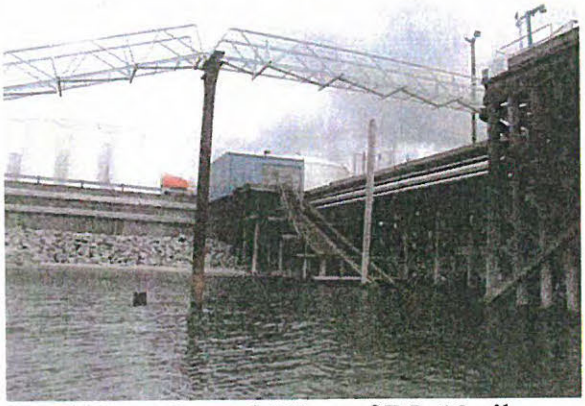
B: Blackberries on bank at UGC



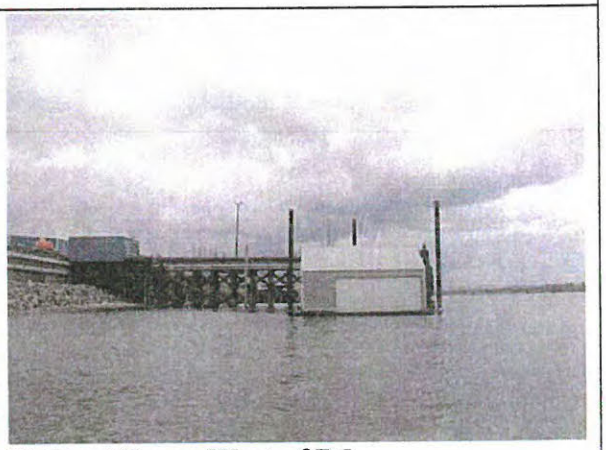
C: Treated dolphin: 30 piles



E: 3 pile on bank and blackberries



G: Old Boat Launch West of B5: 18 piles



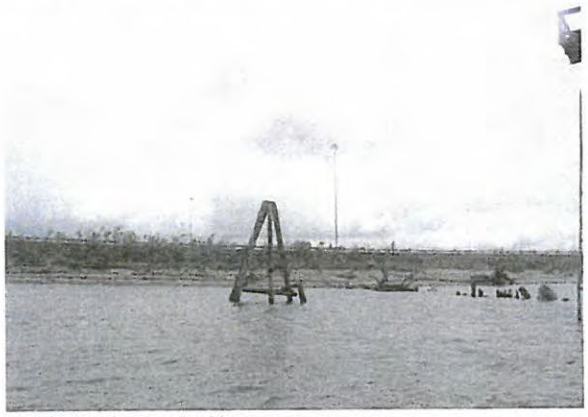
H: Boat House West of B5

J: Blackberries and debris on bank

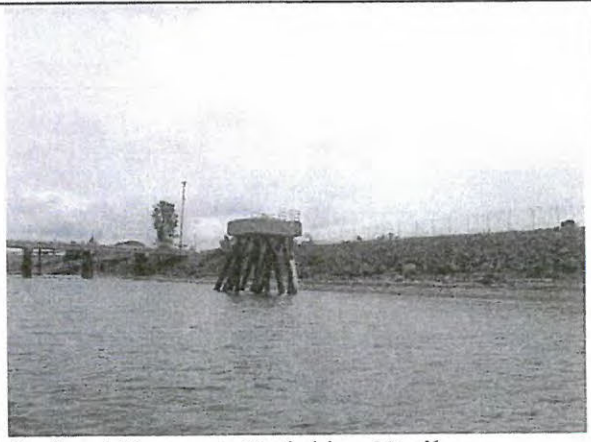
K: Treated pilings and debris along bank between Berths 8 and 9

L: 3 pile and treated debris on bank

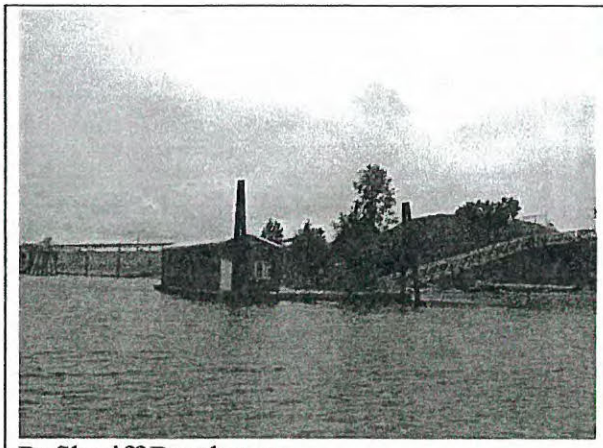
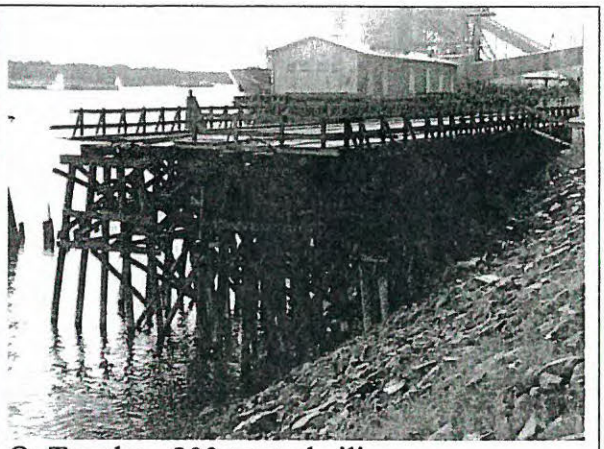
M: 2 pilings



N: Dolphin: 4 pile



O: Steel/Concrete Dolphin: 12 pile

 P: Sheriff Boathouse	 Q: Trestle: ~200 treated pilings
No photos for sites D, F, I,	

Appendix E: Costs

Preliminary Cost Estimate

Project: Port of Vancouver Natural Resources Inventory Management Plan

Description of Work: 200 feet of bank restoration on gradually sloping shoreline - Figure 16.

Assumptions: Revegetation at site not covered by Coast Guard security requirements. 2-year flood water level at El 14. Spring water level at El 11. Approx. 5000 SF w/average of 6 trees/1000 SF=30. Approx. 6000 SF w/average of 35 shrubs/1000 SF=210.

Number	Description	Quantity	Units	Unit Price	Total Price	Comment
1	Mobilization	1	LS		$1,613.60	
	TESC (Temporary Erosion and Sediment Control)					
	Straw wattles	400	LF	$3.00	$1,200.00	
2	Revegetation					
	1 Riparian trees in clusters of 3 to 9	30	EA	$50.00	$1,500.00	
	2 Riparian shrubs in drifts/masses of 20 to 50	210	EA	$7.00	$1,470.00	
	3 LWD in small groups at 200' oc	8	EA	$2,000.00	$16,000.00	
3	Contingency at 10%				$2,017.00	
Subtotal					$23,810.00	
	Contractor's Overhead @ 10%				$2,381.00	
	Profit @ 5%				$1,191.00	
	Insurance at 2%				$477.00	
Subtotal					$27,860.00	
	Sales Tax @7.7%				$2,146.00	Calculated with Sales Tax
	Bond @3%				$901.00	
					$30,910	

Preliminary Cost Estimate

Project: Port of Vancouver Natural Resources Inventory Management Plan

Description of Work: 200 feet of bank restoration on moderately sloping shoreline with wood cribbing. Figure 17.

Assumptions: Wood piles and LWD used to construct wood/concrete cribs for grade control. 60 foot at 2:1 ratio bury versus stickup, doug fir peeled, delivered 6$/ft - plus $300 to drive a piece. Pile driving from barge. Revegetation at site not covered by Coast Guard security requirements. 2-year flood water level at El 15. Spring water level at El 13. Approx. 6000 SF w/average of 35 shrubs/1000 SF=210.

Number	Description	Quantity	Units	Unit Price	Total Price	Comment
1	Mobilization	1	LS		$25,869.60	
	TESC (Temporary Erosion and Sediment Control)					
	Straw wattles	200	LF	$3.00	$600.00	
	Silt curtain	250	LF	$14.00	$3,500.00	
	Dewatering	8	DAY	$700.00	$5,600.00	
2	Crib structure -lower levels (2)					
	4 Wood piles (10" dia., 12' oc)	80	EA	$380.00	$30,400.00	From barge
	4 12 - 18" crib logs	120	EA	$300.00	$36,000.00	20-50' long
	4 12 - 18" crib logs w/ root wads	40	EA	$500.00	$20,000.00	20-50' long
	4 12" anchor logs w/ rootwads	40	EA	$500.00	$20,000.00	20-50' long
	4 wood lagging	400	LF	$8.00	$3,200.00	2x10s lagged to 40' high
3	Crib structure-upper level (2)					
	4 Wood piles (10" dia., 12' oc)	80	EA	$380.00	$30,400.00	From barge
	4 12 - 18" crib logs	120	EA	$300.00	$36,000.00	20-50' long
	4 12 - 18" crib logs w/ root wads	40	EA	$500.00	$20,000.00	20-50' long
	4 12" anchor logs w/ rootwads	40	EA	$500.00	$20,000.00	20-50' long
	4 wood lagging	400	LF	$8.00	$3,200.00	2x10s lagged to 40' high
4	Dredge Fill					
	6 Dredge spoil staging and offload	7	DAY	$500.00	$3,500.00	
	6 Dredge spoil placement	8000	CY	$9.00	$72,000.00	From barge
5	Revegetation					
	5 Riparian trees in clusters of 3 to 9	30	EA	$50.00	$1,500.00	
	5 Riparian shrubs in drifts/masses of 20 to 50	210	EA	$7.00	$1,470.00	
	5 LWD in small groups at 200' oc	8	EA	$2,000.00	$16,000.00	
6	Contingency at 10%				$32,337.00	
Subtotal					$381,580.00	
	Contractor's Overhead @ 10%				$38,158.00	
	Profit @ 5%				$19,079.00	
	Insurance at 2%				$7,632.00	
Subtotal					$446,450.00	
	Sales Tax @7.7%				$34,377.00	Calculated with Sales Tax
	Bond @3%				$14,425.00	
					$495,260	

Preliminary Cost Estimate

Project: Port of Vancouver Natural Resources Inventory Management Plan

Description of Work: 200 feet of shallow water/nearshore habitat improvement at existing piles. Figure 18.

Assumptions: Steel lagging can be attached to existing piles. Water depth at lower level makes scuba installation more economical than dewatering for installation. Upper level installed terrestrially. 2-year flood water level at El 15. Spring water level at El 13.

Number	Description	Quantity	Units	Unit Price	Total Price	Comment
1	Mobilization	1	LS		$43,400.00	
	TESC (Temporary Erosion and Sediment Control)					
	Silt curtain	250	LF	$14.00	$3,500.00	
2	Crib structure -lower level)					
	8 Attach steel lagging (c 10x30)	4000	LF	$40.00	$160,000.00	Scuba installation
3	Crib structure-upper level (2)					
	8 Attach steel lagging (c 10x30)	2000	LF	$20.00	$40,000.00	Normal installation
4	Dredge Fill					
	9 Dredge spoil staging and offload	10	DAY	$500.00	$5,000.00	
	9 Dredge spoil placement	12000	CY	$9.00	$108,000.00	From barge
5	Provide Light Wells					
	10 2" OC cross bars, 2.25"x3/16"	7,500	SF	$30.00	$225,000.00	
6	Provide Bat Boxes					
	11 Wood boxes mounted to steel piles 20' OC	10	EA	$100.00	$1,000.00	
7	Contingency at 10%				$54,150.00	
Subtotal					$640,050.00	
	Contractor's Overhead @ 10%				$64,005.00	
	Profit @ 5%				$32,003.00	
	Insurance at 2%				$12,801.00	
Subtotal					$748,860.00	
	Sales Tax @7.7%				$57,663.00	Calculated with Sales Tax
	Bond @3%				$24,196.00	
					$830,720	

Preliminary Cost Estimate

Project: Port of Vancouver Natural Resources Inventory Management Plan

Description of Work: 200 feet of shallow water/nearshore habitat improvement with partial pile and dock removal. Figure 19.

Assumptions: Steel lagging can be attached to existing piles. Water depth at lower level makes scuba installation more economical than dewatering for installation. Upper level installed terrestrially. 2-year flood water level at El 15. Spring water level at El 13. Approximately 6000 SF of riparian shrub enhancement consistent with Coast Guard security regulations.

Number	Description	Quantity	Units	Unit Price	Total Price	Comment
1	Mobilization	1	LS		$35,477.60	
	TESC (Temporary Erosion and Sediment Control)					
	Silt curtain	250	LF	$14.00	$3,500.00	
2	Crib structure -lower levels (1)					
	8 Attach steel lagging (c 10x30)	4000	LF	$40.00	$160,000.00	Scuba installation
3	Crib structure-upper level (2)					
	8 Attach steel lagging (c 10x30)	2000	LF	$20.00	$40,000.00	Normal installation
4	Dredge Fill					
	9 Dredge spoil staging and offload	10	DAY	$500.00	$5,000.00	
	9 Dredge spoil placement	12000	CY	$9.00	$108,000.00	From barge
5	Cut and remove piles and decking					
	a Cut and remove piles	24	EA	$2,000.00	$48,000.00	
	b Cut and remove decking	7,500	SF	$10.00	$75,000.00	
6	Provide Bat Boxes					
	11 Wood boxes mounted to steel piles 20' OC	10	EA	$100.00	$1,000.00	
7	Remove Hiimalayan blackberries and install shrubs					
	2 Remove Himalayan blackberries	1,000	SF	$1.50	$1,500.00	
	2 Riparian shrubs in drifts/masses of 20 to 50	210	EA	$7.00	$1,470.00	
8	Contingency at 10%				$36,450.00	
Subtotal					$515,400.00	
	Contractor's Overhead @ 10%				$51,540.00	
	Profit @ 5%				$25,770.00	
	Insurance at 2%				$10,308.00	
Subtotal					$603,020.00	
	Sales Tax @7.7%				$46,433.00	Calculated with Sales Tax
	Bond @3%				$19,484.00	
					$668,940	

Preliminary Cost Estimate

Project: Port of Vancouver Natural Resources Inventory Management Plan

Description of Work: 200 feet of shallow water/nearshore habitat improvement with existing dense piles. Figure 20.

Assumptions: Steel lagging can be attached to existing piles. Water depth at lower level makes scuba installation more economical than dewatering for installation. Upper level installed terrestrially. 2-year flood water level at El 15. Spring water level at El 13.

Number	Description	Quantity	Units	Unit Price	Total Price	Comment
1	Mobilization	1	LS		$46,600.00	
	TESC (Temporary Erosion and Sediment Control)					
	Silt curtain	250	LF	$14.00	$3,500.00	
2	Crib structure -lower levels (1)					
	8 Attach steel lagging (c 10x30)	4000	LF	$40.00	$160,000.00	Scuba installation
3	Crib structure-upper level (4)					
	8 Attach steel lagging (c 10x30)	4000	LF	$20.00	$80,000.00	Normal installation
4	Dredge Fill					
	9 Dredge spoil staging and offload	10	DAY	$500.00	$5,000.00	
	9 Dredge spoil placement	12000	CY	$9.00	$108,000.00	From barge
5	Provide Light Wells					
	10 2" OC cross bars, 2.25"x3/16"	7,500	SF	$30.00	$225,000.00	
6	Provide Bat Boxes					
	11 Wood boxes mounted to steel piles 20' OC	10	EA	$100.00	$1,000.00	
7	Contingency at 10%				$58,150.00	
Subtotal					$687,250.00	
	Contractor's Overhead @ 10%				$68,725.00	
	Profit @ 5%				$34,363.00	
	Insurance at 2%				$13,745.00	
Subtotal					$804,090.00	
	Sales Tax @7.7%				$61,915.00	Calculated with Sales Tax
	Bond @3%				$25,981.00	
					$891,990	

Preliminary Cost Estimate

Project: Port of Vancouver Natural Resources Inventory Management Plan

Description of Work: 200 feet of bank restoration on steeply sloping shoreline with pile removal. Figure 21.

Assumptions: Removal of piles to 2' below ground surface. 2-year flood water level at El 15. Spring water level at El 13.

Number	Description	Quantity	Units	Unit Price	Total Price	Comment
1	Mobilization	1	LS		$27,640.00	
	TESC (Temporary Erosion and Sediment Control)					
	Silt curtain	250	LF	$14.00	$3,500.00	
	Dewatering	20	DAY	$700.00	$14,000.00	
2	Cut and remove piles and decking					
	12 Cut and remove piles	190	EA	$1,200.00	$228,000.00	From barge
	12 Cut and remove decking	10,000	SF	$10.00	$100,000.00	20-50' long
6	Contingency at 10%				$34,550.00	
Subtotal					$407,690.00	
	Contractor's Overhead @ 10%				$40,769.00	
	Profit @ 5%				$20,385.00	
	Insurance at 2%				$8,154.00	
Subtotal					$477,000.00	
	Sales Tax @7.7%				$36,729.00	Calculated with Sales Tax
	Bond @3%				$15,412.00	
					$529,150	

Preliminary Cost Estimate

Project: Port of Vancouver Natural Resources Inventory Management Plan

Description of Work: 200 feet of shallow water/nearshore habitat improvement with partial pile and dock removal. Figure 22.

Assumptions: Steel lagging can be attached to existing piles. Water depth at lower level makes scuba installation more economical than dewatering for installation. Upper level installed terrestrially. 2-year flood water level at El 15. Spring water level at El 13. Approximately 6000 SF of riparian shrub enhancement consistent with Coast Guard security regulations.

Number	Description	Quantity	Units	Unit Price	Total Price	Comment
1	Mobilization	1	LS		$65,320.00	
	TESC (Temporary Erosion and Sediment Control)					
	Silt curtain	250	LF	$14.00	$3,500.00	
2	Crib structure -lower levels (1)					
	8 Attach steel lagging (c 10x30)	3000	LF	$40.00	$120,000.00	Scuba installation
3	Crib structure-upper level (4)					
	8 Attach steel lagging (c 10x30)	4000	LF	$20.00	$80,000.00	Normal installation
4	Dredge Fill					
	9 Dredge spoil staging and offload	10	DAY	$500.00	$5,000.00	
	9 Dredge spoil placement	8000	CY	$9.00	$72,000.00	From barge
5	Cut and remove piles and decking					
	12 Cut and remove piles	280	EA	$1,200.00	$336,000.00	
	12 Cut and remove decking	20,000	SF	$10.00	$200,000.00	
6	Contingency at 10%				$61,650.00	
Subtotal					$943,470.00	
	Contractor's Overhead @ 10%				$94,347.00	
	Profit @ 5%				$47,174.00	
	Insurance at 2%				$18,870.00	
Subtotal					$1,103,870.00	
	Sales Tax @7.7%				$84,998.00	Calculated with Sales Tax
	Bond @3%				$35,667.00	
					$1,224,540	

Appendix D.10

Marine Mammal Monitoring Plan

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VANCOUVER ENERGY

ENERGY INDEPENDENCE | ECONOMY | SAFETY | ENVIRONMENT | COMMUNITY

Vancouver Energy
Marine Mammal Monitoring Plan

Plan No. C.04 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 30 April 2015

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Vancouver Energy
Marine Mammal Monitoring Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	30 April 2015	Submittal for Application Review

Vancouver Energy
Marine Mammal Monitoring Plan

Table of Contents

Section

1. Introduction 3
1.1 Purpose of Plan 3
1.2 Regulatory Requirements 6
1.3 Related Plans and Documents 6
2. Monitoring Area 6
2.1 Noise Analysis 6
2.1.1 Underwater Noise 6
2.1.2 Terrestrial Noise 8
2.2 Monitoring Zones 8
2.3 Observer Locations 9
3. Monitoring Protocol 9
3.1 Minimum Qualifications for Marine Mammal Observers 11
4. Best Management Practices 11
5. References 11
6. List of Acronyms and Abbreviations 12

List of Tables

Table 1. Underwater Injury and Disturbance Threshold Decibel Levels for Marine Mammals 7
Table 2. Monitoring Zone Distances 7
Table 3. Terrestrial Injury and Disturbance Threshold Decibel Levels for Pinnipeds 8
Table 4. Project-Related Terrestrial Noise Attenuation 8

List of Figures

Figure 1. Vicinity Map 4
Figure 2. Project Site Plan 5
Figure 3. Monitoring Locations and Observation Radii 10

List of Appendices

Appendix A. Marine Mammal Observation Sheet – Example

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1. Introduction

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1 and Figure 2.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility operates 24 hours per day, 7 days per week.

1.1 Purpose of Plan

This marine mammal monitoring plan (MMMP) describes procedures to identify the presence of marine mammals during construction activities, which may result in "take," ("to hunt, harass, capture, or kill") and establishes actions that will be taken to minimize impacts to such marine mammals. This plan will be implemented during the following construction activities.

- In-water work construction activities related to Area 400 Marine Terminal modifications, including removal of existing piles, temporary pile installation and removal, and pile strengthening.
- Upland work related to impact pile driving of shore-based mooring points.

The impact addressed by this plan is mammal exposure to elevated noise levels, both underwater and in-air, resulting from construction activities that could potentially result in "take." Monitoring will be conducted prior to and during the work activities listed above with the potential to impact marine mammals. Work elements subject to this plan, described above, will be stopped when a marine mammal is detected within the monitoring area and will not restart until after the marine mammal has left the monitoring area.

Figure 1 - Vicinity Map

LEGEND

- Project Boundary
- Vancouver, WA
- Portland, Oregon

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

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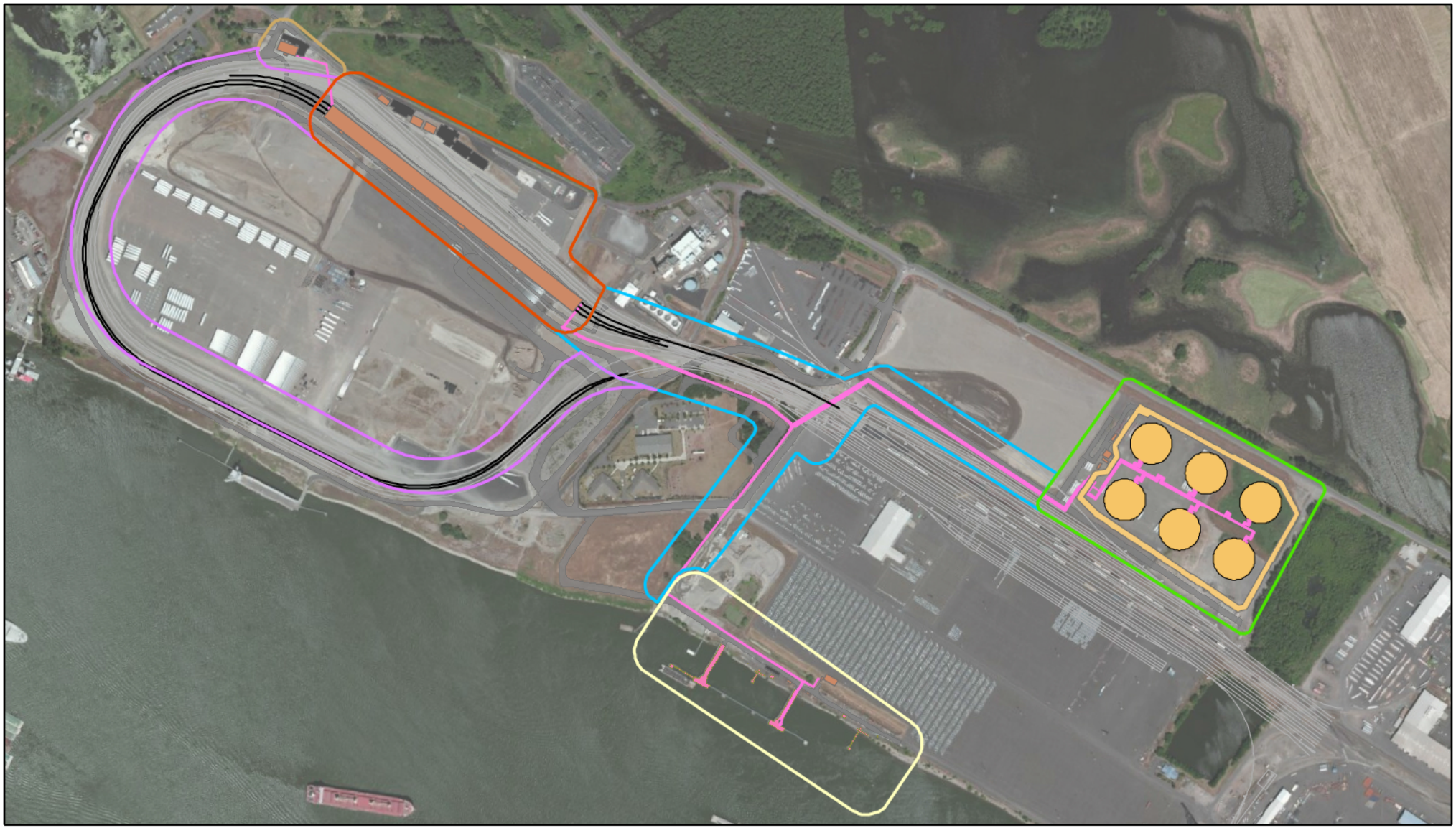

Figure 2 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000 Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

1.2 Regulatory Requirements

Marine mammals potentially present in the vicinity of construction activities include the following.[1]

- Harbor seal (*Phoca vitulina ssp. richardsi*)
- California sea lion (*Zalophus californianus*)
- Steller sea lion (*Eumatopius jubatus*)

These marine mammals are protected from "take" under the Marine Mammal Protection Act. For purposes of the act, "take" is defined as "to hunt, harass, capture, or kill" (16 USC Chapter 31). Marine mammals are also considered priority species under the Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) program (WDFW 2008). However, WDFW does not provide any PHS management recommendations for marine mammals.

1.3 Related Plans and Documents

Other plans prepared for the Facility that address components related to wildlife monitoring during construction include the following.

- Water Quality Protection and Monitoring Plan (WQPMP) – This plan includes visual monitoring of surface water quality conditions; these monitoring activities include provisions for construction-related in-water work activities that could affect aquatic species.
- Wildlife Construction Monitoring Plan (WCMP) – This plan addresses monitoring protocols for WDFW amphibian and avian PHS-listed species to verify that construction activities do not have adverse impacts.

2. Monitoring Area

The monitoring area includes all areas that will be subject to elevated underwater noise levels predicted to exceed the published guidance for harassment and harm (NOAA 2015). This MMMP defines a maximum monitoring zone based on the Level B harassment criteria for non-impulsive noise. Any marine mammal detections within the monitoring area will result in work stoppage for any pile driving until the marine mammal leaves the zone.

2.1 Noise Analysis

2.1.1 Underwater Noise

The use of vibratory and impact pile drivers can result in increased underwater noise levels that can impact marine mammals that may be present. Noise effects are divided into two groups, Level A harassment and Level B harassment (NOAA 2015). The Level A harassment threshold represents the onset of physical injury or loss of hearing and occurs at 190 decibels (dB). The Level B harassment zone includes behavioral disruptions and occurs at 160 dB for impact driving and 120 dB for vibratory pile driving. Table 1 shows the underwater injury and disturbance thresholds that the National Marine Fisheries Service (NMFS) has established for marine mammals.

[1] Cetaceans are not known to travel the Columbia River up to the Port and are not included in this plan.

Table 1. Underwater Injury and Disturbance Threshold Decibel Levels for Marine Mammals

Criterion	Criterion Definition	Threshold*
Level A harassment	PTS (injury) conservatively based on TTS**	190 dB RMS for pinnipeds
Level B harassment	Behavioral disruption for impulsive noise (e.g., impact pile driving)	160 dB RMS
Level B harassment	Behavioral disruption for non-pulse noise (e.g., vibratory pile driving, drilling)	120*** dB RMS

*All decibel levels referenced to 1 micropascal (re: 1 µPa). Note all thresholds are based off of root mean square (RMS) levels.

** PTS=Permanent Threshold Shift; TTS=Temporary Threshold Shift

***The 120 dB threshold may be adjusted slightly if background noise levels are at or above this level.

The zone of influence for underwater noise has been determined using the practical spreading loss model. This model, currently recognized by both USFWS and NMFS as the best method to determine underwater noise attenuation rates, assumes a 4.5-dB reduction per doubling of distance (Washington State Department of Transportation [WSDOT] 2013). The baseline underwater noise level in the portion of the Columbia River that is within the monitoring area is conservatively assumed to be approximately 120 dB_{RMS} (WSDOT 2013), although actual background underwater noise levels may be higher, given the amount of industrial shipping traffic.

For purposes of establishing the monitoring zone, a worst-case estimate of the underwater noise levels that could be generated during impact pile driving of upland mooring points is estimated at approximately 191 dB_{PEAK}, 177 dB_{RMS}, and 167 dB_{SEL} for 24- and 36-inch steel piles[2]. Monitoring zones for Levels A and B criteria are shown below in Table 2. Monitoring zones were calculated using a standard equation for calculating underwater sound attenuation.

$$TL = 15 * Log\left(\frac{R1}{R2}\right)$$

Where TL is the transmission loss, represented as the difference between measured sound level and the threshold level, R1 is the distance where sound attenuates to the threshold level, and R2 is the distance of the measured sound level. Solving the equation for R1 results in

$$R1 = R2 * 10^{\left(\frac{Measured\ Sound - Threshold\ Level}{15}\right)}$$

Table 2. Monitoring Zone Distances

Criterion	Threshold Level	Distance (R1)
Level A harassment	190 dB RMS	15.6 feet
Level B harassment	160 dB RMS	1,560.5 feet
Level B harassment	120 dB RMS	137 miles

These distances present a worst-case, hypothetical model, and attenuation will likely occur over a shorter distance. Sound waves will travel only in straight lines and will not extend beyond the opposite shore of the Columbia River. An additional factor that will affect the attenuation of underwater noise is the proximity of the Facility to the busy Columbia River shipping channel. For purposes of this MMMP, the extent of impact due to temporarily elevated underwater noise has been estimated to extend throughout the water column of the Columbia River, in straight line distances from the proposed pile-driving activities, in all directions. Figure 3 on page 10 provides a graphical depiction of this zone of influence.

[2] Reference levels are measured at a distance of 35 meters (Caltrans 2012).

2.1.2 Terrestrial Noise

The area in which terrestrial noise levels can affect marine mammals is determined by threshold noise levels as shown in Table 3.

Table 3. Terrestrial Injury and Disturbance Threshold Decibel Levels for Pinnipeds

Criterion	Criterion Definition	Threshold*
Level A harassment	PTS (injury) conservatively based on TTS**	None established
Level B harassment	Behavioral disruption for harbor seals	90 dB RMS
Level B harassment	Behavioral disruption for non-harbor seal pinnipeds	100 dB RMS

*All decibel levels referenced to 20 micropascal (re: 20 µPa). Note all thresholds are based off of root mean square (RMS) levels.

** PTS=Permanent Threshold Shift; TTS=Temporary Threshold Shift

Peak terrestrial noise generated during impact installation of upland piles has been estimated to be approximately 110 dBA, measured at 50 feet (FTA 2006). In-air noise attenuation calculations generally show a 6-dB loss for a doubling of distance from the source as shown in Table 4.

Table 4. Project-Related Terrestrial Noise Attenuation

Distance from Source (ft)	Construction Noise in dBA (Point Source, Hard Site) (-6 dBA reduction per doubling of distance)
50	110
100	104
200	98
400	92
800	86

Terrestrial noise would fall below Level B harassment for non-harbor seal pinnipeds between 100 and 200 feet, and below Level B harassment for harbor seals between 400 and 800 feet. There are no pinniped haulout sites or suitable haulout habitat within 800 feet of the project area; therefore, no pinnipeds are expected to haul out within the monitoring area that will be affected by terrestrial noise. As a result, any marine mammals that enter the monitoring area will be in an aquatic environment and subject to underwater noise before reaching the zone of terrestrial noise impacts. As such, the terrestrial noise limits are not taken into account in this MMMP.

2.2 Monitoring Zones

Based on the results of the noise attenuation analysis conducted for the project, it has been determined that the Level A harassment (injury) threshold for underwater noise for pinniped species could be exceeded at a distance of up to 15.6 feet during impact pile-driving activities. Additionally, the Level B harassment (behavioral disruption) for impulsive underwater noise for pinniped species could be exceeded at a distance of up to 1,560 feet during impact pile driving. Non-impulsive underwater noise could exceed the threshold for up to 137 miles. The actual zone of impact is smaller due to the geographic constraints of the Columbia River. Because this project strives to avoid any impact to marine mammals during construction, the monitoring zone includes all areas of the Columbia River that could exceed the non-impulsive noise disturbance threshold as identified in Figure 3 on page 10.

Two monitoring zones will be used depending on the construction activity. Zone 1 includes the entire area where underwater noise levels may exceed the Level B harassment non-impulsive threshold for pinnipeds (the 120 dB isopleth) and will be monitored during in-water vibratory pile-driving activities only. Zone 2 includes the area where underwater noise levels exceed the Level B harassment for impulsive noise for pinnipeds (the 160 dB isopleth) and will be monitored during upland impact pile driving only. These zones will be maintained as an injury protection zone. To prevent Level A or B harassment, any pile driving will be shut down immediately if any marine mammals are observed entering the monitoring zone, effectively reducing the possibility of any marine mammals being exposed to Level A or B harassment; for this reason, the project will not result in any Level A or B "takes."

2.3 Observer Locations

Monitoring will be completed by two qualified individuals in locations sufficient to conduct monitoring consistent with Section 3. One individual will be stationed either on the pile-driving rig or in the immediate vicinity and will have clear line of sight views of the monitoring area (Figure 3 on page 10). The second individual will be stationed in the upstream portion of the monitoring area, in the vicinity of the Interstate 5 bridge, and will monitor the zone in the upstream portion of the monitoring area.

3. Monitoring Protocol

Marine mammal monitoring during the project will consist of the following procedure.

1. Individuals meeting the minimum qualifications identified below (section 3.1) will be present on site (on land or dock) at all times during in-water pile driving and shore-based mooring point pile-driving activities conducted during November to February.
2. The area will be monitored by two qualified individuals during pile driving (see section 3.1). The monitoring staff will record any presence of marine mammals by species, document any behavioral responses noted, and record Level B "takes" when sightings overlap with pile installation activities. Observations will be recorded on data sheets (Appendix A).
3. The individuals will scan the waters within each monitoring zone using binoculars (10X42 or equivalent), spotting scopes (20 to 60 zoom or equivalent) (Washington Department of Fish and Wildlife 2000), and unaided visual observation.
4. The monitoring zone will be maintained as an injury protection zone, in which pile driving will be shut down immediately if any marine mammal is observed within the monitoring area. Zone 1 will be monitored during all vibratory pile driving and Zone 2 will be monitored during all upland impact pile driving. Monitoring zones will be confirmed daily with the Facility construction manager and will depend on scheduled activities. For example, if only upland impact pile driving occurs, then only Zone 2 will be monitored.
5. If waters exceed a sea-state that restricts the observers' ability to make observations within the monitoring zone (e.g., excessive wind or fog), pile driving will cease until conditions allow the resumption of monitoring.
6. The waters will be scanned 20 minutes prior to commencing impact pile driving and during all pile driving. If marine mammals enter or are observed within the designated monitoring zone during or 20 minutes prior to impact pile driving, the monitors will notify the on-site construction manager to not begin or to cease work until the animal has moved outside the designated radius.

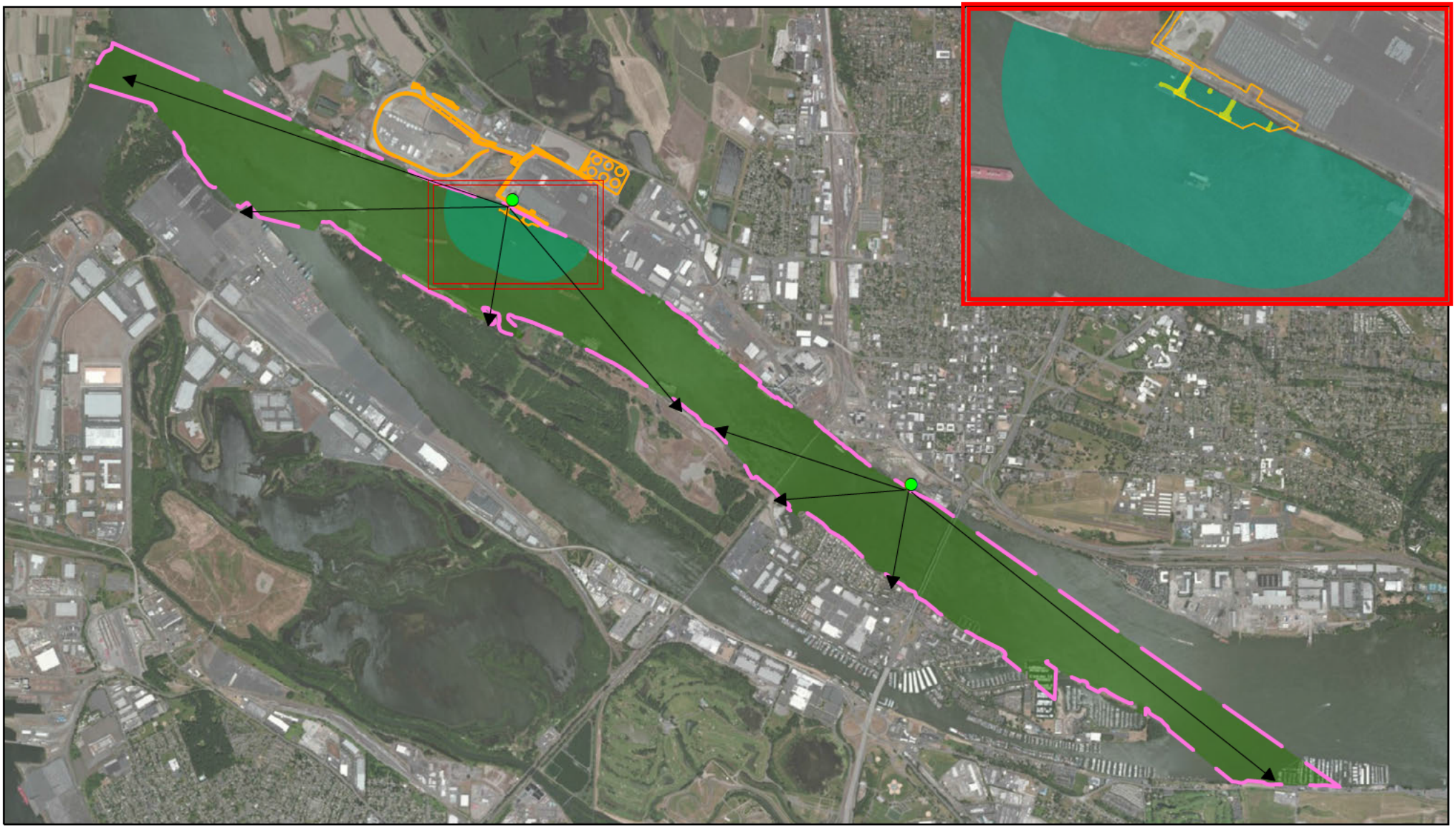

Figure 3 - Mammal Monitoring Area

0 2,000 4,000 8,000 Feet

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LEGEND

- Monitoring Location
- Mammal Monitoring Area
- Project Site Boundary
- Monitoring Zone 1 *137 Miles*
- Monitoring Zone 2 *1,560.5 Feet*

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

3.1 Minimum Qualifications for Marine Mammal Observers

1. Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with the ability to estimate target size and distance. Use of binoculars or spotting scope may be necessary to correctly identify the target.
2. Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
3. Experience or training in the field identification of marine mammals (i.e., pinnipeds).
4. Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations.
5. Writing skills sufficient to prepare a report of observations that will include such information as the number and types of marine mammals observed; the behavior of marine mammals in the project area during construction; the dates and times when observations were conducted; the dates and times when in-water construction activities were conducted; the dates and times when marine mammals were present at or within the defined disturbance zone; the dates and times when in-water construction activities were suspended to avoid incidental harassment by disturbance from construction noise; etc.
6. Ability to communicate orally, by radio or in person, with project personnel to provide real time information on marine mammals observed in the area.

4. Best Management Practices

In-water work is restricted to the approved in-water work window for the Facility. A portion of the in-water work period overlaps with the beginning of the time that marine mammals typically begin entering the Columbia River, during January and February. When marine mammals are observed within the monitoring area during activities subject to this MMMP per the monitoring procedures described above, pile driving will not be initiated, or, if initiated, will cease temporarily until the animal leaves the monitoring area.

5. References

California Department of Transportation (Caltrans). 2012. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. Updated October 2012.

Federal Transit Administration (FTA). 2006. Construction Noise Methodology.

National Oceanic and Atmospheric Administration (NOAA). 2015. Interim Sound Threshold Guidance. http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html. Last accessed 2 March 2015.

Washington Department of Fish and Wildlife. 2000. Final Report. Monitoring Incidental Harassment of Harbor Seals (Phoca vitulina richardsi) at Gertrude Island during the McNeil Island Corrections Center Still Harbor Dock Renovation Project. 1 December 1998 to 15 August 1999. Dyanna Lambourn and Steven Jeffries. Washington Department of Fish and Wildlife Marine Mammal Investigations. Tacoma, WA. January 10, 2000.

Washington State Department of Transportation (WSDOT). 2013. Biological Assessment Preparation – Advanced Training Manual Version 02-2013. February 2013.

6. List of Acronyms and Abbreviations

bbl: barrel or barrels

dB: decibel or decibels

ESA: Environmental Species Act

Facility: Vancouver Energy

FTA: Federal Transit Administration

MMPA: Marine Mammal Protection Act

NMFS: National Marine Fisheries Service

NOAA: National Oceanic and Atmospheric Administration

Port: Port of Vancouver USA

PTS: Permanent Threshold Shift

RMS: root mean square

TTS: Temporary Threshold Shift

USFWS: U.S. Fish and Wildlife Services

WDFW: Washington Department of Fish and Wildlife

Appendix A
Marine Mammal Observation Sheet – Example

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Appendix A – Marine Mammal Observation Sheet

Marine Mammal Observations

Project Name: _____ Date: _____ Sheet _____ of _____ for this day

Monitor: _____ Monitoring Location: _____

Sighting No.	Time of Day	Weather	Species	No. of Individuals	Location*	Behavior/Construction Activity

* e.g., Direction: distance estimate or mark on figure with sighting number.

Appendix D.11

Health, Safety, Security and Environmental (HSSE) Plan

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Port of Vancouver Tesoro Savage Petroleum Terminal Project

HSSE Execution, Construction and Commissioning Plan

SAVAGE HSSE Overview

Health, Safety, Security and Environmental (HSSE) Plan

Since January 1998, Savage has maintained a partner company relationship in the American Chemistry Council's (formerly the Chemical Manufacturers Association) Responsible Care® initiative. Savage's interpretations of and commitment to the Responsible Care® Codes of Management Practices are:

Employee Health and Safety: We will protect and promote the health and safety of individuals working at or visiting the Facility. Our employees have the necessary training and resources to perform their work in a safe and prudent manner. Employees attend communication meetings and are given opportunities to participate in developing, implementing, and reviewing health and safety programs. All employees and visitors to the Facility follow safe and environmentally responsible work practices.

Process Safety Management: Procedures are in place to ensure that work is performed safely, effectively and productively. Employees are hired using Savage's comprehensive "Hire Right!" program and trained on applicable work procedures. Each facility has written, process specific operating procedures defining the scope of work, the required personal protective equipment, and the potential hazards. Customer service profiles are maintained on each customer, documenting proprietary and specific service requirements. Equipment is maintained both preventatively and progressively, and documented accordingly. In the event of an occurrence, Root Cause Analysis is performed and corrective actions are implemented.

Community Awareness and Emergency Response: We are committed to emergency preparedness through proper planning, risk assessment and training. We effectively communicate with the community and emergency responders regarding our facilities in an effort to promote emergency preparedness. Where available and practicable, we maintain communication with the Local Emergency Planning Committee (LEPC) and local emergency responders to foster knowledge of our operations and potential hazards. Public concerns about our facilities are addressed on a case by case basis.

Security: We are committed to provide for and promote the general security of our employees, our customers and their products, our facilities and equipment, facility visitors and the general public. Security becomes the responsibility of each employee. It is our intent, where possible, to detect, deter and delay anyone or anything from obtaining unauthorized access to our facilities that would pose a security risk. Security vulnerable assessments are conducted at our facilities to determine security risks and weaknesses. A site specific security plan is developed from the vulnerability assessment. Employees are trained in their responsibilities with regards to the security plan. Security plans are kept confidential and are only shared where necessary.

Pollution Prevention: We are committed to achieving ongoing reductions in the amount of contaminants and pollutants released to the air, water and land. Controls are in place at

facilities to prevent releases of contaminants. We value the communities and physical environments in which we operate. Annual emergency response drills are held in an attempt to reduce or eliminate potential releases into the environment. Work practices are routinely evaluated, through monthly inspections and observations, to ensure proper measures are taken to protect and preserve the environment. Possible waste streams are identified, tracked, recorded and evaluated to ensure proper disposal.

Product Stewardship: We take full responsibility and accountability for the products we handle for our customers, those products we use in providing our services, any by-products that may be generated in the course of our business and our employees are trained to appropriately respond in each instance. We maintain close contact with customers and vendors regarding specific handling instructions. We understand our obligation to protect the health, safety and environment of our employees, our customers and the communities in which we reside. All business is conducted in compliance with government regulations.

Distribution: We take full responsibility for reducing the risk of harm posed by the distribution of the products within our care, custody and control. Employees are trained in proper handling procedures and emergency preparedness and attend safety meetings to develop and maintain the integrity of our distribution practices. We constantly seek creative solutions to improve distribution safety. Inspections and observations are conducted in an effort to preempt distribution failures.

In an effort to maintain an atmosphere of continuous improvement, annual reviews of the above seven codes are performed to ensure that standards are being met. Each at Savage is committed to delivering safe, quality, and environmentally responsible "***Best Value –Worry Free***" service.

Safety Program

Safety is of paramount importance to us. Drawing upon Savage's extensive operational experience, and applying the Savage Hazard Analysis & Prevention System at every stage, Savage designs facilities that are safe, environmentally sensitive, efficient and highly productive. We will implement a strong safe operations plan, which will include:

- Safe operating procedures designed specifically for the Facility and rail operating partners, the product to be handled, and the Facility's operating objectives;
- Safety and emergency procedures that are integrated with the Facility's and the Port's own procedures;
- Implementation of Savage's Lead Safety

VPP
Voluntary Protection Programs
An OSHA Cooperative Program

Specialists and Safety Specialists systems on site, together with ongoing safe operations training; and

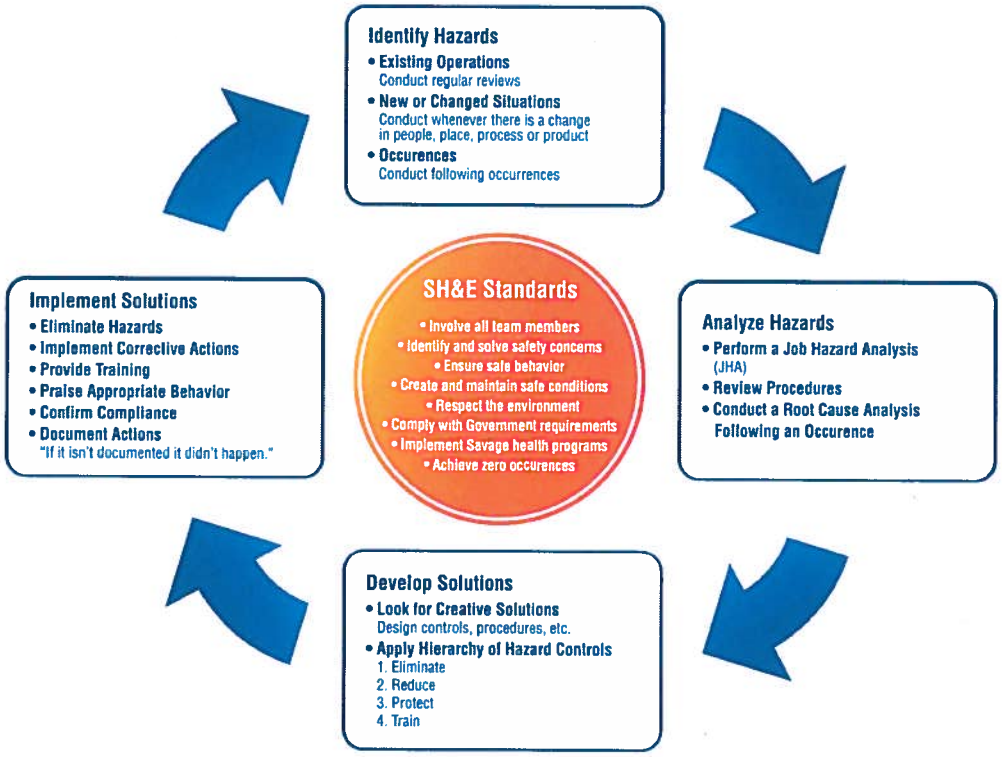
- Access to Savage's safe operations programs and industry training, including OSHA, FRA and HAZMAT training.

Safety Specialist Program:
The objectives of our Safety Specialist Program is to have the front line employees be active team members and actively involved in the safety program, instill Savage's safety standards and the Savage System into the hearts of our front line safety team, provide safety assistance with the manager at the operation level by implementing Savage's proprietary SHAPS program and S^7 operating system, create an environment where we have Safe Behaviors and Safe Conditions, and create a level of Zero Occurrences.

Savage trains operations managers and individual operators to be Lead Safety Specialists and Safety Specialists. Over 40 percent of our current work forces have been trained in these programs.

Savage Hazard Analysis and Prevention System (SHAPS)
SHAPS is Savage's proprietary system used to identify and mitigate hazards. A summary of our SHAPS model in visual form is included below.

SAVAGE Hazard Analysis & Prevention System (SHAPS)



Environment

We recognize and respect the beauty and uniqueness of the area in which the Port is located, and understand its part in the greater ecosystem. We bring to the Port the expertise and commitment of Savage to operate the Facility in an environmentally responsible manner.

Spill Prevention and Response

While we have active programs to test and improve our ability to effectively respond to a spill, our focus is on prevention.

Hydrogen Sulfide (H_2S)

Hydrogen Sulfide (H_2S) is ever present in many industrial processes as a by-product and also during the decomposition of organic matter containing sulfur. H_2S can be found in, but not limited to: refineries, drilling operations, blowouts, tank gauging, tank batteries and wells, recycled drilling mud, and water from sour crude wells. H_2S may also be found in most processes present at sulfur terminals. Savage has extensive experience with H_2S through our sulfur, refinery and crude oil transloading operations.

- All employees will be provided awareness training and testing through Savage's Hazard Analysis & Prevention System in order to be familiar with the potential hazards and proper safe work procedures to follow if exposed to this health hazard. The training will be provided prior to working in any job with potential exposure to H_2S operations;
- Savage will issue personal H_2S monitors to all employees.

Training Program

Savage employees are trained on safe work practices, processes, policies, rules, regulations and site specific operational items. The most important asset at all of our operations is our PEOPLE. We employ the highest quality people by way of Savage "Hire Right, Train Right, Treat Right" program. This program identifies the attributes that best fit the individual operation and incentivizes our people to ask the question; "How can we become better tomorrow than we are today?"

New and Existing Employees

All employees must complete all site specific hazard/customer specific training and site regulatory requirements training before receiving the following training: Employees must complete the New Hire Railroad Operations (RO) Training and pass the associated exams.

Employees in training must complete the following to the satisfaction of a qualified trainer:

- Baseline procedures,
- Site specific procedures,
- Job specific training,
- Pass the written exam(s),
- Pass proficiency exam(s)

Employees may complete the baseline training prior to completing the New Hire RO Training, in a non-production area or a safe location as long as the employee is under the direct and immediate supervision of a trained and qualified employee.

Employees must complete the Port specific training regarding On Track Safety (OTS) along with any additional Port required training.

NOTE:* Any employee **NOT having completed documentation of his/her training must be under the direct and immediate supervision of a trained and qualified employee while performing the new job or task.

HSSE Management

The Health, Safety, Security, and Environmental (HSSE) execution plan provides an overview of relevant HSSE topics and their application to the construction and commissioning of the Tesoro Savage Petroleum Terminal (the "Project"). Tesoro Savage Petroleum Terminal LLC, the Project owner, intends to contract with Savage to manage the construction and commissioning of the Facility.

The objectives of this HSSE Execution Plan are:

- To clearly state the Project HSSE objectives and expectations and provide a tool for the Project Team to use in achieving them;
- To detail the Project organization, responsibilities and methods of management control as they relate to HSSE; and
- To provide an overview of relevant HSSE topics and their application during the Project.

Savage Rules of Safety establish the minimum requirements for the safety procedures to be followed during the Project. Although embedded in each of these rules, it is important to emphasize that:

- Work will not be conducted without a pre-job risk assessment and a safety discussion appropriate for the level of risk.
- All persons must only undertake work for which they are trained and competent, medically fit and sufficiently rested and alert to carry out.
- Engineering controls, work practices and personal protection equipment will be used as per the risk assessment and minimum site requirements.
- Emergency response plans, including rescue plans, will be developed from a review of credible potential emergency scenarios, and will be established before commencement of work.
- Everyone has the right and obligation to stop work that is unsafe.

The Project Team will incorporate Savage Safety Rules through the use of policies for each of the elements.

Where contractor procedures are more rigorous than Savage procedures, the contractor procedure will take precedence and must be followed by the contractor.

Project Objective

The Tesoro Savage Petroleum Terminal (the "Facility") will include the capability to transload North American crude oil from railcar to storage and then to vessel for distribution to refineries on the North American west coast. The Facility will include rail car unloading stations, crude oil storage tanks, vessel loading infrastructure, and associated piping and equipment, and will be capable initially of handling up to two unit trains of crude oil per day, with the potential for near-term expansion to handle up to four unit trains per day. Benefits include:

- Economic benefits to Washington State
- Long-term supply chain benefit (North American vs. imported crudes)
- Reduce ANS dependency as ANS production declines
- Diversify the feedstock options (crude slate and intermediates)

General HSSE Requirements

The expectation is that all contractors will follow all of the Savage HSSE guidelines and procedures for the Project. This includes, but is not limited to:

- Contractors' HSSE Handbook
- Contractor Process Hazards Handbook
- Recycle program (including disposal of fabrication extras)
- Contractor Qualifications
- Savage Safety and Health Manual

Specific HSSE Requirements

Possible Chemical Exposure

- H_2S – MSDS
- Utility Water – MSDS
- Crude - MSDS
- Diesel - MSDS
- Crude Additive 1 - MSDS
- Crude Additive 2 - MSDS

Principles

The following principles will guide the collective Project Team in all Project activities:

- There is no task so important that the time cannot be taken to do it safely.
- People are our most important asset.
- Communication is the key to injury prevention.
- All injuries, property damage and environmental incidents are preventable.
- Everyone is expected to stop unsafe work.
- Near miss reports are a gift. Elimination of little things will prevent larger things from occurring.
- Addressing safety in the planning phase of a job saves time and prevents incidents
- Effective safety management and leadership are good business.

Project HSSE Policy

Everyone who works for Savage is responsible for getting HSSE right. Good HSSE performance and the health, safety and security of everyone who works for us are critical to the success of our business.

Our goal is simple - No accidents, No harm to people, and No damage to the environment.

We continue to drive down the environmental and health impact of our operations by pollution prevention, reducing waste, emissions and discharges, and using energy efficiently.

Culture

Savage has a well-established HSSE program and a history of best-in-class safety and environmental performance. Although nothing is being taken for granted, the Project Leadership Team expects to benefit from this tradition of safe work performance.

Workforce

The Project is located in Vancouver, WA. The area is home to a local contractor workforce. The duration of the Project and its timing in relation to other projects in the area should allow for a stable, well trained workforce. Each contractor will be responsible for screening its employees to determine their appropriateness for a role and for assuring their competency.

SAVAGE and Business Unit Alignment

The HSSE Execution Plan as outlined in this document was developed in alignment with Savage HSSE goals, expectations and standards as presented in the following:

- Savage Rules of Safety
- Group Defined Practice for Assessment, Prioritization & Management of Risk
- Reporting HSSE and Operational Issues
- Group Defined Practice for Incident Investigation
- Savage Control of Work Standard
- HSSE Review of Projects

Project HSSE Goals

We are convinced that, through a dedicated commitment to HSSE, a goal of ZERO incidents is achievable.

Project HSSE Targets

Output Metrics			Input Metrics	
Days Away From Work Cases	0		To be decided	
Recordable Injury Frequency Rate (RIF)	0.35		Joint Safety Observations Completed	
Loss of Primary Containment (LOPC)	0			
Environmental Reportable Incidents	0		Pre-Task Assessments Completed	

We are committed to completing this Project incident and injury free. Our commitment to safety is absolute and never ending. We care about the health, safety, and security of every worker, neighbor, and customer, and we will protect the environment in which we operate.

By following procedures and policies, performing risk assessments, upholding the responsibilities in Control of Work, and practicing and expecting safe work activities from others, we can make this Project incident and injury free.

HSSE Training Expectations

Training expectations include HSSE-related, project-specific training for the Project Team members and the construction contractors' supervisory personnel, as well as turnover and pre-commissioning training for the Construction Management and Commissioning personnel.

Orientation

All personnel are required to complete the Safety Orientation Training program before performing work on site.

- Training for individuals who are making deliveries, but not performing other work onsite, may be limited to the Driver's Site Safety Orientation video.
- Visitors will be escorted by a Project Team member or by suitably qualified contractor personnel at all times. The Visitor Orientation program is provided by the HSSE Team.
- The use of the Escort Policy must not be used to circumvent training requirements.
- Authorization for escort training and the authority to escort Project visitors is provided by the Project HSSE Manager.

Contractor Specific Safety Orientation

Prior to performing any work onsite, new contractor employees must receive all required contactor-specific safety training required for their role. In addition, the contractor-specific training must detail the Project specific risk assessment procedure.

Each contractor Safety Execution Plan must include a safety training matrix that identifies the training provided to each employee, by role, trade or other grouping.

Project Specific Safety Orientation

Completion of a Project Specific Safety Orientation is required for unescorted access to the Project site. The orientation will be facilitated by the Project HSSE Manager and the Project Manager, or their designees.

Specialized Training

Specialized HSSE Training (i.e. Safety Tech, HazOp, COW, etc.) may be required for certain roles within the Project Team. The Project HSSE Manager will coordinate this training as needs are identified.

Safety Committees

Safety committees are a recognized way to increase the effectiveness of the overall safety program. The Project recognizes the value of these committees and the empowerment they provide the contractors.

Petroleum Terminal Project Craft Safety Committee

The Project will maintain a cross functional safety team to provide a forum for addressing safety and health concerns related to field construction activities. The team will be comprised of hourly/craft employees with staff support. All contractors performing field construction activities on the Project must have representation on the Project Safety Team. Terms of Reference are included in Appendix 5.

Safety Meetings

Safety meetings differ from safety committees in their intent and format. The Project requires both safety committees and safety meetings.

Toolbox Talks

Daily toolbox talks are required for all groups prior performing field work. The talks should be specific to the work to be performed that day (Permits, PPE requirements, JSAs, PTAs, etc.). These should be led by a work crew member and be a *conversation about the topic, not a presentation*

Weekly All-Hands Safety Meetings

At the start of each work week, an all-hands meeting will be held. General safety information will be shared along with an update on the weeks planned scope. These informal meetings will be co-lead by the Construction Manager and HSSE Manager or their delegates.

Monthly Safety Meeting

Each contractor must have a monthly safety meeting with their onsite employees to provide a forum for an extended conversation about a project-specific training topic.

All-Hands Safety Meetings

The Project will present the content from the all-hands meetings. The content may be modified at the discretion of the Project HSSE Field Coordinator to ensure relevancy to the Project.

Communications

Effective communication is critical to the success of the Project. Communication occurs in many forms, including email, groups meetings, and individual face-to-face. When it comes to HSSE concerns, it is important that we communicate quickly and completely so that appropriate action can be taken to mitigate the concern.

Policies & Procedures

Relevant and Project policies & procedures will be available to all contractors through online access. Hard copies of the most relevant Health & Safety Procedures will be kept in the Permitting Trailer for easy reference.

Meetings

Meetings are effective for sharing consistent information with multiple people. They do not replace the need for individual face-to-face communication. Meeting participation should be broad enough to meet the objectives of the meeting, but attendance should also be consciously limited to only those who are required.

Radio Communication

The ability to effectively communicate has direct safety implications. Project radio traffic will occur on Savage's radio system. Radio channels on the radio system will be assigned and a chart will distributed.

Contractors may choose to operate on their own radio systems; however, select personnel for each contractor must also carry Savage radios. At a minimum, all Project safety personnel will be available on Savage radios.

HSSE Leadership

The Project Team will demonstrate HSSE leadership by incorporating HSSE elements into a variety of Project activities. This HSSE Execution Plan and its details must be supported by all team members.

Demonstration of HSSE Leadership

All team members will:

- Start each meeting with a relevant HSSE discussion topic.
- Share lessons learned to aid in raising HSSE awareness.
- Participate in all HSSE related training.
- Actively report, investigate and embed learning from safety opportunities and near misses.

Additionally, Project Leadership Team (PLT) members will:

- Review all new and outstanding HSSE issues and risks, their status and projected resolution date
- Actively engage workers in conversations about the risks of the work they are performing and to solicit ideas for minimizing these risks as well as ideas for improvements to the processes in place to control these risks.

HSSE Organization

The Project Leadership Team is committed to ensuring sufficient HSSE resources for the duration of the Project. Field roles will be filled by a combination of Savage and/or Savage trained contractor safety professionals. Staffing levels will be regularly reviewed and may be adjusted based on the quantity and risk of the work being performed. The Project HSSE Manager, in consultation with the Project Manager and the HSSE Manager, will determine the minimum HSSE staffing levels for each phase of the Project.

Project Safety Organization

The Project will include a dedicated HSSE Manager whose focus will be to lead the development and delivery of the HSSE Execution Plan requirements in a consistent and effective manner to achieve outstanding HSSE performance. The Construction Management Team (CMT) will include HSSE Manager who will work closely with the contractors to help them interpret the Project and safety requirements.

Each contractor will be required to develop a detailed Construction Execution Plan (CEP), with emphasis on safe execution of the work. The CEP must include safety staffing levels in addition to the other requirements outlined elsewhere in this document. The CEP will be reviewed and agreed during a pre-mobilization review with the contractor's leadership team and the PLT.

A contractor safety representative must be onsite at all times project work is being performed, regardless of the nature of work or crew size. Exceptions must be approved by the Project HSSE Manager.

HSSE Interface Requirements

The Project will maintain alignment with HSSE philosophy, performance expectations and culture. To ensure this, the Project will routinely interact with HSSE resources from the HSSE

team. The Team will aim for collaboration and transparency on design features and construction practices.

Savage's HSSE Team for the Project is interfacing and providing resources as follows:

- Coby Long, CSP is the Savage HSSE Director, and is considered a key stakeholder for HSSE related issues for this Project. The PLT will enroll him in relevant issues, successes, and staffing requests.
- Coby Long or approved designee is the Site Lift Authority. He will approve each critical lift plan as well as participate in the Day of Lift review

The Project HSSE Manager is the single point of contact for coordination of these resources.

HSSE Assurance Processes

The Project will use a variety of assurance processes to ensure good HSSE practices will be included in the design. These include;

- Ergonomics evaluation of the unloading rack work station duties using HITRA or other techniques.
- Evaluation of the personal exposures to hydrocarbons for the unloading work activities and determining PPE required.
- Fire Hazard Analysis of the process and the required fire protection systems.
- Hazard Operability (HazOp) studies of the final design.
- Constructability Review of safety issues.

These assurance processes will be identified in the Engineering Schedule to ensure they are completed at the appropriate time.

HSSE Roles and Responsibilities

It is expected that everyone on the Project, regardless of their role, be actively engaged in safety. Personal commitment to uphold the safety values of the Project will be sought from each individual on the Project team.

All Project Team Members

All Project Team Members must:

- Stop work that is unsafe
- Demonstrate HSSE commitment through their actions
- Actively participate in HSSE meetings and Risk Review meetings
- Share lessons learned
- Work in a manner which prevents accidents, eliminates harm to people and does not damage the environment.
- Participate actively in the Project's Risk Identification Meetings
- Understand the Environmental Policy and their role in its implementation.
- Be aware of the potential environmental aspects and impacts of the operation.

- Acquire training as outlined in this HSSE Management Plan.
- Align the Projects overall objectives with Savage's overall safety goals.
- Document field observations

Project Leadership Team

The Project Leadership Team must:

- Lead development of the site specific Project HSSE Execution Plan.
- Ensure that resources are in place to execute an effective HSSE program (i.e. HSSE organization, permitting, training, equipment, qualified personnel, finance and time).
- Develop and assign personnel performance objectives for implementing the HSSE Execution Plan.
- Ensure that Project contractors and suppliers are in alignment with the HSSE goals of the Project.
- Evaluate and select contractors who adhere to the high HSSE expectations of the Project.
- Engaging contractor leadership to ensure their full participation in the HSSE Management of their employees.

Commissioning Team

- Participate and encourage the successful implementation of the HSSE Execution Plan
- Ensure compliance with the Project HSSE Policies.
- Engage in conversations about hazard identification and mitigation.
- Participate in communication with stakeholders regarding Project activities as well as activities that may impact the Project.
- Lead preparation for and communication of the introduction of process hazards into the Project Brownfield site.

Construction Management Team

The Construction Management Team must:

- Schedule work in such a manner to minimize Simultaneous Operations (SIMOPS) risks.
- Document field observations,
- Ensure compliance with and Project HSSE Policies,
- Engage the workforce in conversations about the risk of the work being performed.
- Ensure that task performance remains consistent with the terms of the permit and risk assessments, and intervenes to stop work any time the conditions warrant.

HSSE Team

Project HSSE Team must:

- Listen to field workers concerns and suggestions, ensuring they are addressed appropriately.
- Ensures personal and process safety elements of the Project, from concept through design, construction & commissioning are given their due attention.
- Coordinate with the business unit on environmental permitting requirements.

- Maintain Project HSSE records and documentation.
- Compile Project HSSE scorecard data.
- Monitor and assign responsibility for completion of HSSE action items included in the Project Risk Register.
- Coordinate the input of data into Savage's system of record for tracking incidents.
- Maintain relevant environmental documentation and records.
- Conduct HSSE management and technical oversight for Project's contractors.
- Conduct Project Specific Safety Orientations.
- Daily validation of Brownfield and Non-Brownfield conditions and review of Brownfield and Non-Brownfield site safety conditions.
- Reinforce positive HSSE behaviors and actions of Project personnel.
- Provide HSSE assurance through field and recordkeeping audits.
- Participate in daily toolbox meetings.
- Review risk assessments to ensure they accurately recognize the tasks, hazards and controls.
- Verify implementation and execution of the HSSE Execution Plan, compliance with the Savage Rules of Safety and associated contractor HSSE plans and procedures

HSSE in the Execute Phase

The hazards of the Project are comprised of a combination of existing site hazards along with the hazards and safety risks created as a result of the work scope. The site hazards will vary depending on the exact *location* of the work while the Project hazards vary based on the *nature* of the work. When risk assessing the work, it is critical that both types of hazards are addressed and appropriate controls be put in place to minimize the likelihood on an incident.

Work on the Project has been broken into two categories; OSBL and ISBL. ISBL stands for Inside Battery limits and refers to work that will occur in a designated area in the immediate vicinity of the new Project being built (and outside of the existing perimeter fence). This includes extensive civil work. The vast majority of the ISBL work will occur within an area that has been defined as a "Brownfield" construction site. Although there are operating facilities surrounding the Project, the site itself is comprised of native soils and clean fills. The surrounding facilities are: Keyera, Clark County Public Utilities, Far West Steel, Subaru, BHP Billiton, Clark County Correctional Facility and Cal Portland.

OSBL stands for Outside Battery limits and refers to work that will occur outside the immediate area of the new Project (and inside of the existing perimeter fence). This includes much of the tie-in work that will occur throughout the Facility. This work is often within the battery limits of other operating facilities. It is especially important to discuss site hazards when risk assessing this work. All Port of Vancouver site work practices, policies & procedures must be adhered to for work.

Because of these differences, work rules and safety procedures may vary between OSBL and ISBL. The Control of Work process is one example where significant differences will exist. To

minimize confusion and drive consistency, separate teams will be utilized for execution of ISBL and OSBL work.

Brownfield Site Hazards

The following are recognized as the primary site hazards associated with the Project work location:

Proximity to operating facilities and live rail lines (Fire/Explosion/Spill/Toxic Release)

Project work is occurring directly east of operating facilities as named above. The hazard of operating facilities is a constant exposure. Constant awareness of the nearby facilities will be maintained, and communication plans will be in place to ensure the Project is notified in the event of an operational issue that could result in personnel exposures.

Traffic

The worker/vehicle interface is a recognized hazard. The Project logistics plan must address this exposure by identification of designated walk routes, cross walks and vehicle access points. Significant soils excavation and hauling will be required in this Project. An excavation and hauling safety plan will be developed in the Define Phase after contractor selection. Traffic flow and staging of materials will need to be coordinated to minimize impacts to the Project as well as activities (plot plan with lay down and traffic flow will be developed in Define). Any required closures will need to be coordinated with operations, maintenance and construction to minimize impacts to operations. Construction equipment cleanliness needs to be reviewed to minimize impacts to sewer systems and storm water. We will need to evaluate the need for a contained wash area to minimize mud tracking in the construction sites and on public roads.

Project Hazards

In addition to common construction hazards, the following are recognized as the primary hazards associated with the Project work scope:

Confined Space Entry

Confined space work may occur throughout the Project. Any work that requires personnel entry into drums, tanks, towers, vaults, and trenches deeper than 4 feet, must have a Confined Space Entry permit. Excavations may also require a Confined Space Entry Permit, based on configuration. The HSSE Manager will evaluate all excavations to determine if an entry permit is required. Contractors must ensure that the Attendants and Entrants are adequately trained. The Confined Space Entry Policy will be used for all Project confined spaces.

Each confined space will be equipped with a continuous gas monitor per the Continuous Monitoring policy. Exceptions will need to be approved in advance by the Project HSSE Lead. Also, as part of the Emergency Response and Rescue Plan, all confined space entries will be reported to the Shift Superintendent daily.

Cords & Hoses

Cords and hoses must be routed in a manner to minimize trip hazards and the potential for damage to the cords or hoses from passing equipment and vehicles. When overhead routing is not possible, controls must be in place to increase visibility and prevent damage. At no time must vehicles or equipment be permitted to pass over unprotected cords or hoses.

Elevated Work Platforms

Work from elevated work platforms is common in construction and can reduce the risks associated with building scaffolding or working from ladders for short duration work. At the same time, these tools introduce a variety of risks to the jobsite. Elevated work platforms may only be used for their intended purpose as specified by the manufacturer. They may not be rigged from or used as a crane. Workers must work with their feet on the floor of the basket and wear a full body harness and lanyard fixed to manufacturer provided and approved attachment points in both scissor and boom style lifts. An Elevated Risk Assessment or Risk Assessed Procedure is required for any transfers from work platforms at elevation.

Excavation/Ground Disturbance

The Project has significant scope around the excavation of a large volume of dirt. Extensive underground surveying will be conducted in the area to ensure it is safe to perform excavations in the area. Underground obstructions may exist within the Project boundaries so proper planning and execution of subsurface work is essential. For purposes of permitting any ground disturbance activities, the Project will follow the Excavations, Trenching, and Shoring and Pile-driving policy.

Falling/Dropped Objects

Falling objects pose a risk wherever work is performed at elevation. Control of objects at height via toe boards, netting, proper rigging and tool lanyards is our primary control measure. Secondary controls may include control of personnel working below elevated work. Flagging may only be used as the primary means of falling object protection when other controls have been determined to be infeasible. When flagging is used for falling object protection, the use of red "Entry Requires Special Permission" flagging is required. Each contractor's Safety Execution Plan must address how falling object protection will be achieved.

At a minimum, netting is required on all elevated platforms and scaffolding during construction.

Falls from Elevation

The Project will follow the Fall Protection Policy while working at heights. Contractors will be required to; provide their employees with approved fall protection equipment, ensure that employees are trained and, ensure that they follow this procedure. As part of the pre-task risk assessment, appropriate fall protection and restraint or arrest systems, including appropriate tie off points, must be defined. Fall Protection Policy includes scaffold and ladder specifications as it relates to fall protection and working at heights and must also be followed.

All elevated work, regardless of the height, must be performed from an appropriate ladder or work platform. At no time may work be performed while standing on piping, pumps, buckets, chairs, wooden boxes or other surfaces not designed as work platforms.

Flagging & Barricading

The Project will follow the Policy for flagging and barricading. Barricades and flagging must be removed by the group completing the work as soon as it is safe to do so. Each week, at a minimum, all flagging across the site must be removed and work zones re-established at the start of the next shift.

Hand/Portable Tools

Improper use of tools is a leading cause of injury. Tools may not be modified from their original design and may only be used for their intended purpose. All guards must remain in place while the tool is in use. If an acceptable tool is not commercially available and one needs to be modified or manufactured onsite, a risk assessment must be conducted and be approved by the HSSE Manager.

When equipped with a removable handle, the handle must remain in place unless it creates a physical obstruction. Prior to removal, the task must be documented on the Pre-Task Assessment (PTA) for the work and the PTA must be signed by a contractor safety representative. The handle must be replaced immediately following the task for which it was removed.

When using MAG drills, the power supply must be tagged where the extension cord is supplied power and the drill must be physically secured (chained or strapped) to prevent falling in the event of a power failure.

It is important to have the right tool for the job. The use of cheater bars or double wrenching is expressly prohibited.

Hot Work

The entire Project Non-Brownfield has been classified as a fabrication area. Hot work within the designated Non-Brownfield will not require a Safe Work Permit, continuous monitoring or a dedicated fire watch. However, work areas must still comply with the following;

- Work areas must be free of combustible materials,
- A fire extinguisher or water hose must be available at the work site,
- Sparks must be contained to the immediate work area, and
- Shielding must be adequate to prevent flash burns

Hot work that occurs outside the Non-Brownfield will be managed in accordance with the Safe Work Permits Policy.

Housekeeping

Everyone is responsible that their area is kept in a safe, clean condition at all times. This includes the removal and proper disposal of nails and other debris. Satisfactory working conditions and the safety of all depends upon your housekeeping habits. A deliberate roll back of each work areas must occur daily at the end of the shift. Tools and materials may remain staged, but all debris must be cleaned up and disposed of.

Knives

The improper use of utility and pocket knives is a common cause of injury on construction Projects. This is often the result of using the wrong tool for the task (i.e. stripping wire with razor knifes or knife cutting zip ties). Contractors must actively manage the use of knives and keep their use to a minimum. Wire strippers, side cutters, scissors and safety cutters are generally safer alternatives to knives. When physically possible, these safer options must be used.

When knives are determined to be the most appropriate tool for the task, they must be used with a cut resistant glove. At a minimum, a level 2 (ANSI/ISEA 105-2005) glove must be worn on the opposite hand.

Lifting (Crane)

The Project will follow the Lifting Policy for all lifts. The contractor will be required to fill out any Critical Lift Certificates needed, and provide the technical specifications of the lift. Savage HSSE will facilitate the required Elevated Risk Assessment. The Lift Authority will approve each critical lift prior to commencement as well as participate in the Elevated Risk Assessment.

As part of the Emergency Response and Rescue Plan, all critical lifts that should not be shut down in the case of an evacuation will be reported to the Shift Superintendent. This report must include the names of specific individuals authorized to remain behind to secure the load to a safe position in the event of an alarm.

Personnel under Loads

Personnel access must be restricted while lifting operations are underway. This may be achieved through the use of flagging or spotters. The only time personnel may be under a suspended load is while performing approved multi-lift rigging. At no other time may a person be positioned under a live load. Tag lines must be used to control the load to allow control while maximizing the distance between the handler and the load.

Lifting (Manual)

Improper manual handling of materials cause more injuries than any other work activity. Incorrect lifting is the number one cause of back injuries and also accounts for many hand and foot injuries. Each contractor's Safety Execution Plan must address manual material handling including weight limits for single person lifts.

Mobile Equipment Operations

Safe operation of heavy equipment requires supervision, adequate risk assessment/management, competent operators and proper maintenance of the equipment. Trucking and heavy equipment operations are one of the Projects greatest exposures and will require active oversight. Prior to the start of excavation activities, the contractor must provide a detailed Excavation Safety Plan that includes components to ensure oversight, adequate risk assessment/management, competent operators and proper maintenance of the equipment. At a minimum, yellow high visibility vests will be required for all ground personnel working in the vicinity of mobile equipment operations. Spotters are required for all vehicles and equipment backing. The only exceptions are passenger vehicles backing from designated parking spots.

Personnel Baskets

The use of a crane to hoist employees in a personnel basket is prohibited except when the use of conventional means is determined to pose a greater risk. All lifts using a personnel basket are considered critical lifts. No Personnel Basket lifts are anticipated on this Project.

Pile Driving

If the Project scope calls for the installation of piles will be done in compliance with the Excavations, Trenching, and Shoring and Pile-driving policy, the contractor must develop a Plan that specifically addresses the health & safety issues associated with the pile driving operations, including material handling methods, pile lifting, site logistics, SIMOPS, and PPE requirements.

Powered Work Platforms

All powered work platforms such as Scissors Lifts, JLG, or other must:

- Have a documented written inspection prior to being put into use on site.
- Have a daily pre-user (documented) inspection.
- Have all occupants in a fall protection harness and tied off at all times during lift operation.
- Only be operated by a trained/qualified operator.
  (In the event of an emergency situation anyone can operate ground controls to bring the platform to the ground to assist in exiting the area and or rescue)

Scaffold Requirements

All requirements outlined in the Scaffold Safety policy must be followed for Project scaffolding. In addition, within the Area, the following requirements apply:

- Swing gates must be used at all access points
- Fixed toe boards must be installed around each work platform.
- Netting must be installed to the top rail to provide falling object protection on all scaffold decks
- Green tags indicate a scaffold is complete and there are no identified hazards. Yellow tags must be used whenever hazards exist, such as head knockers, holes in deck, uneven decking, etc. The need for a harness will be determined by the competent

scaffold builder and contingent upon the nature of the hazard. Harness requirements must be noted on the yellow tag.

Slips, Trips & Falls

Slips, trips and falls associated with non-risk assessed activities remains a leading cause of injury within Savage. The construction site will be managed to minimize hazards associated with slips, trips and falls. Designated walk routes must be established and maintained in good condition. Hazardous ground conditions must be immediately corrected, flagged or barricaded. Employees will be prohibited from taking short-cuts through un-improved areas or areas of active construction.

Soil Disposal Plan

This Project may require large quantities of soil to be removed from project site and replaced with structural fill material. As much of this soil as possible will be re-used within the Facility while the balance will be transported offsite to an approved disposal facility. This activity would generate a significant amount of traffic, which must be managed by the selected hauling contractor. Trucking activity has the potential to cause community complaints if not properly managed. The contractor must provide a detailed Excavation, Transportation & Disposal Safety Plan that includes expectations related to onsite stockpile operations and management of issues likely to result in community complaints including truck routing, cleaning procedures and schedule. All soil disposal will be done in accordance to local, state and federal laws.

Safety Activities

A variety of proactive safety activities will occur through the duration of the Project that are intended to help deliver on our goal of no accidents, no harm to people, and no damage to the environment. Our objective is to identify and correct the little things before incidents occur.

Safety Observations

Documentation of field safety observations is expected of the Construction Management, Project Leadership and HSSE Teams. A schedule will be created that will pair Savage and contractor representatives for joint safety tours. The results of these observations will be reviewed and the data analyzed to identify trends or specific items needing attention. These results will be discussed with the Companies involved as well as shared with the Project Safety Team for Project-wide impact.

Compliance Assurance

A primary role of the HSSE Manager is compliance assurance. Their regular field presence and intimate knowledge of both the Project and site HSSE expectations allows for timely and constructive feedback to the workforce. As opportunities are identified, the HSSE Manager will provide coaching and guidance to help bridge any gaps between the Project's expectations and the performance observed.

The Project HSSE Manager will coordinate routine audits of key elements of the contractor's safety programs to assure they are being carried out as described. These audits will be both formal and informal and include reviews of both field activities and supporting documentation.

Investigations

All events requiring formal investigations, including injuries, incidents and near misses, will be entered into Savage's S7i System. All investigations will be coordinated by the Project HSSE Manager. The Project will use the classification system for determining the appropriate level of incident investigation based on the severity or potential severity of the event.

General Safety & Health

The following section outlines additional Project health and safety expectations not identified in the Site Hazards or Project Hazards sections above.

Complacency

Early success can often lead to complacency, where satisfaction is accompanied by a decrease in awareness of actual danger or deficiencies. A concerted effort to address complacency will continue for the duration of the Project. Variation of routine is important. This can include changing formats of meetings, safety stand-downs, etc.

Emergency Preparedness and Response

The Project will coordinate the Emergency Preparedness plans with the Port of Vancouver and Vancouver Fire Department. As such, all conditions of the EPP will apply to the Project.

Emergency preparedness drills will be conducted at the start of the Project to familiarize everyone with the appropriate parts of the emergency response plan.

Exceptions or deviation from Existing Safety Policies

Exceptions from established written Safety and Health procedures at the Project require a formal exception as will be outlined in the Safety Manual. Exception requests cannot be approved if it is in conflict with WISHA or other government laws or regulations. Exception requests related to the Project must be coordinated through the Project HSSE Manager. Recommendation for approval must include the relevant SME. The Project Manager is the approving Manager for all Project exception requests.

Hazard Communication & Access and Control of Exposures to Chemicals-

Contractors must have a written Hazard Communication Program and ensure that their employees and subcontractors have received the required training in accordance with WA DOSH requirements. Contractors will provide the Project HSSE Team with Material Safety Data Sheets (MSDSs) for review and approval for all new chemicals brought in to the. The Project HSSE Team will gain approval prior to the chemicals entering the site.

Contractors must ensure that all containers and properly labeled, secured, and that spill prevention measures are in place.

Industrial Hygiene Assurance and Monitoring

Health for the Project team will be managed by:

- Including health issues as a topic for HSSE review meetings
- Assuring that all Project team members follow site PPE requirements
- Providing training that reviews site specific health hazards (noise, toxic vapors, etc)
- Identifying, assessing, and mitigating health hazards as part of job task risk assessments
- Reviewing any new chemicals brought on site.
- Conducting Industrial Hygiene audits (Health Team)

Line of Fire

On nearly every job there is something which could hit, spray, pinch or crush. The first priority should be to eliminate these hazards. If this is not possible, we want people to focus on moving themselves out of the line of fire. Awareness training on "Line of Fire" recognition must be included in each contractor's Project specific safety training and covered in toolbox meetings.

Management of Change

Temporary and permanent changes to organization, personnel, systems, process, procedures, equipment, products, materials or substances cannot proceed unless a Management of Change (MOC) process is completed. This must include:

- a risk assessment conducted by all areas impacted by the change
- development of a work plan that clearly specifies the timescale for the change, and any control measures to be implemented regarding:
    - equipment, facilities and process
    - operations, maintenance, inspection procedures
    - training, personnel and communications
    - documentation
- authorization of the work plan by the responsible person(s) through completion

The Project will meet the requirements of major projects, including application of Management of Change from the Define Stage HAZOP through Execute and turnover to operations. All changes to equipment and facilities will follow the Project's Change Management Procedure. If the change is considered to impact safety, the existing Management of Change procedure must be used for the ISBL as well as the OSBL.

Personal Protective Equipment (PPE)

All Project employees must use approved safety equipment and maintain equipment in accordance with OSHA and Savage requirements. For contractor personnel, the PPE requirements for the Project will be reviewed at the new hire orientation. Personnel must be trained on the use of any required PPE before beginning work.

In addition to the requirements outlined in the procedures above, the Project has the following PPE requirements:

- High visibility vests will be worn by all personnel in the Brownfield and Non-Brownfield. Requirement to wear vests may be waived by the Project HSSE Manager as conditions warrant.
- Dust goggles are required under face shields when chipping or grinding concrete and are also required when working in dusty or dirty conditions.
- Face shields must be worn over safety glasses when using impact guns, grinders, or other particle producing tools or work.
- Workers full names must be visible on the front of their hard hats
- Fire Retardant Clothing (FRC) will not be required for the portion of the work until hydrocarbons are introduced.

Safety & Health Policies

Other Safety and Health Policies may be applicable to the Project. Prior to mobilization in the field, each contractor must perform a gap analysis to identify discrepancies between their policies and the policies or expectations. The gaps will be evaluated and the final decisions will be agreed and documented prior to commencing work in the field.

Simultaneous Operations

Because of the high density of work that will occur on the Project, management of Simultaneous Operations is an essential element of our safety program. Initial risk assessments often occur well before the day of work and various tasks in the same area may be risk assessed by different people. It is often hard to predict what other work may be occurring on the day work will be executed. For this reason, it is essential that a review of Simultaneous Operations occur as part of the Pre-Task Assessment (PTA) before each and every job task is started. Coordination and communication between adjacent crews is essential to the safe execution of the work. This coordination and communication is an essential element of the permit to work process.

Workers are expected to periodically review and update their PTA cards as needed throughout the day. Changes in hazards, including new SIMOPS, should be documented.

Smoking Policy

In accordance with the Smoking Policy, smoking is prohibited inside the fence line, and on Savage property except for specially marked areas located in the parking lots. The purpose of this policy is to control ignition sources within the Facility as well as reduce exposure of personnel to harmful second hand smoke. Smoking is permitted only is specially marked areas and smoking material must be left in vehicles or in the break facilities. Smokers are required to minimize the amount of time spent in smoking areas and are asked to keep the areas clean.

Transportation

As outlined in the Transportation and Traffic Safety Policy Savage standards and Federal security regulations require stringent processes for limiting the number of vehicles in the to

only those necessary for safe and efficient operations. If there is any means of transportation other than a personal vehicle that will allow you to do your job safely and effectively, you are expected to use it. This may include using a company vehicle, taking the shuttle, walking, or riding a bicycle.

Contractors bringing company vehicles inside the fence requires prior permission from the Senior Project Manager or Construction Manager. Drive-in access determinations will be based on an assessment of role, need and primary work location and controlled through the individual's Vancouver ID badge. The Security Superintendent has the authority to grant or deny the request for drive-in access.

Driving a vehicle on Savage property requires completion of the Safe Driving Training video. While driving on Savage property, all vehicle occupants must wear seat belts at all times. Additionally, the driver is not to use two-way radios or cell phones while driving. If the driver is to take a call or use a radio, he or she must pull over prior to doing so. Use of personal vehicles inside the fence is prohibited unless special permission is obtained from the Senior Project Manager.

If the Evacuation Alarm sounds, pull over the vehicle immediately, turn off the engine, and walk to the safest evacuation area. Do not to drive the vehicle until the All-Clear has sounded.

BNSF Track Operation

Contractors operating equipment near the BNSF Track should stay 150 feet from the nearest rail. Barricades should be put up off the BNSF right of way indicating where the contractors and their employees can work safely.

Prior to beginning work on live track the contractor-In-Charge must notify a BNSF representative of the need, and specifically the location where the work will be done. A job briefing must be conducted with the Railroad representative. Referenced in 49CFR214, Subpart C, which requires some form of On-Track Safety briefing prior to fouling any track.

If contractors have to work within the BNSF right of way contractor employees need to have the BNSF safety training.

- Rail Security Awareness Training
- Contractor Orientation Training

Contractors Working Around Live Tracks

Contractors must follow the following policy when working on or around live track:

- Green, Yellow/Red, and Red Flag Protection must be used on live tracks to warn train crews of men or equipment working on or around the track.

- Always be on alert to moving equipment. Contractor employees must always expect movement on any track, at any time, in either direction.
- Do not walk or step on the top of the rail or any other track components
- In passing around the ends of standing cars, engines, roadway machines or work equipment, leave a minimum of 25 feet between yourself and the end of the equipment. Do not go between equipment if opening is less than 50 feet.
- Before crossing over tracks, look in both directions.
- Do not sit on, lie under, cross over between cars.
- No tools or equipment are left close to any live track.
- All contractor employees must have and be wearing identification.
- All contractor employees must be wearing the proper Personal Protective Equipment.
- All Project employees will attend the Port of Vancouver's Rail Safety Training.

Contractor's equipment must be safe to operate if equipment is not safe to operate the equipment must be removed from the site.

Treatment of Injuries

Contractors must provide the means to provide first-aid and keep appropriate first aid supplies readily available. Savage employs a medical service PC365 to be used as well when dealing with non-critical injuries. Emergency Medical Technicians are also available around the clock to assist as needed through the Vancouver Fire Department, Station 1.
All injuries, regardless of the severity, must be reported to Savage per the guidelines outlined in the Incident Reporting section of this document.

Control of Work

The majority of the Project scope of work will be conducted within a defined and controlled area identified as the "Brownfield".

Brownfield Permit to Work

The majority of the Project scope of work will be conducted within a defined and controlled area identified as the "Brownfield". A risk assessment was conducted to identify the boundaries of the Brownfield. In general, this area contains no process hazards or non-construction energy sources. With the absence of these hazards, the risk profile of the work site changes, allowing the use of a specialized Permit to Work procedure more appropriately designed for managing construction risks. The Brownfield Permit to Work Procedure will be used as the basis for all ISBL work in the Petroleum Rail Project. It will be modified as needed to address the specific hazards and needs of the Project.

Non-Brownfield Work

Project work to be conducted outside of the defined boundaries of the Brownfield and within the fence line will be performed under the Port's standard Control of Work Policies.

The Project team will use the unit's existing Area Authority for permitting activities. The detailed permit issue process will be documented and communicated to the construction contractors prior to field activities commencing.

Energy Isolation

To maintain Brownfield condition, Lock Out Tag Out (LOTO) Policy requires that all hydrocarbon process piping to remain physically separated (air gapped) from the existing systems. It also requires that all other systems remain air gapped or, a detailed isolation strategy to be developed for the system.

The Project will follow the Electrical Safety Policy and Control of Hazardous Energy Procedure (LOTO). We will also adhere to the Blinding Policy. Energy isolation must be considered during the development of individual job packages, with consideration toward any source of electrical, hydraulic, mechanical, pneumatic, chemical, thermal, or any other energy connected to a source.

Connections to utilities (utility water, potable water, temporary electrical power, firewater, plant air & instrument air) can be made within the Brownfield for field checks and hydro testing without impacting the Brownfield status, provided approved procedures are in place to manage the energy source. These connections must be coordinated with the unit Operations Representatives. All other systems must remain isolated utilizing an air gap.

Operations will define isolation requirements for each system prior to turnover. Upon turnover, Operations will assume ownership of the master isolation and blind list.

Risk Assessments, ASAPs

All risk assessments will be developed by the contractor performing the work, with input from Savage. JSAs will be done as tasks are identified in the Execute Stage. Any Abnormal Safety Assessment Plan (ASAP) will be done using the Savage Vancouver ASAP procedure #150 (see references at the end of this document for location of current procedures).

Security

The Facility is a Maritime Transportation Security Act (MTSA) as well as a CFATS and DOT regulated facility. The Project will comply with all site security requirements.

Project Access

All workers will be issued a Savage ID badge for entry and access into the ISBL area, and are required to keep this badge on them at all times. In addition, a Project specific decal will be provided to individuals who have completed the Project specific orientation. This decal is required for unescorted access within the defined Project boundaries.

Transportation Workers Identification Credential (TWIC)

A valid TWIC card is required of all individuals entering the Facility. There are no exceptions to this requirement for Project workers. Individuals without a TWIC card require an approved escort. TWIC cards do not have to be carried on the workers person in the field. Access to the TWIC Zone must be done in accordance to the Port of Vancouver Facility Security Plan.

Project Escort Requirement

Individuals who have not received Project specific orientation must be accompanied by an individual who has had this training. This requirement is Project specific and in addition to the requirements outlined in the Escort Policy.

Traffic Control/Blockage of Roadways

If a roadway must be blocked or access restricted as a result of Project work, advanced planning and notification to stakeholders is required. The Project will follow the policy for Road Closures. All road closures and traffic control activities will be coordinated through the Project HSSE Lead or his delegate.

Tools & Materials

Any tools, materials or equipment being brought out of the Facility require an authorized Material Gate Pass. These passes may be obtained from the Project HSSE Lead. All items are subject to inspection prior to release.

Environmental Compliance

The Project is committed to socially and environmentally sound operations. We will undertake our activities in a manner that is environmentally responsible with the aspiration of "no harm to people and no damage to the environment."

Permitting Overview

Permitting will be handled by the Savage Environmental department and will include the appropriate EFSEC permitting as well as required Federal Permits

All permit conditions applicable to operation of the new equipment will be included in the training materials.

Soil

A detailed plan will be developed for the management of soil being excavated for this Project. Fill material will be segregated and managed separately from native soils. An environmental representative will be onsite as needed during excavation to help distinguish between these materials. Potholing will be conducted near the BNSF track, and at selected locations within the Brownfield area. Soils that are subject to Restricted Covenants must be separated from non-impacted soil, and disposed of according to the waste management plan.

Storm Water

A detailed plan will be developed for the management of storm water from the Project site. Prevention of contamination is crucial. Any hydrocarbon or chemical spills, regardless of the size, must be reported to the Project HSSE Lead. This includes fuel, engine and hydraulic leaks from equipment. Minimization of sediment entrainment is also a high priority. This is accomplished through the use of Best Management Practices (BMPs). Diversion of storm water from the site in a manner inconsistent with the plan is prohibited.

One of the specific BMPs required on the Project is the placement of secondary containment under all bulk chemicals and gasoline or diesel powered portable equipment in all areas that do not drain to the oily water sewer. Self-propelled mobile equipment is exempt from this requirement.

Recycling

A recycling center will be established within the Project site. It is important that any recyclable materials remain free from contaminants and be placed in designated containers. The recycling center will have containers for the collection of aerosol cans, aluminum cans, small metal, safety warehouse returns, plastic, glass and cardboard.

Portable Equipment

Notification to the Project HSSE Lead is required for temporary emission sources and any portable engines exceeding a prescribed limit that are used in the Project, to determine potential regulatory impacts.

Waste

The Project Management team will assure that all design and construction work for the Project considers the environmental compliance requirements of Federal, State, and local agency permits as well as all Savage Group Defined Practices.

Incident Management

All incidents are preventable. In order to achieve World Class HSSE performance, each incident that occurs must be reported, reviewed and the learnings shared. The process outlined in the Incident Investigation, Notification and Reporting Policy will be followed during the Project.

Any work-related safety incident, including first aid, must be reported immediately. The following notifications are required:

- Savage Shift Supervisor
- Project HSSE Lead, who will coordinate entry into S7i

A written incident report is required to be submitted by **the *end of the current shift*** for all injuries, including first aid incidents. Determination of OSHA record keeping requirements will be the responsibility of the Company incurring the injury.

Types of incidents where reporting is required include; workplace injuries and illnesses, vehicle accidents, spills, environmental releases, near hits, major incidents (MIAs) and high potential incidents (HIPOs).

A detailed investigation should be carried out for all serious or major incidents (injury, illness or damage) and any minor accident or near-miss that had a high potential of being a major one. Less serious incidents should be investigated with a degree of rigor appropriate to the potential for loss or injury. The principles employed are the same.

A Project team contact list and emergency contact information can be found in Appendix A of this plan.

Shared Learning

It is the intent of the Project to incorporate lessons learned from both internal and external sources. Specific effort will be made to capture lessons learned on our own project. Learning will be shared widely across the Project in a timely manner so they may be incorporated into pre-task planning, design and constructability and education and training materials.

HSSE Lessons Learned

The learning from safety performance reviews, audits, investigations, and verification activities must be documented and used in improving future performance.

- Learning will be systematically captured and subject to periodic formal review to identify system improvements for future activities.
- Contractors will be included in sharing of lessons learned and encouraged to share lessons from their activities.
- Specific effort must be made to solicit feedback from frontline employees on best practices observed along with ways to improve processes and reduce the risk associated with future work activities.

When a contractor's work has been completed, the Project Team will evaluate major contractors' HSSE initiatives and performance and provide feedback on effectiveness at the close of the contract.

The Project HSSE lead will document and implement the Project's safety lessons learned.

Monitoring Performance

HSSE performance metrics (leading and lagging) indicators are established and communicated throughout the Project organization. Project leadership regularly reviews the HSSE performance metrics to determine progress against objectives and targets and what management system changes are necessary.

Key Performance Indicators

Reporting will be consistent with requirements for the Vancouver reporting system already in place. The Project HSSE Lead will report this data on a weekly basis for incorporation with the overall statistics.

Inputs to be tracked and reported:

- Safety training provided for every employee working on the job site
- Observation audits / theme audits conducted and action items closed
- Joint field audits by Savage and contractors
- Incident investigations completed
- To be decided

Outputs to be reported:

- Hours Worked
- Major incidents and High Potential incidents
- Injuries/Illnesses
- Near Misses
- Environmental incidents

General Performance Monitoring of Contractors

HSSE performance and compliance must be measured and reviewed on a regular basis during execution.

- Regular performance reviews of each contractor should be established, with appropriate senior and line management attendance.
- Subcontractor performance and compliance should be visible and verified.
- Contractors are accountable for reporting of all incidents incurred by their subcontractors.
- Contractors delivering outstanding safety performance should be considered for positive recognition.
- Contractors that fail to deliver the required performance improvement, or experience further breaches of the safety boundary conditions, should be considered for reduced work share, suspension, or contract termination, depending on the severity of the breach.

HSSE Rewards and Recognition System

Working safely is a base expectation of everyone on the Project. Simply doing so will not be a basis for reward on the Project. Instead, the PLT is looking to recognize and reward individuals who go above and beyond this base expectation and become actively engaged in delivering an outstanding outcome.

The reward and recognition program for the Project will use a variety of methods to recognize individuals, including periodic giveaways at the discretion of PLT. Only individuals providing

direct support to the Project are eligible to receive Project Safety Rewards. In establishing reward criteria, the following guidelines must be used:

- Rewards should promote discretionary behaviors that are above and beyond base requirements.
- Preference is for individual recognition/employee participation. Although at times, team or small group recognition can also be appropriate.
- Specific action by the individual should be required for the individual to receive the reward.
- Rewards should be based on leading indicators, not results.

Safety Leadership Award

A "Safety Leader of the Week" program will be established to recognize the individual or crew that best demonstrated the Extraordinary Safety Leadership Behaviors. Individuals may be nominated by anyone using a simple nomination card available in the lunchroom and in the permit trailer.

Reporting Recognition

"Thank You" reward cards will be given to individuals who identify, address and report near misses, unsafe conditions or unsafe behaviors on Project Make a Difference cards. We will also reward individuals that recognize best practices, make H&S suggestions or share process safety or quality concerns. These reward cards can be redeemed for a variety of nominal gifts or collected towards higher valued items.

Great Catch Program

The quality of items submitted is more important than the quantity. To promote quality reports, a "Great Catch" program will be established. Special awards will be made to individuals who submit reports on items that were especially difficult to identify, provide high learning value or may have resulted in a significant impact if unidentified. Great Catch awards will be issued at the weekly all-hands meetings so the learning can be shared across the Project.

Milestone Recognition

Milestone recognition may include proactive measures of safety activities in addition to the traditional recognition of the results (i.e. hours worked without incident). In general, targets will not be promoted ahead of the milestone. In addition, associated recognition programs must be structured to ensure they do not discourage incident reporting.

Company Specific Recognition Programs

In addition to the general recognition program outlined above, each contractor, at its discretion, may operate company specific safety recognition programs. These programs are independent of Savage and should be managed exclusively by the contractor company. To comply with Savage Code of Conduct and IRS requirements, at no point may cash or cash equivalents (i.e. gift cards, gas cards, etc) be exchanged between Savage employees and contractors.

Commissioning

Commissioning consists of the period after System Turnover has been achieved, but before Start-Up. System Turnover is complete when; Pre-commissioning activities have been completed and documented, System turnover documentation (including Non-Destructive Examination (NDE) and other field Quality Control (QC) records) are delivered to the Quality Assurance Manager and Project Turnover Coordinator, "A & B" punch-list items have been completed, and the immediate respective work areas are left in an uncluttered clean condition with all combustible materials removed. Commissioning includes those activities connected with operating equipment or facilities to prepare them for a safe, reliable start-up. This can include steam blows, system purging, introduction of inert fluids and utilities, chemicals loading, trip and alarm testing and final checking of system tightness and cleanliness.

Operations and Maintenance Competency Assurance

The Project Team will interface with operations and maintenance to ensure that existing or new personnel are capable of performing the jobs and are adequately trained to do so. Operating and maintenance procedures and training requirements will be developed prior to commissioning.

Commissioning and Hand-over Requirements

During commissioning planning, environmental aspects and impacts of the commissioning activities should be evaluated.

Prior to the commencement of commissioning activities, training requirements for the commissioning team should be established and training completed. In addition, all work procedures should be evaluated for compliance with Savage HSSE expectations and any deficiencies corrected. A HITRA will be performed on the actual off-loading work activities to ensure that ergonomic and other safety exposures have been addressed. Personal exposure monitoring will also be conducted during the off-loading operation to document health exposures and the selection of proper PPE.

The Commissioning Team will incorporate HSSE into commissioning and handover planning, procedures and systems.

Pre-Startup Safety Review (PSSR)

Prior to start-up of a system, a pre-startup safety review of the system will be performed and documented, and all deficiencies will be corrected.

Pre-startup safety reviews (PSSR) are conducted to ensure construction of the Project is complete, and all training, procedures, documentation, and programs are in place and ready for safe startup and operation. All findings, recommendations and open actions from the PSSRs MUST be completed and closed out before equipment commissioning begins.

Process Safety Information

The Project Team will compile and supply the following process safety information to the Operating Team and the Document Control group:

- Safety Critical List of Equipment (Protective Devices Register)
- Process Flow Diagrams (PFDs)
- Piping and Instrumentation Diagrams (P&IDs)
- Electrical Area Classification Drawings
- Plot Plans
- Electrical One Line Drawings
- Shutdown and Interlock Drawings
- Cause and Effect Drawings (Alarm and Shutdown Drawings)
- Relief Valve Basis and calculations
- Process Equipment Data Sheets
- Other Data Sheets (Utilities, MSDSs, etc.)

Start-up, Operating & Maintenance, and Emergency Procedures

Practices and procedures must be documented to ensure operations are carried out under specified conditions and in a consistent manner. These instructions should be up to date, clear, concise and unambiguous.

The Commissioning Team will provide instructions for start-up, normal operation, planned and emergency shutdown and preparation for maintenance, as well as any other OSHA Process Safety Management (PSM) required operating procedures. The format and content will be consistent with Savage's PSM requirements and Vancouver operating and maintenance procedures.

Appendix 1: Emergency Contact List

Emergencies		**xxxx or xxx-xxxx**
Battalion Chief		**xxxx or Radio Channel xx**
Shift Super		**xxxx or Radio Channel xx**
Security		**xxxx or Radio Channel xx**

_____ Construction Team

_____	Construction Coordinator	xxx-xxx-xxxx
	Project Engineer	
_____	HSSE Field Coordinator	xxx-xxx-xxxx

_____ Construction Team

_____	Construction Coordinator	xxx-xxx-xxxx
	Project Engineer	
_____	HSSE Manager	xxx-xxx-xxxx

Project Leadership Team

Dave Corpron	Projects & Const Manager	801-944-6600
Boyd Draper	Sr. Project Manager	801-944-6600
Coby Long, CSP	Project HSSE Manager	801-944-6600
_____	Commissioning Manger	
_____	Tech Services Manager	
_____	QA/QC Lead	

List of contractors Below

_____		
	Sr. Project Manager	360-
	Asst. Project Manager	360
	Const Superintendent	360-
	Safety Manager	360-
_____		
	Project Manager	360-
	General Superintendent	360-
	Safety	360-
_____		
	Project Manager	360-
	General Superintendent	360-

	Safety Lead	360-
	Project Manager	360-
	Site Manager	360-
	Safety Manager	360-

Appendix 2: Project Site Map

Appendix 3: Brownfield Sign-In Expectations

The purpose of the sign-in / sign-out requirement is to provide the Project with documentation of who has permission to be onsite within the Tesoro Savage Petroleum Terminal Project Brownfield and to describe the requirements for controlling and recording access to the area.

These expectations apply to any person entering the Permit Trailer located _____.

NOTE: Project specific orientation is required for all individuals prior to entering the Brownfield area unescorted. Visitors without Project Specific Orientation must be escorted for the duration of their visit by an individual that has received the project specific orientation.

1. Sign in is required immediately upon arrival to the site. Once onsite, travel must be directly to the Project Permit Trailer to sign in prior to any work or site walks being performed.

2. Sign out is required at the end of the shift or when leaving the site for an extended period of time.

3. When the Project Permit Trailer is not staffed, individuals visiting the site that are not assigned to the project full-time must contact the HSSE Manager via radio to inform them that you will be entering their area. The HSSE Manager will provide an update of site conditions and/or restrictions.

4. Once signed in, short trips outside the Brownfield, including breaks and lunch, will not require sign out.

5. Work groups that are entering the area may be signed in by their Foreman or the Foreman's designee. Sign in will include foreman or designee's name and crew size. Example: Matrix, John Smith + 4.

6. There are no exceptions as to personnel required to sign in or out of the area.

Appendix 4: Incident Reporting Form

To be determined in conjunction with Tesoro Savage Petroleum Terminal LLC

Appendix 5: Safety Team Terms of Reference

I. Vision
A self-directed cross-functional safety team that is actively engaged in reducing the risks associated with field construction activities.

II. Objective
The objective of the Project Safety Team is to promote a proactive approach to safety and health on the Project and to improve the effectiveness of the Project's overall safety program.

To advise and consult Project leadership on safety and health issues related to the Project.

III. Scope
The team's scope includes health & safety concerns associated with field construction activities related to the Project that are performed onsite at the Vancouver. This includes both OSBL and ISBL work as defined in the Project HSSE Execution plan.

IV. Deliverables
a. Field Audit Reports will be used to document audit activities.
b. Minutes will be kept at each team meeting.
- Previous meeting minutes and audits will be reviewed at the team meeting to determine if any issues remain outstanding
- All reports, audits, evaluations and recommendations of the team will be made part of the minutes of the safety team meeting

c. An action item register will be maintained to ensure closure of issues identified
- A reasonable time will be established for Project management to respond in writing to all safety team recommendations

V. Safety Team Formation and Membership
a. The Team will be comprised of both craft and management representatives.
b. Team members will be volunteers Sub contractors with contract duration of ninety (90) days or longer will be represented on the Team.
c. Employee representatives must serve a continuous term of at least four (4) weeks on the team. At the end of the fourth week the employee representative must bring his/her replacement to the meeting to assume his/her duties.
d. Reasonable efforts must be made to ensure that team members are representative of the major subcontractors and/or major work activities in progress.

VI. Stakeholders
a. Project Workforce

Project employees will be given the opportunity to actively participate in safety team activities by:

- Volunteering to serve as a team member
- Participating in field auditing activities conducted by the team
- Completing Observation forms and turning them it in to any safety team member.
- Suggesting improvements to the safety program to their respective team representative for consideration.

b. Project Leadership Team

The PLT recognizes the value of these teams and the empowerment they provide the contractors. The PLT will support the efforts of the team and provide guidance when necessary to ensure the team is successful at meeting its objective.

VII. Safety Team Duties and Functions

a. The team will elect a Chairperson from within their ranks at their first meeting.
b. The team will develop a written agenda for conducting safety team meetings. The agenda will prescribe the order in which team business will be addressed during the meeting.
c. The team will hold regular meetings and perform job audits on a bi-weekly basis. The team will document site audits and transmit them to Project HSSE Lead with recommendations for changes.
d. The team will review all accidents and near misses and recommend corrective actions to prevent a reoccurrence.
e. The team will follow up on their recommendations to ensure corrective actions have been implemented.

VIII. Hazard Assessment and Control

Safety Team will:

a. Establish procedures for auditing field construction activities to locate and identify safety and health hazards.
b. Conduct field audits on a weekly basis.
c. Establish procedures for reviewing the Project HSSE Incident Log and informal reports of hazards from Project employees.
d. Make recommendations for improvement to Project Management, based on those reviews.

IX. Accident investigation

The safety Team will establish procedures for reviewing all safety related incidents including injury accidents or illnesses. At least one member of the Safety Team must participate in the investigation of near misses and/or incidents associated with field construction activities.

X. Safety and Health Training and Instruction

The following items must be discussed with all new safety team members:

a. Safety team purpose and operation
b. Methods of conducting safety team meetings
c. Safety team members must receive training in:
- Hazard identification in the workplace
- Principles regarding effective accident and incident investigation

XI. Delegation of Authority

The safety team has no fiscal or policy authority. For activities or initiatives requiring financial support, a request for funding will be submitted in writing to the Project HSSE Lead.

Recommendations for policy or procedure changes must be submitted in writing to the Project HSSE Lead for consideration.

Appendix 6: Gas Detection Overview

General Requirements
As outlined in the Hot Work Policy, within the Project Brownfield is exempt from the requirement for continuous LEL monitoring. In addition, the area is exempt from the use of personal H2S monitors. The Brownfield area maintains an electrical classification of General Purpose and there are no process hazards present within the Brownfield.

The most likely source of flammable or toxic gas within the Brownfield is an uncontrolled release from an existing operating unit. The potential for a release to reach dangerous levels within the Brownfield was assessed and determined to be very low, but plausible.

Controls in place to manage this risk include the formal communication plan in place between the Project and the Operations Shift Supervisor, existing LEL & H2S gas detection within the existing units & the area-wide alarm system.

The Project has no requirements or agreements to maintain general area or perimeter gas detection. Continuous gas monitoring remains required for all confined space work. There are no variances in place for confined space entry work within the Brownfield. Continuous monitoring is required for all confined space entries.

Appendix D.12

Operations Facility Safety Program

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Vancouver Energy Operations Facility Safety Program

Plan No. OP.02 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 30 April 2015

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Vancouver Energy
Operations Facility Safety Program

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	30 April 2015	Submittal for Application Review

Vancouver Energy
Operations Facility Safety Program

Table of Contents

Section

1. Project Description
    1.1 Purpose of Plan
    1.2 Regulatory Requirements
    1.3 Related Documents
    1.4 Operations Safety Program Overview
2. Operations Rail Operating Safety and Maintenance Plan
3. Emergency Response Plan and Security Plan
    3.1 Emergency Response Plan
    3.2 Security Plan
4. Distributed Power Training
5. Locomotive Daily Inspection
    5.1 Road Power Daily Inspections
    5.2 Savage Locomotive Daily Inspections
    5.3 Train Air Brake Test and Inspection
6. Cardinal Rule Training
7. Managing Fatigue
8. Procedures
    8.1 Crude Oil Transfer Railcar to Manifold Procedure
    8.2 Tank Car Inbound Inspection Procedure
    8.3 Tank Car Outbound Inspection Procedure
    8.4 Baseline Procedures
    8.5 Site Specific Rules – Hot Work Permit
    8.6 Site Specific Procedures – Hydrogen Sulfide Detection
    8.7 Genie Z45/25 Aerial Lift Certification
    8.8 Train Air Brake Tests and Inspections
9. SHAPS
10. Safety Topic of the Week
11. Rail Bulletins

12. Ergonomics and Back Safety
13. Miscellaneous Forms
    13.1 Black Thunder Miscellaneous Replacing the Truck Tire
    13.2 Communications Meeting Form
    13.3 Confined Space Work Permit
    13.4 Hot Work Permit
    13.5 Report of Satisfactory Initial Terminal Air Brake Test
    13.6 Visitor Sign-in Log
14. Waste Management and Disposal
15. Lockout/Tagout Procedure
16. Fire Protection Plan

List of Figures

Figure 1. Site Plan..... 5
Figure 2. Operations Management Hierarchy..... 6

1. Project Description

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility operates 24 hours per day, 7 days per week.

1.1 Purpose of Plan

This operations facility safety program describes how the Facility will provide necessary instruction and guidance for the health and well-being of the facility, staff, contractors, and visitors.

1.2 Regulatory Requirements

This programmatic plan is written as a guide to address the broadly applicable health and safety requirements of Washington Administrative Code (WAC) Title 296, as administered by the Washington Department of Labor and Industries. Where applicable, federal regulations of the Occupational Safety and Health Administration (OSHA) found in Chapter 29 of the Code of Federal Regulations (CFR) are also cited.

1.3 Related Documents

Finally, because operation of the Facility will occur while portions of the Facility are under construction, the following documents and plans implement safety measures and procedures relative to construction activities.

- Contaminated Media Management Plan (CMMP)
- Construction Safety and Health Manual (CSHM)

1.4 Operations Safety Program Overview

1.4.1 Principles and Goals

The following principles guide the collective Facility team in all Facility operation activities.

- There is no task so important that the time cannot be taken to do it safely.
- People are our most important asset.
- Communication is the key to injury prevention.
- All injuries, property damage, and environmental incidents are preventable.
- Everyone is expected to stop unsafe work.
- Near miss reports are a gift. Elimination of little things prevents larger things from occurring.
- Addressing safety in the planning phase of a job saves time and prevents incidents.

- Effective safety management and leadership are good business.

The Certificate Holder requires that all direct employees and contractors abide by applicable regulations as well as the guidelines described in this Plan.

Our goals are simple:
No accidents
No harm to people
No damage to the environment

1.4.2 HSSE Organization

The Certificate Holder is contracting with Savage Companies to and Tesoro Maritime Company to manage operations of the Facility. The Vancouver Energy Team relies upon corporate health, safety, security, and environmental (HSSE) expertise, and employs its own Facility Security, Health, Environmental, and Quality (SHE&Q) manager. The Facility SHE&Q manger, the operations manager, maintenance manager, and general manager together form the overall Facility HSSE team. Figure 2 illustrates the operations management organizational chart for the Facility.

The Certificate Holder is committed to providing sufficient HSSE resources for the duration of the operation of the Facility. The Certificate Holder employs a dedicated Facility SHE&Q manager whose focus is to lead the development and delivery of operations HSSE requirements in a consistent and effective manner to achieve outstanding HSSE performance.

1.4.3 HSSE Systems and Procedures

Multiple proactive safety activities occur through the duration of Facility operations. These include, but are not limited to, reporting and documentation, investigations, audits, personal protective equipment, training and orientation, communication, hazard communication and task specific procedures. HSSE systems and procedures are described in detail in Section 2 and following of this plan.

1.4.4 Compliance Assurance

A primary role of the SHE&Q manager is compliance assurance. Their regular presence and intimate knowledge of the SHE&Q manager and other facility management and supervisory personnel allows for timely and constructive feedback to the workforce. As opportunities are identified, the SHE&Q manager provides coaching and guidance to help bridge any gaps between the Facility's expectations and the performance observed.

The Facility SHE&Q manager coordinates routine audits of key elements of the contractor's safety programs to assure they are being carried out as described. These audits are both formal and informal and include reviews of both operations activities and supporting documentation. Safety metrics are tracked and reported, including but not limited to: hours worked, major incident assessments and high-potential incidents, injuries/illnesses, near misses, environmental incidents.

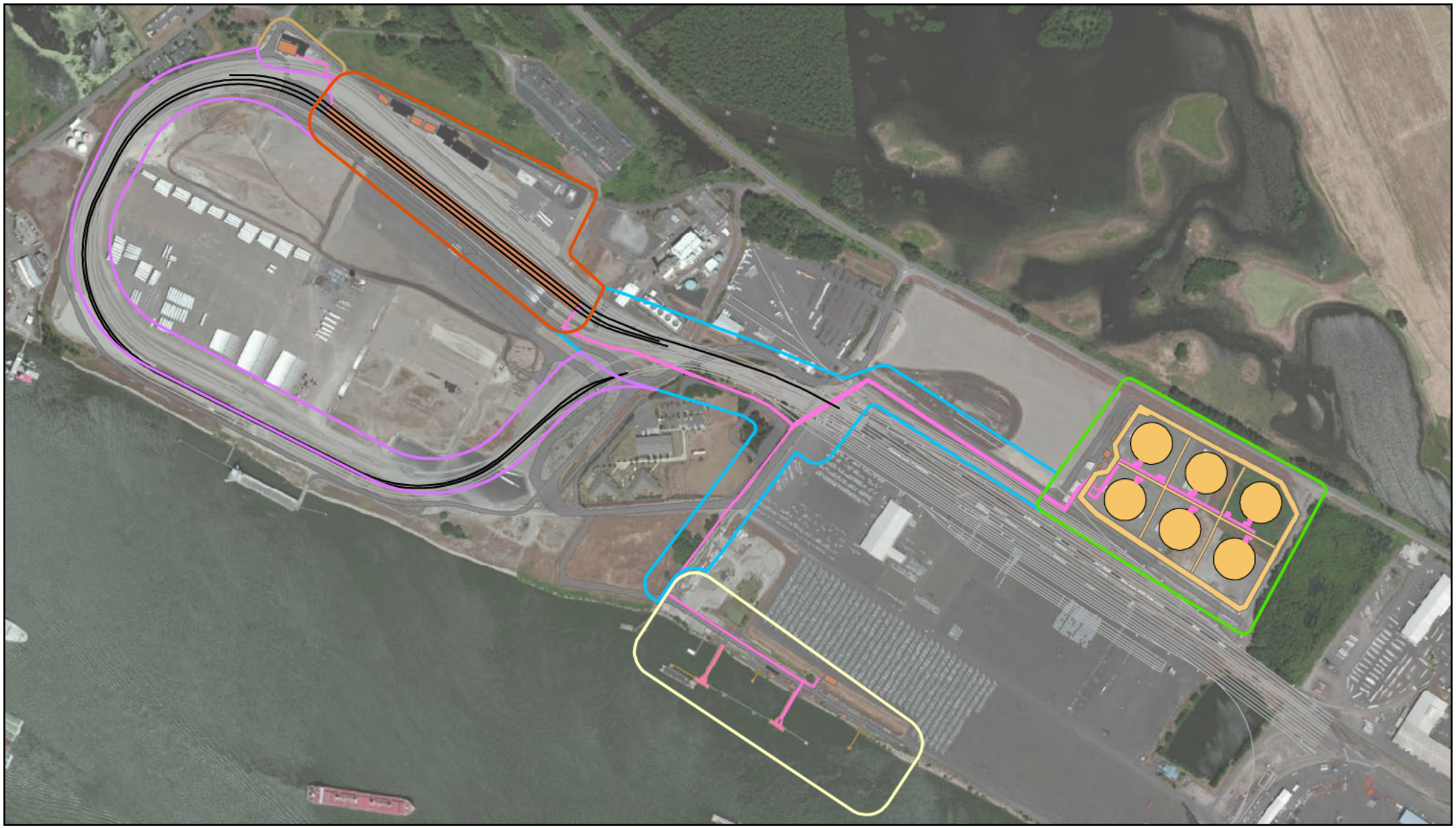


Figure 1 - Site Plan

Proposed Project Facilities

- Containment Berm
- Storage Tank
- Rail
- Roads
- Parking
- Marine Terminal
- Building
- Pipeline

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000
Feet

N

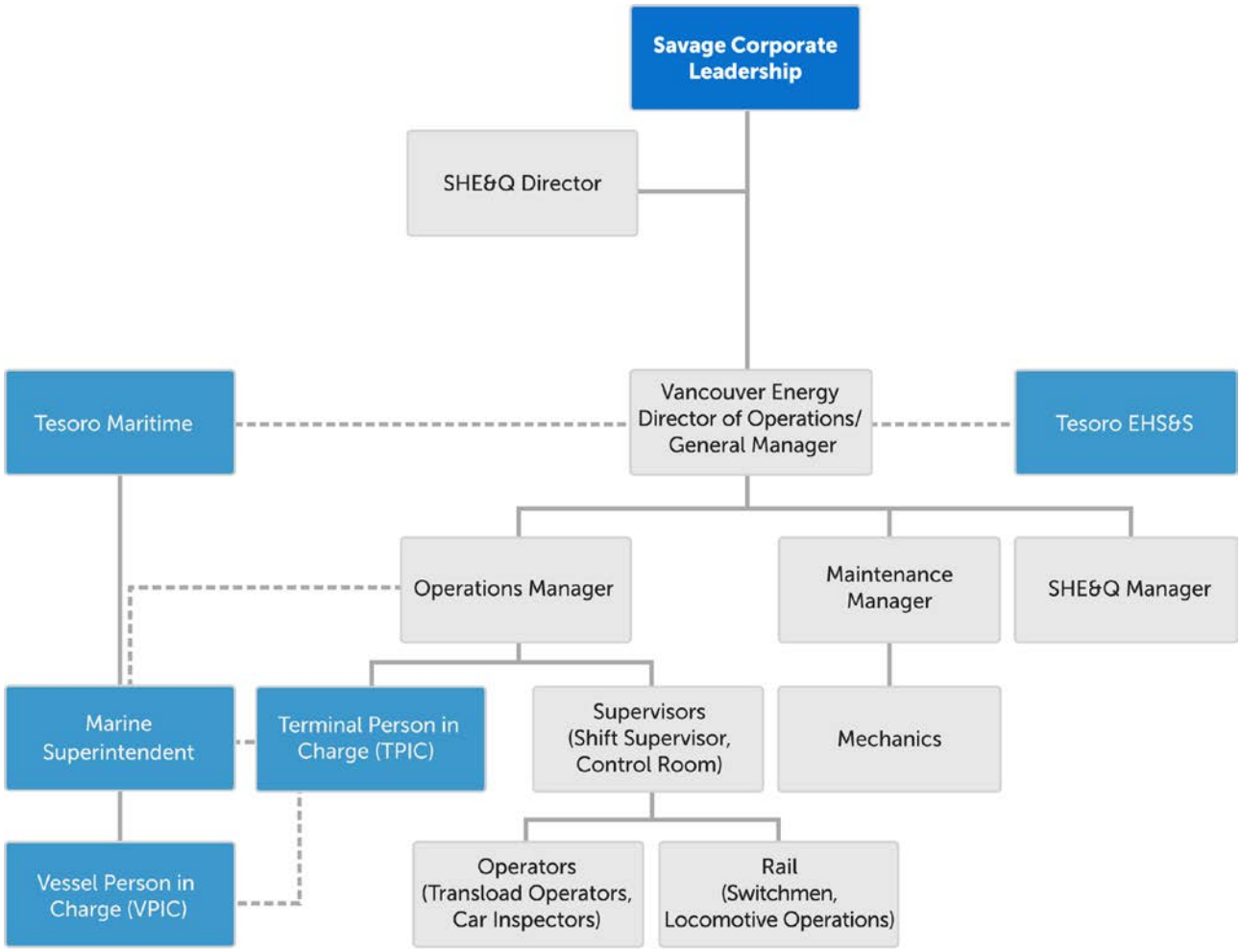
VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

Figure 2. Operations Management Hierarchy



Vancouver Energy

2.0 - Operations Rail Operating Safety and Maintenance Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Vancouver Energy Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	30 April 2015	Submittal for Application Review

Introduction and Background

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- Area 200 – Rail Unloading – located at Terminal 5 of the Port
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- Rail Infrastructure – located at Terminal 5 of the Port

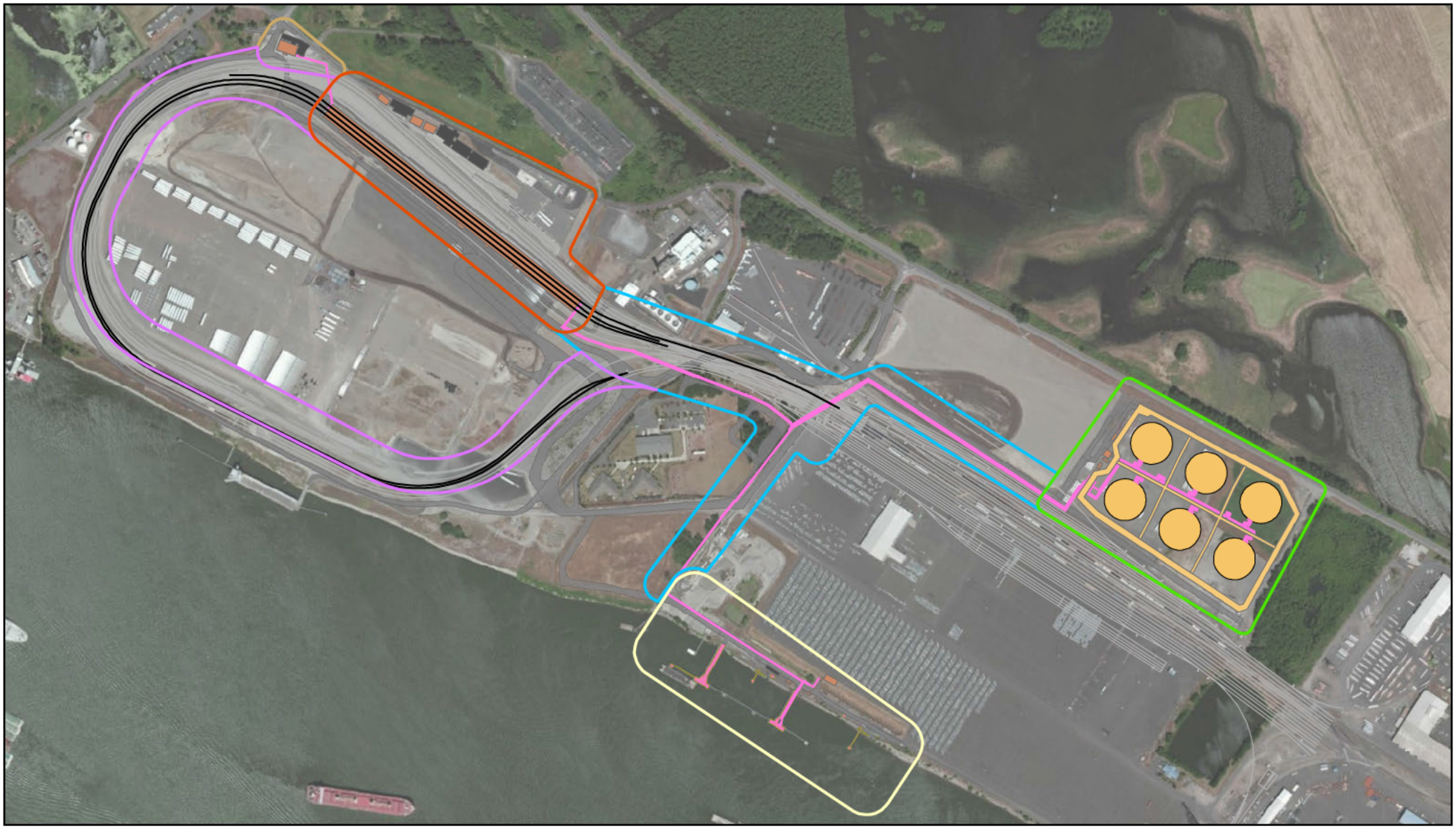
The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility operates 24 hours per day, 7 days per week.

The Facility is engaged in the movement of railcars, inspection of railcars, loading/unloading of railcars, weighing railcars, washing railcars, routine track maintenance, and other rail-related services. The Facility is committed to performing these duties in a safe and responsible manner.

The Facility will have three functional areas.

- The Crude Unloading area at the Terminal 5 rail loop
- The Storage Tanks at Terminal 4 Parcel 1A East
- The Marine Loading at Terminal 4 Berth 13 and Berth 14

These instructions contain the minimum rules applicable for industrial rail switching and other rail related services and serve as a reference manual and a training guide. Employees are to be conversant with and understand the information contained in this Operating Manual.



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0 250 500 1,000
Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

Revisions

Revisions applicable to the Operating Manual are made through Operating Bulletins and Notices and are accessible to all employees. Operating Bulletins and Notices are approved by the Rail Operations (RO) Leadership Team and issued by the Director of Safety. This Operating Manual is reviewed minimally on an annual basis. A three-ring binder will be maintained at each operation with updated versions containing the RO Manual, Operations Bulletins, Managers Bulletins, and Site-Specific Procedures with Written and Proficiency Exams controlled by the Operations Mangers and Safety Specialist. If changes are made to the RO Manual employees will update their manuals as needed in a communication meeting. Requests for changes will be sent to the RO Director of Safety.

Exceptions

Only exceptions to these rules will be site-specific rules that may supersede a rule in this book. All site-specific rules must be in an approved written procedure format and be approved by the Group Leaders and the Safety and Training Directors.

Rail Operations Cardinal Rules

Red Zone

Always ask for and receive verbal confirmation (“Red Zone”) before fouling any area between working ends of railcars, locomotives.

Exceptions:

- Riding a tank car outside the gauge
- Operating cut lever

Secured Equipment

Apply a sufficient number of hand brakes as required by Minimum Hand Brake Application Chart or Site-Specific Requirements to hold standing railcars in place. After applying hand brakes, always perform a push/pull test on all railcars.

Fouling Tracks

Do not leave equipment in the foul. If equipment cannot be left clear of the converging track’s foul point, then the equipment must always be pulled to switch points and placed in a position that will:

- Foul the entire track; and
- Prohibit any equipment movement on the converging track.

Vehicles, equipment, or materials within 4’ of any active rail or track are to be considered in the foul.

Point Protection

Always protect the leading movement by having the ability and being in position to visually confirm clear track. Always be in a position to stop short of:

- A compromised rail condition.
- Shoving into a stubbed track or one equipped with a bumping mechanism.

Restricted Speed

A speed that allows stopping within half the range of vision, or half of the last car count given to safely stop short of:

- Engineer or rail movements.
- Rolling equipment.
- Persons or equipment fouling the track.
- Stop signal.
- Derail or switch improperly lined.

Vancouver Energy
Operations Rail Operating Safety and Maintenance Plan (Section 2.0)

Table of Contents

Section

Introduction and Background 1
Revisions 3
Exceptions 3
Rail Operations Cardinal Rules 4
1. General Responsibility 9
1.1 Safety 9
1.1.1 Maintaining a Safe Course 9
1.1.2 Alert and Attentive 9
1.1.3 Accidents, Injuries and Defects 10
1.1.4 Condition of Tools and Equipment 10
1.2 Rules 10
1.2.1 Rules, Training, Regulations, and Instructions 10
1.3 Carrying Out Rules and Reporting Violations 11
1.3.1 Compliance with Instructions 11
1.3.2 Good Faith Challenge 11
1.4 Minimum Rail-specific PPE 12
1.5 Care of Property 13
1.6 Occupying the Roof 13
1.7 Unauthorized Persons 13
1.8 Altering Equipment 13
1.9 Flat Spots 13
1.10 Reporting Engine Defects 13
1.11 Reference to Locomotives and Engines 13
2. Giving and Receiving Signals 13
2.1 Looking for Signals 13
2.2 Signals by Employees 13
2.3 Giving Signals 14
2.4 Signal Disappearance 14
2.5 Emergency Stop 14
2.6 Hand Signals 14
2.7 Radio and Hand Signals 15
2.8 Acknowledgment 15
3. Engine Bell Signals 15
3.1 Ringing the Engine Bell 15
4. Engine Whistle Signals (Horn) 16

4.1 Sounding the Engine Whistle (Horn) 16
4.2 Engine Whistle Illustrations 16
5. Engine Lights 16
5.1 Display of Engine Lights 16
5.2 Engine Headlight Failure 16
6. Improperly Displayed Signals 17
7. Protection of Workmen and Employees 17
7.1 Definitions 17
7.2 What a Blue Signal Signifies 17
7.3 Blue Signal Protection Removed 18
7.4 How to Provide Blue Signal Protection 18
7.5 Protection for Emergency Repair Work 18
7.6 How to Provide Red Zone Protection 18
7.7 Removing Red Zone Protection 18
8. Red Flag Displayed between Rails 18
9. Operating Bulletins and Notices 18
10. Starting Engine Movement 19
11. Stopped Clear of Fouling Point 19
12. Movements at Restricted Speed 19
12.1 Precautions against Unusual Conditions 19
12.2 Water above Rail 19
12.3 Maximum Authorized Speed 20
13. Emergency Stop Protection 20
14. Switches and Derails 20
14.1 Switch Stand Mechanisms, Switch Points and Derails 21
14.2 Difficult Switch 21
14.3 Proper Alignment of Switches 21
14.4 Cleaning Switch 21
15. (Section Reserved) 21
16. Hand Brakes and Securing Devices 21
16.1 Push/Pull Test 21
16.2 Minimum Hand Brake Application Chart 22
16.3 Hand Brake Operation 22
16.3.1 Accessing the Hand Brake Platform 22
16.3.2 Visual Check 22
16.3.3 Application of Hand Brake 22
16.3.4 Release of Hand Brake 22
16.3.5 Assistance during Hand Brake Release 22
16.3.6 Operating Hand Brakes from the Ground 23
17. Other Hand Brake Operations 23
17.1 Descending the Hand Brake Platform 23
17.2 Standing on Drawbar 23
17.3 Wheel Chocks 23
17.4 Unattended Locomotive 23

17.5 Releasing Hand Brakes on grade 23
18. Coupling and Uncoupling Regulations 23
18.1 Switching with Air 24
18.2 Opening and Closing Couplers 24
18.3 Proper Stance 24
18.4 Failure of Operating Lever and Coupler Adjustment 24
18.4.1 Prior to Coupler Adjustment 24
18.4.2 Coupler Adjustment 24
18.4.3 Failure of Operating Lever 24
18.5 Working within Physical Capabilities when Coupling 25
18.6 Adjustment of Drawbars with Feet 25
18.7 Loading/Unloading devices 25
18.8 Proper Alignment 25
18.9 Trainline Air Hose 25
18.10 Applying Air to Coupled Cars 25
18.11 Uncoupling Cars 25
19. Working on or Around Equipment 26
19.1 Getting On Stationary Equipment 26
19.2 Getting Off Stationary Equipment 26
19.3 Getting On/Off Moving Equipment Is Prohibited 26
19.4 Close Clearance 26
19.5 Prohibited Means of Getting On/Off Rail Equipment 26
19.6 Equipment Condition 26
19.7 Distance from Moving Equipment 26
19.8 Mounting or Dismounting Equipment on Bridges, Trestles, or Overpasses 26
19.9 Debris 27
20. Fouling Other Tracks 27
21. Shoving Equipment 27
22. Shoving into Stub Tracks 27
23. Radio Rules 27
23.1 Reliability Tests 27
23.2 Monitoring Radio Transmission 27
23.3 Proper Radio Terminology 27
23.4 Transmitting 27
23.5 Required Identification 28
23.6 Content of Communication 28
23.7 Verification Procedures 28
23.8 Communication Not Understood or Incomplete 28
23.9 Emergency Communications Procedures 28
24. Tracks and Track Equipment 29
24.1 Walking On or Near Track 29
24.2 Safe Distance from Rail Movements 29
24.3 Walking On or About Tracks 29
24.4 Sitting on, stepping on and walking on Rail 29

24.5 Crossing Over 29
24.6 Leaning Against Railcars or Rail Equipment..... 29
24.7 Riding Rail Equipment..... 29
25. Employee's Acknowledgment of Receipt..... 31

List of Figures

Figure 1. Site Plan..... 2

1. General Responsibility

1.1 Safety

Safety is a critical element in the performance of job duties. Obeying the rules is essential to safety and is a condition of employment.

1.1.1 Maintaining a Safe Course

In case of doubt or uncertainty, always take the safe course.

1.1.2 Alert and Attentive

Employees must be careful to prevent injury to themselves and to others. They must be alert and attentive when performing their duties and plan their work to avoid injury.

1.1.2.1 Games, Reading, or Electronic Devices

Employees on duty must not:

- Play games.
- Read magazines, newspapers, or other literature not related to their duties when:
  - On a train, engine or while performing switching related functions.
  - Performing safety related activities.

Or

  - It would delay or interfere with required duties.

Personal Electronic or Electrical Devices

Employees are prohibited from using personal electronic or electrical devices such as cell phones, electronic games, TV's, computers, media players (including wearing associated earpieces) or from having such devices turned on while on duty. However, a personal wireless communication device, (cell phone) may only be used for voice communication as a redundant means of communication in the event of company-supplied radio failure and in accordance with company rules or instructions.

Exceptions

Employees may use a personal cell phone only during a recognized period of break time, meal period or after a job briefing with all crew members specifying that all railroad operations for that crew and employee have been stopped and suspended and the employee is not foul of any track. Such use must not interfere with any safety related duty.

Employees may use any means of communication necessary to respond to an emergency situation involving the operation or encountered while performing a duty for the company.

1.1.2.2 Company Authorized Cell Phones

In addition to compliance with all Company radio rules and instructions, the following applies to the use of company authorized Cell devices.

1. Except in an emergency, employees must not use a company authorized electronic device for purposes other than which it was intended or while:
   - Operating the controls of a moving locomotive.
   - Standing on the ground in a position foul (within 4 feet of the nearest rail) of any track.
   - On the ground and engaged in an active switching operation.
   - Any crew member is riding on any piece of equipment outside the cab of the locomotive.

- Any other employee is assisting in the preparation of the train or testing of railroad equipment or brakes.
- Inside the controlling cab of a locomotive or train unless there has been a job briefing and all crew members agree that it is safe to do so.

Or

- Obtaining or releasing mandatory directives when company radio communication is available.

2. Company authorized electronic devices may be used for company business when it will not interfere with safety related duties:

- For voice communication as a redundant means of communication in the event of radio failure.

Or

- To access stored electronic rule book files. When doing so, the wireless capability of the device must be disabled.

3. Company provided wireless devices with “Push-To-Talk” or “Direct Connect” type features may be used in lieu of a company radio to conduct train or switching operations when authorized by the company.

1.1.3 Accidents, Injuries and Defects

Immediately report all accidents, personal injuries, or any unusual condition that may affect the safety and efficiency of the rail operation. When required, promptly furnish a written report after reporting the incident.

1.1.4 Condition of Tools and Equipment

Employees must check the condition of equipment and tools used to perform their duties. Employees must not use defective equipment or tools until they are safe for use.

Employees must report any defects to their supervisor.

1.2 Rules

1.2.1 Rules, Training, Regulations, and Instructions

Safety Rules – Employees must have a copy of, be familiar with and comply with the rules and procedures in this Operating Manual.

Training – Employees must be familiar with and obey all rules, regulations and instructions. They must attend the required training classes and pass the required examinations.

Savage employees are trained on safe work practices, processes, policies, rules, regulations, and site-specific operational items.

New and Existing Employees

All employees must complete all site-specific hazard/customer-specific training and site regulatory requirements training before receiving the following training:

a) Employees must complete the New Hire RO Training and pass the associated exams.

b) Employees in training must complete the following to the satisfaction of a qualified trainer. A qualified trainer is an employee with the training, documentation, and experience relating to the task that is being trained for the purposes of proficiency testing requirements.

- Baseline procedures with proficiency exams
- Site-specific procedures with written and proficiency exams
- Job-specific training with proficiency exams

c) Employees may complete the Baseline training prior to completing the New Hire Rail Operations (RO) Training, in a nonproduction area or a safe location as long as the employee is under the direct and immediate supervision of a trained and qualified employee.

NOTE: Any employee NOT having completed documentation of his/her training must be under the direct and immediate supervision of a trained and qualified employee while performing the new job or task.

- All new hire employees must wear an item that designates they are in training and it differentiates themselves from the other employees. This distinguishable item must be visible for everyone to see clearly and must be worn until new employee is signed off to work unsupervised.

Explanation – Employees must ask their supervisor for an explanation of any rule, regulation or instruction of which they are unsure or do not understand.

Issued or Modified – Rules, regulations and instructions may be issued or modified by Operating Bulletins or Notices.

1.3 Carrying Out Rules and Reporting Violations

Employees must cooperate and assist in carrying out rules, regulations and instructions. Employees must correct if possible and then report any condition or practice that may threaten the safety of rail movements, employees or the general public and any misconduct or negligence that adversely affects the company or the customer.

1.3.1 Compliance with Instructions

Employees must comply with all instructions, directions and warnings given verbally, in writing, by bulletin, notice, or signs.

1.3.2 Good Faith Challenge

1.3.2.1 Right to Challenge

Federal Regulations have provisions that allow an employee the right to challenge a directive which, based upon the employee's good faith determination, would violate a company operating rule relating to:

- Shoving movements.
- Leaving equipment foul of an adjacent track.

Or

- Handling of hand-operated switches or fixed derails.

1.3.2.2 Good Faith Challenge Procedure

An employee may inform a supervisor issuing a directive that a good faith determination has been made that the directive would violate a railroad operating rule relating to:

- Shoving movements.
- Leaving equipment foul of an adjacent track.

Or

- Handling of hand-operated switches or fixed derails.

The supervisor will not require the employee to comply with the directive until the challenge is resolved. The supervisor may:

- Require the challenging employee to perform other tasks not related to the challenge until the challenge is resolved.

Or

- Direct an employee, other than the challenging employee, to perform the challenged task before the challenge is resolved. Employee so directed will be informed of the challenge, and determine that the challenged task does not violate the rules.

1.3.2.3 Resolving Good Faith Challenge

1. A challenge may be resolved by one of the following:
   - The supervisor's acceptance of the employee's request.
   - An employee's acceptance of the directive.
   - An employee's agreement to a compromise solution acceptable to the person issuing the directive.
2. If the challenge cannot be resolved because the supervisor issuing the directive has determined that the employee's challenge has not been made in good faith or there is no alternative to the direct order, the railroad will:
   - Provide immediate review by at least one manager, which must not be conducted by the supervisor issuing the challenged directive or that supervisor's subordinate.
   - Resolve the challenge using the same options available for resolving the challenge as the initial supervisor.
3. If the manager making the final decision concludes that the challenged directive would not cause the employee to violate any requirement of the involved rules, the reviewing manager's decision shall be final and not subject to further immediate review.
   - The manager will inform the employee that Federal law may protect the employee from retaliation, if the employee's refusal to do the work is a lawful, good faith act.
   - The employee making the challenge will be afforded an opportunity to document, in writing or electronically, any protest to the manager making the final decision before the employee's tour of duty is complete. The employee will be afforded the opportunity to retain a copy of the protest.

1.3.2.4 Request for Review and Verification of Decision

Upon written request, at the time of the challenge, the employee has the right for further review by the "Unit Safety Manager". Within 30 days after the expiration of the month during which the challenge occurred, the "Unit Safety Manager" will verify the proper application of the rule in question. The verification decision shall be made in writing to the employee.

1.3.2.5 Employee Rights and Remedies

The Good Faith Challenge is not intended to abridge any rights or remedies available to the employee under a collective bargaining agreement or any Federal law.

1.4 Minimum Rail-specific PPE

Reflective material must be worn at all times while performing work duties. If the uniform is not equipped with reflective material, a reflective vest, belt, or arm and leg bands must be worn. The reflective material must be worn so as not to be covered by any other clothing.

Work boots are required to be worn at work sites with a minimum 6-inch lace up with a defined heel and hard toecap. Special provisions may be made to the "lace up" portion for employees working with chemical transfers (where rubber boots are required). Company-approved hard hat and protective eyewear must be worn as required by company policy. Company-approved hand protection must also be worn.

1.5 Care of Property

Employees are responsible for properly using and caring for the property of the company and customer. Employees must return said property when requested by the proper authority. Employees must not use company or customer property for personal use.

1.6 Occupying the Roof

Employees whose duties require them to occupy the roof of a car or engine must do so only with proper authorization and only when the equipment is standing.

1.7 Unauthorized Persons

Unauthorized persons are not permitted on the property or equipment of the company or the customer.

1.8 Altering Equipment

Employees are not to alter, tamper with, nullify, change the design of or interfere with the normal function of any device or equipment on engines, railcars or other equipment or property, except in case of an emergency. Changes made in an emergency are reported to the proper authority as soon as possible and adjustments made accordingly.

1.9 Flat Spots

If a wheel on rail equipment has a flat spot more than 2 ½ inches long, or if the wheel has adjoining flat spots that are each at least 2 inches long, the equipment must be moved very slowly at couple speed (2 miles per hour) and the condition reported to the supervisor.

1.10 Reporting Engine Defects

Locomotive operators or other employees report engine defects to the supervisor and enter the defect on the Daily Locomotive Inspection Form.

1.11 Reference to Locomotives and Engines

Reference to locomotives and engines in the Operating Manual also include on-rail, off- rail, and railcar movers.

2. Giving and Receiving Signals

2.1 Looking for Signals

To recognize and follow signals correctly, employees must:

- Always be on the lookout.
- Comply with the intent of the signal.
- Not act on any signal that they do not understand or that may be intended for other movements or employees.

2.2 Signals by Employees

To give clear signals during the day, employees must:

- Use the correct color of flags or lights.
- Use day signals from sunrise to sunset.

To give clear signals during the night, employees must:

- Use the correct color of reflective flags or lights.
- Use night signals from sunset to sunrise and when day signals cannot be seen clearly.

Flags may be made from cloth, metal or other suitable material.

2.3 Giving Signals

Employees who give signals must:

- Make sure the signals can be plainly seen.
- Give signals clearly so they can be understood.
- Give signals from locomotive operator's side of the track.

2.4 Signal Disappearance

When moving under the control of hand signals, the disappearance from view of either the employee or the signal controlling the movement must be regarded as a stop signal.

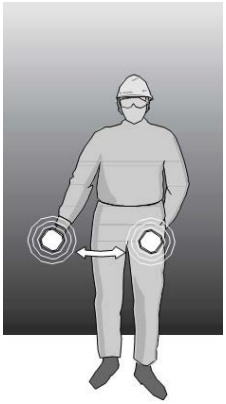
2.5 Emergency Stop

- Any object waved violently by any person on or near the track is a signal to stop.
- In case of emergency, any employee discovering a hazardous condition affecting the safe passage of a movement must, by the use of flags, lights, radio or any other means, make every possible effort to stop the movement.

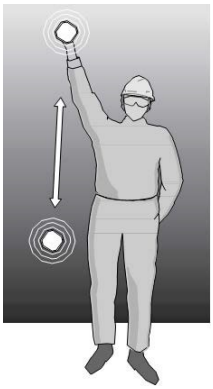
2.6 Hand Signals

The following diagrams illustrate the hand signals for a movement to stop, move forward, and move backward:

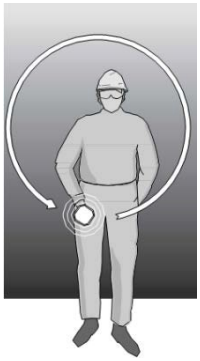
Stop – Swung from side to side at right angle to the track



Move Forward – Raised and lowered vertically



Move Backward – Swung vertically in a circle at right angle to the track



2.7 Radio and Hand Signals

- Radio or hand signals are to be used to communicate signals or instructions.
- Advanced hand signals may be used provided a clear understanding is established among employees.
- There is no hand signal for Red Zone Protection. Red Zone Protection must be communicated vocally.
- If there is doubt as to the meaning of a signal, it must be regarded as a stop signal.

2.8 Acknowledgment

An employee receiving a radio call must acknowledge the call immediately unless doing so would interfere with safety.

3. Engine Bell Signals

3.1 Ringing the Engine Bell

The engine bell must be rung:

1. When the engine is about to move, except when making momentary stop and start switching movements.
2. As a warning signal:
    - Passing a rail movement or engine operating on an adjacent track.
    - Approaching, passing and moving about facilities where people may be working.

- Approaching public crossings at grade with the engine in front. If distance does not permit, ringing must begin soon enough before the crossing to provide a warning and continue until the crossing is occupied.

4. Engine Whistle Signals (Horn)

4.1 Sounding the Engine Whistle (Horn)

1. When weather conditions impair visibility, sound the whistle frequently.
2. If the whistle fails, ring the bell continuously while moving.
3. When other employees are working in the immediate area, sound the whistle signal before moving.
4. The radio may be used in place of the whistle signals, except for signals (a) and (e) of the following illustrations.

4.2 Engine Whistle Illustrations

The required whistle signals are illustrated by "o" for short sounds and "-" for long sounds.

Sound	Indication
(a) Succession of short sounds	Use when an emergency exists, or persons or animals are on the track. When crews on other movements hear this signal they must stop until it is safe to proceed.
(b) o o	Acknowledgement of any signal not otherwise provided for.
(c) o o o	Acknowledgement to move backward
(d) o o o o	Request for signal to be given or repeated if not understood.
(e) –o-	Approaching public crossings at grade with engine in front, start signal not less than ¼ mile before reaching crossing, if distance permits. If distance does not permit, start signal soon enough before crossing to provide warning. Prolong or repeat the signal until the engine occupies crossing.
(f) o-	Acknowledgement to move Forward
(g) -o	Approaching men or equipment on or near track

5. Engine Lights

5.1 Display of Engine Lights

1. When moving, a headlight is displayed to the front and, when equipped, to the rear of an engine in non-main and industrial track service by day and by night.
2. The headlight on the end coupled to cars may be dimmed, except when approaching public crossings at grade, until fully occupied by the movement.
3. When approaching public road crossings at grade with the engine leading, the headlight on the leading end must be on full power until the crossings are fully occupied.

5.2 Engine Headlight Failure

If both headlights on an engine fail, repairs must be made as soon as practicable.

1. At night, display a white light on the front of the engine, the bell must be rung continuously; the whistle sounded frequently and the speed reduced as necessary.
2. When approaching public road crossings and other vehicular or pedestrian crossings the movement must stop and the crossing must be manually flagged in advance of the movement until the crossing gates are fully lowered or if no traffic is approaching or stopped at the crossing.

6. Improperly Displayed Signals

1. If a signal, flag or sign is improperly displayed, or absent from the place it is usually shown, regard the signal as still being in place.
2. Promptly report improper displayed signals or absent fixed signals, flags or signs to your immediate supervisor.

7. Protection of Workmen and Employees

This rule outlines the requirements for protecting workmen inspecting, testing, repairing or servicing railcars and other track maintenance equipment; as well as employees moving on or about rail equipment.

7.1 Definitions

1. Rail Equipment: Engines, cars or an engine coupled to one or more cars.
2. Blue Signal: During the day, a clearly distinguishable blue flag or blue light, and at night a blue light. The blue light may be steady or flashing.
3. Effective Locking Device: When used in relation to a manually operated switch or derail, a lock that can be locked or unlocked only by the craft or group of workmen applying the lock.
4. Switch Providing Protection: For the switch to provide protection the switch must be lined against the track to be protected and locked by an effective locking device.
5. Red Zone: The area between the working ends of rail equipment is designated as the Red Zone for the purposes of this Operating Manual.
6. Red Zone Protection: Protection secured by the locomotive operator upon request. This protection will, at a minimum, be

    - Independent Brake Fully Applied
    - Apply the Automatic Brake (10 pounds) (as needed to control car movement)
    - Center the Reverser Handle and
    - Open the Generator Field Switch (Down position)

    NOTE: Only when these steps have been completed may the operator confirm that Red Zone Protection is in effect.

7. Place the throttle in stop position

7.2 What a Blue Signal Signifies

Blue Signal Protection is mandatory whenever equipment is under repair. A blue signal signifies that workmen are on, under or between rolling equipment and requires that:

1. Rolling equipment must not be coupled to or moved.
2. Rolling equipment must not pass a blue signal on a track protected by a blue signal.
3. Other rolling equipment must not be placed on the same track so as to block or reduce the view of the blue signal.
4. Rail equipment must not enter a track when a blue signal is displayed at the entrance to the track.
5. Blue signals must be displayed for each craft or group of workmen who will work on, under or between rolling equipment.

Note: More than one piece of rolling equipment may be placed on the same track when a derail divides a track into separate working areas.

7.3 Blue Signal Protection Removed

1. Blue signals may only be removed by the craft or group who placed them.
2. When blue flag signal protection has been removed from one entrance of a double ended track or from either end of rolling equipment, that track is no longer under blue signal protection.

7.4 How to Provide Blue Signal Protection

One of the following methods of protection or a combination of these methods must be provided:

1. Each manually operated switch that provides direct access must be lined against movement onto the track and secured by an effective locking device. A blue signal must be placed at or near each switch.
2. A derail capable of restricting access to the track where work will occur must be locked in derailing position with an effective locking device and positioned at least 50 feet from the rolling equipment to be protected.

7.5 Protection for Emergency Repair Work

If a blue signal is not available for employees performing emergency repairs on the same track as a locomotive, the employee controlling the locomotive will, upon request from the crewman working directly with the repairmen, provide “Red Zone Protection” and such protection must remain in effect until removed by request from the crewman who originally requested it.

7.6 How to Provide Red Zone Protection

When a task requires an employee to work inside the Red Zone area, that employee requests Red Zone Protection from the locomotive operator.

If more than one member of the crew intends to work under Red Zone Protection, the employee in charge will request the protection and such protection will remain in effect until the employee in charge determines that all members of his/her crew understand the intention to remove the protection and all are in the clear.

7.7 Removing Red Zone Protection

When the requirement for Red Zone protection is no longer in effect and all employees working under the protection are in the clear, the request to remove Red Zone Protection is made to the locomotive operator. The locomotive operator will not remove Red Zone Protection unless directed by the employee who initially requested it.

8. Red Flag Displayed between Rails

When a red flag or red light is displayed between the rails of a track other than a main track, the movement must stop a minimum of 3 car lengths away and not proceed until the red flag or red light has been removed by an employee of the craft or group that placed it. This protection is intended for individuals working on track with or without equipment; but, may be used for anyone wishing to restrict access to a specific area for any purpose other than the repair of rail equipment (for repair of rail equipment see section 7.4, How to Provide Blue Signal Protection).

9. Operating Bulletins and Notices

Operating Bulletins and Notices are issued by the proper authority and in the prescribed format.

1. Operating Bulletins and Notices are posted in a book provided for that purpose in the general office.

2. Operating Bulletins contain information or instructions pertaining to the movement of engines and cars, operating and switching procedures, track and equipment conditions and safety instructions.
3. Notices contain non-operating information of interest to the employees. Operating Bulletins are numbered consecutively, beginning on the first day of each new year.
4. A yearly re-issue, containing the number, date and the contents of each operating bulletin remaining in effect, is issued the first day of each calendar year. The Operating Bulletins remaining in effect from the previous year may be consolidated into a Summary Bulletin at the start of the calendar year. All other Operating Bulletins not addressed in a Summary or re-issued will no longer be in effect.
5. Employees responsible for the placement of operating bulletins and notices must post them in the book provided for that purpose immediately after they are received and they must record on each bulletin the time and date it is posted in the books.
6. Before commencing work, every employee and trainee must read, understand, sign and date all newly posted Operating Bulletins and Notices.

10. Starting Engine Movement

An engine or rail movement must not start to move until a hand signal or instruction is received by the locomotive operator from a crew member.

11. Stopped Clear of Fouling Point

An engine or rail movement required to stop for another rail movement must be stopped clear of the route to be used by the other engine or rail movement.

12. Movements at Restricted Speed

When required to move at restricted speed, movement must be made at a speed that allows stopping within half the range of vision short of:

- Engine
- Rail movement
- Rolling movement
- Persons or equipment fouling the track
- Stop signal
- Derail or switch improperly lined

12.1 Precautions against Unusual Conditions

Protect trains and engines against any known conditions that may interfere with their safety. When conditions restrict visibility, regulate speed to ensure that crew members can observe and comply with all operating rules. In unusually heavy rain storm, snow storm, or high water, trains and engines must approach bridges, culverts, and other potentially hazardous points prepared to stop. If they cannot proceed safely, they must stop until it is safe to resume movement.

12.2 Water above Rail

Rail Movements are not to operate through water of a depth of more than two inches above the ball of the rail (top of the rail). They may operate through water if the depth is two inches or less above the ball of the rail, but at a speed not to exceed 2 miles per hour and with proper authorization.

12.3 Maximum Authorized Speed

Switchmen and operators are jointly responsible for knowing and not exceeding the maximum authorized speed for their train.

The maximum speed permitted by the site/customer must be adhered to or a speed of 10mph must never be exceeded, whichever is less.

13. Emergency Stop Protection

When a train or engine is stopped by an emergency application of the brakes or severe slack action occurs while stopping, take the following actions.

- When a derailment occurs on an industrial track or the track of another railroad is fouled or obstructed by the derailed equipment, an emergency radio broadcast is immediately initiated and action must be started to prevent a collision.
- Cars/locomotives should not be moved until the investigation team/supervision has arrived on site and/or has given the okay to do so in order to clear a road crossing or fouling track.
- Crew members of the derailed equipment must, by the use of flags, lights, emergency radio calls or any combination thereof, stop all rail movements on, or approaching the obstructed track.
- The supervisor must be notified immediately and a call must be made to other rail movements and other affected railroads to notify them of this emergency.
- Protection of the fouled track must continue until notified by the supervisor that all rail movements in the area, and those of other affected railroads, have been notified and that all rail movements have been secured.

14. Switches and Derails

The employee handling the switch or derail is responsible for the position of the switch or derails in use. When possible, employees on the engine must verify that the switches and derails near the engine are properly lined.

1. Employees handling switches and derails must ensure that:
    - The locomotive or railcar has a minimum distance of 25 feet from the switch point to prevent the weight of the equipment from allowing a gapping switch point.
    - Communicate to the operator that the switches and derails are properly lined for the intended use, example: “Switch is lined from the main to the siding.” (“Points Look Good” must also be conveyed to the operator.)
    - When the operating lever is equipped with a latch do not step on the latch to release the lever except when lining the switch.
    - After locking a switch or derail, test the lock to ensure it is secured.
2. When not in use, switches must be locked, hooked or latched, if so equipped.
3. If a switch is run through it is unsafe and must be immediately reported to the supervisor. When the switch has been run through, the entire movement must be made through the switch and the movement should never be reversed until the switch has been inspected, repaired, or temporarily spiked and tagged on the switch handle.
4. Replace any missing or defective switch locks. If they cannot be replaced report the condition to the supervisor and spike the switch if possible. If switch is spiked do not operate the switch.
5. Employees in rail movement service must know the location of all fixed derails.
6. A train or engine moving on or entering tracks where fixed derails are located must stop at least 150ft from the derail in derailing position.
7. Do not make a movement over a derail in the derailing position.
8. Derails are left in the derailing position and locked (where applicable) to provide protection against unexpected movement.
9. Avoid leaving unattended railcars and locomotives stopped on open derails.
10. Railcars left standing in front of a derail must have a minimum distance of 50 feet unless otherwise required by a site-specific rule/yard capacity, and precautions must be taken prior to coupling to a car in this position.

14.1 Switch Stand Mechanisms, Switch Points and Derails

1. Ensure all switch stand mechanisms and switch point travel areas are free of tools, material or debris and any persons working in the area are in the clear prior to operating the switch.
2. Look in both directions to ensure that no moving equipment is approaching on adjacent tracks prior to operating a switch or derail. Ensure your body position, while operating the switch, does not place you between rail traffic and the switch stand or within the travel area of the switch lever.
3. Ensure you are facing the switch stand and your body is well braced with both feet firmly planted on the ground or on the switch ties before operating switch and:
    - For operating a ball type switch or derail, bend knees and use leg muscles to steadily lift lever while keeping feet clear of ball.
    - For operating high stand switch or derail, take a firm grip with both hands near the end of the operating lever and exert a steady pull. Avoid jerking, pushing or kicking to try and move or seat the switch lever.
    - Never stand or sit on a switch handle and stay clear when movement is being made over a switch.

14.2 Difficult Switch

Employees must not exert force beyond their normal physical capabilities in order to line a switch, which is difficult to operate. They must obtain assistance to complete task and notify your supervisor of the problem.

14.3 Proper Alignment of Switches

Ensure the switch is properly lined for the route to be used, the switch points fit tightly, not to exceed 1/8-inch gap, from the stock rail, and the switch is fully secured.

14.4 Cleaning Switch

A broom, scraper or any suitable device available must be used to clean switch mechanisms of ice, snow and other debris. Never use your hands or feet to clear out any debris between switch points.

15. (Section Reserved)

16. Hand Brakes and Securing Devices

A sufficient number of hand brakes must be applied on cars prior to uncoupling or leaving a train unattended. Also verify the following:

- Verify the chain is tight, and brake shoe is firmly against the wheel.
- Single cars that are set out will require chocks. (Exception: During switching operations, single cars may be left temporarily with hand brakes only.)

16.1 Push/Pull Test

Prior to leaving equipment, test the hand brake's effectiveness by fully applying a sufficient number of hand brakes then slightly move the car or cut of cars as needed to ensure the necessary retarding force is available.

When performing a push/pull test you must follow the proper steps below in order to ensure you have a sufficient amount of hand brakes on cars/locomotives left standing.

- Apply hand brakes per our minimum hand brake chart (more if needed, a sufficient amount)
- Apply hand brakes as directed by site-specific requirements

- Prior to leaving the cars/locomotive standing release all airbrakes
- Instruct the locomotive operator to either push or pull until you see movement in the cars/locomotives
- Then instruct the locomotive operator to power down, without setting any airbrakes
- Finally visually ensure the cars/locomotives stop and the hand brakes will hold

16.2 Minimum Hand Brake Application Chart

1 car	1 hand brake	40-49 cars	5 hand brakes
2-19 cars	2 hand brakes	50-59 cars	6 hand brakes
20-29 cars	3 hand brakes	60-69 cars	7 hand brakes
30-39 cars	4 hand brakes	70-79 cars	8 hand brakes

(Note: At locations where a specific number of hand brakes are required, such locations are identified in Operating Bulletins and Notices or Site-Specific Procedures and equipment left unattended is checked as provided by Rule 17.0 Hand Brakes and Securing Devices – specifically the Push/Pull test.)

16.3 Hand Brake Operation

16.3.1 Accessing the Hand Brake Platform

There are a variety of hand brakes in service. When ascending to the hand brake platform always use the ladder on the side of the car. Maintain four points of contact at all times. Get a firm grip with both hands on the ladder rungs. For good balance, place feet at an angle with the balls of the feet on the ladder rung. While climbing, always maintain firm grasp with hands and be alert at all times for any sudden movement. Upon reaching a height that is equal to that of the brake platform, place one hand on end ladder and grasp firmly. Bring one foot over to the end ladder, maintain balance and then swing the other foot around to the end ladder. Prior to applying the hand brake you may place your right foot on the edge of the brake platform securing it against your heel, maintaining good balance.

16.3.2 Visual Check

Visual check of hand brake components, including brake wheel, lever, pawl, ratchet and chain, is to be carried out before operating hand brake. Any defects found must be reported to your supervisor.

16.3.3 Application of Hand Brake

To apply hand brake, place release lever in “on” position, then with right hand begin applying hand brake by rotating wheel in clockwise motion. Always keep hand on the outside of the wheel rim while applying. Never apply using the wheel spokes, if sufficient force cannot be applied by using the wheel rim additional brakes and/or wheel chocks may be necessary. Always visually confirm that the brake shoes are contacting the wheels of the railcar after applying the hand brake.

16.3.4 Release of Hand Brake

To release hand brake, move release lever to “off” position with enough force to disengage the hand brake locking feature. Ensure hands and body are clear of brake wheel and feet are clear of the chain, as it may release with great force under tension.

16.3.5 Assistance during Hand Brake Release

If a hand brake has been applied too tight, assistance may be required to release it. The application of the automatic brake may be required to loosen the tension on the brake rigging. Assistance from a second person may be required.

16.3.6 Operating Hand Brakes from the Ground

Operating a hand brake from the ground is strictly prohibited. The only exception is with the proper use of a brake stick.

17. Other Hand Brake Operations

17.1 Descending the Hand Brake Platform

Prior to exiting from between railcars, look both ways to insure there is no approaching movement that may endanger you while dismounting the railcar.

To descend the hand brake platform, slowly move body around to the side ladder. Maintain four points of contact at all times. Climb down slowly while maintaining firm hand holds. Keep feet angled and upon reaching the bottom rung or stirrup, ensure there are no obstacles at the point where you will contact the ground. Ensure feet are firmly planted on the ground before releasing handgrip on ladder rung.

17.2 Standing on Drawbar

Standing on drawbar, drawbar housing or un-coupler lever while applying or releasing hand brakes is prohibited. Reaching over a drawbar or knuckle for any reason is always prohibited.

17.3 Wheel Chocks

Use wheel chocks where required. When placing or removing wheel chocks, keep all body parts outside the Red Zone Area. Never attempt to apply a wheel chock that is defective or missing a handle or never use a modified wheel chock such as a rock or block of wood.

17.4 Unattended Locomotive

When the locomotive cab is not occupied by a qualified crew member, it is considered unattended. When leaving a locomotive or consist (two or more locomotives) unattended, locomotive(s) hand brake(s) must be applied. Release locomotive air brakes to determine hand brakes will prevent movement. (Verify chain is tight and the brake piston has sufficient travel, and the brake shoes contact the wheels.) Fully re-apply independent brake. Loaded trains are not to be left unattended.

- Remove reverser handle
- Generator field switch in off position
- Wheel chocks applied
- Lights dimmed
- Place locomotive isolation switch into the isolation setting

17.5 Releasing Hand Brakes on grade

When the engine is coupled to railcars standing on a grade, do not release the hand brakes until the air brake system is fully charged and Red Zone is in effect.

18. Coupling and Uncoupling Regulations

Switching must be performed carefully to prevent personal injuries as well as damage to equipment or contents. Movements must be carefully handled to avoid shocks from abrupt starting and or stopping. No attempts may be made to uncouple moving railcars.

Extreme care must be exercised when coupling to avoid impact damage. Cars and engines must only be coupled with sufficient force necessary to affect the coupling. Coupling speed is 1 mile per hour and must never exceed 2 miles per hour.

Before coupling to, or moving cars being washed, dried, loaded or unloaded, all persons on or about such cars must be notified. Vehicles, loading/unloading devices and other equipment must be free and clear.

Prior to coupling, a safety stop is required minimum of one car distance (50 feet) and care must be taken to ensure that cars being coupled to are properly secured. After coupling to cars, the coupling must be “stretched” to ensure it is secure beforehand brakes are released or movement commences.

Avoid uncoupling railcars in curves whenever possible. Take care when attempting to couple to any equipment standing on curves or on switches as the drawbars may not align properly. Notify the operator of the position of the cars to be coupled (coupling in a curve) so all crew members have a clear understanding of the potential coupling issue.

18.1 Switching with Air

Do not handle railcars without charging the air brake system. Prior to any movement couple railcar air hoses and charge the brake system; this will allow for a more controlled movement of railcars. (Kicking, dropping, and cutting off cars in motion is strictly forbidden)

EXCEPTION: Site-specific customers who, by contract, require the handling/switching of railcars without air in classification yards. In such cases, site-specific instruction is required and documented training performed.

18.2 Opening and Closing Couplers

Ensure that coupler is in good operating condition with no missing or damaged components. Notify supervisor of any damaged equipment.

18.3 Proper Stance

Always maintain proper stance to couple or uncouple cars. Ensure both feet are placed outside the working end of the rail car, with an open stance, and your body is clear of equipment. To uncouple cars, use hand nearest equipment to operate the uncoupling lever.

18.4 Failure of Operating Lever and Coupler Adjustment

18.4.1 Prior to Coupler Adjustment

Before making adjustments to a coupler, separate equipment by at least 50 feet and secure the equipment using Red Zone Protection as prescribed in Rule 7.1 (f, g) of the Operating Manual.

18.4.2 Coupler Adjustment

Once the area is secured with Red Zone Protection, the employee enters the gauge placing both feet firmly on the ground toes up against the inside base of the rail; with both hands firmly gripping the underside of the coupler, using the legs, lift the coupler applying pressure with the lower back against the coupler to move it over.

18.4.3 Failure of Operating Lever

When an operating lever fails to open a knuckle the employee secures Red Zone Protection and ensures there is a safe distance of at least 50 ft of clearance between the equipment before attempting to open

the knuckle or adjust any coupler components. When opening a knuckle both feet must be outside the nearest rail to prevent injury. With your left hand lifting up on the cut lever, use your right hand to grip the knuckle and pull the knuckle to the open position at the same time.

18.5 Working within Physical Capabilities when Coupling

Employees must ensure they work within their physical capabilities while coupling or uncoupling equipment. Assistance is to be obtained to adjust a difficult operating lever or coupler.

18.6 Adjustment of Drawbars with Feet

Employees must not adjust drawbar or components with feet. Ensure that your feet are kept clear of the knuckle, in case it falls.

18.7 Loading/Unloading devices

Loading and unloading devices must be clear and all top hatches and bottom outlets closed prior to moving.

18.8 Proper Alignment

Before a coupling is made to cars, the drawbars must be checked to ensure they are properly aligned. Whenever possible, car should be left on straight track for coupling. If not possible, extreme caution must be used when coupling. Refer to rule 19.0

18.9 Trainline Air Hose

When coupling a train line air hose, always request Red Zone prior to coupling train line air hoses. Once it is safe, place one foot between the rails while leaving the other foot outside, with your body angled. Your right hand grasps the glad hand of the nearest air hose, while the left hand grasps the glad hand of the air hose farthest away. Kink the air hose in your right hand while bringing it up to a 90-degree angle. Bring the glad hand of the air hose in your left hand up to meet the other glad hand, then let both glad hands slide into place to engage coupling.

18.10 Applying Air to Coupled Cars

Prior to coupling, ensure the angle cock on the railcar away from the air source is completely opened. Once the coupling is made and stretched and the slack action stopped, request and receive “Red Zone Protection”, lace the train line hose. Place one foot inside the gauge with leg against train line hose and place other foot outside gauge. Do not open angle cock too fast as this will put the air brake system into emergency.

18.11 Uncoupling Cars

When uncoupling cars that have air applied, close the angle cock on the last car to remain coupled to the locomotive. After lifting the uncoupling lever and directing the equipment in a direction to separate, look away as the air hoses separate to avoid exposure of dust and debris to the eyes.

19. Working on or Around Equipment

19.1 Getting On Stationary Equipment

First ensure a solid grasp of handrails and/or grab irons with both hands. With your feet firmly planted and body facing equipment, pull with your arms while one foot is placed on the corner of bottom stirrup. Place the other foot in opposite corner of stirrup.

19.2 Getting Off Stationary Equipment

Ensure the location where your feet will contact ground is clear of debris or other objects which could cause injury. Ensure your body is facing equipment as you back down onto ground. With one foot, step down to contact ground and after the first foot is firmly planted, bring down the other foot. When both feet are firmly on the ground, you may then release handholds.

19.3 Getting On/Off Moving Equipment Is Prohibited

Mounting moving equipment is prohibited. You may dismount moving equipment ONLY in case of an emergency. In case of an emergency, always face the direction of movement and dismount the equipment using your trailing foot to hit the ground first. Turn your body away from the railcar while releasing your handlhold once your trailing foot has made contact with the ground.

19.4 Close Clearance

While riding equipment always maintain a vigilant observance in the direction of movement. Ensure that equipment on adjacent tracks, obstructions on ground or buildings do not pose a hazard or within 4ft of the rail. Riding rail cars inside buildings is prohibited.

19.5 Prohibited Means of Getting On/Off Rail Equipment

Getting on or off rail equipment by means other than steps, ladders or handholds provided is prohibited. Dismounting railcars may only be done from the side ladder. Stepping on cut-levers, couplers or anything other than approved safety appliances is prohibited. Never cross from one railcar platform to another railcar platform to access a railcar.

19.6 Equipment Condition

Ensure equipment is in good order prior to mounting it to avoid possible hazards.

19.7 Distance from Moving Equipment

Employees shall not cross in front of moving equipment unless it is clearly determined that sufficient distance (not less than 150 ft. or three railcars) is available and the speed is less than 5 mph. Employees shall not cross behind moving equipment (moving away) at a distance less than 20 ft.

19.8 Mounting or Dismounting Equipment on Bridges, Trestles, or Overpasses

Mounting or dismounting equipment on a bridge, trestle or over pass should be avoided. If necessary, extra caution must be taken to ensure sound footing and sufficient clearance.

19.9 Debris

Debris found near tracks where employees are required to walk should be removed to eliminate potential hazards.

20. Fouling Other Tracks

- Equipment must not be moved foul of another track unless the movement is properly protected. Switches must be lined for the route and it must be visually seen that the portion of the track to be used is clear.
- Equipment must not be left foul of a connecting track unless the switch being fouled is covered by the equipment.

21. Shoving Equipment

When cars or engines are shoved and the way cannot be ensured clear, employees must take an easily seen position on the leading car or engine, or be ahead of the movement, to provide protection. Cars or engines must not be shoved over switches, derails or crossings without protection. Upon request and prior to opening the throttle to shove, the locomotive operator must establish that the crew member directing the shove is in position to protect the point. Equipment must not be shoved to block other tracks unless it is known that adjacent tracks are clear and switches are properly lined for the movement.

22. Shoving into Stub Tracks

When shoving into tracks that are stubbed, equipped with wheel stops or bumping posts, a “Safety STOP” must be made between 50 and 100 feet from the end of the track, wheel stops or bumping post. The movement must not exceed 2 miles per hour for the remaining distance.

23. Radio Rules

23.1 Reliability Tests

- When employees are equipped with radios, they must conduct a communications test as soon as practicable after coming on duty and prior to performing railcar switching to ensure they are working properly.
- Radio tests must consist of an exchange of voice transmissions with another radio, and the quality and readability of its transmission must be ascertained.
- If the radio is found to be defective, it must be exchanged for a working radio.

23.2 Monitoring Radio Transmission

Radio base stations or mobile units must be turned to the appropriate channel with the volume loud enough to receive communications.

23.3 Proper Radio Terminology

All radio communications will be conducted in a professional manner. Any foul or abusive content is strictly forbidden. Suggested examples of proper terminology:

- “Stand-by” - Monitor this channel for my next transmission.
- “Over” - Transmission is ended and a response is expected.
- “Out” - Transmission is ended and no response is expected.

23.4 Transmitting

Employees operating radios must do the following:

- Before transmitting, listen long enough to make sure the channel is not being used.
- Give the required identification.
- Do not proceed with further transmission until acknowledgment is received.

23.5 Required Identification

- Employees transmitting or acknowledging a radio communication must begin with the required identification including engine number.
- After positive identification has been made in connection with switching within the plant, fixed and mobile units may use short identification after their initial transmission and acknowledgement.
- Direction in relation to the controlling unit, distance to be traveled, as well as intent of the move, must be given with each communication.
- Anytime the switchman and locomotive operator travel without obstacles, regular car counts and acknowledgements of communication will need to be made every 10 cars or 500ft. (i.e. there are no crossings, derails, or misaligned switches)
- When the switchman is riding outside of the cab of the locomotive, he/she will need to continue to communicate with the provided radio to ensure all crew members are alert and attentive, and aware of all expected movement. (i.e. - direction and distance.)

NOTE: Site-specific procedures should designate verbiage to be used for direction of travel and must be made clear to all employees (i.e., direction – north/south, east/west, shove/drag, etc.).

- If no further communication is received before the movement has traveled one-half the distance required by the last instruction, the movement must be stopped at once.

23.6 Content of Communication

Radio communications are brief and to the point and contain only essential instructions or information.

23.7 Verification Procedures

When verbal instructions or information pertaining to locomotive or yard movements are received by radio, such information must be repeated to the sender to ensure correctness and acknowledgement before acting on such instructions and/or information.

23.8 Communication Not Understood or Incomplete

- An employee who does not understand a radio communication or who received a communication that is incomplete, must not act upon the communication.
- An employee who receives information that may affect the safety of employees or the public or cause damage to property must take the safe course. When necessary, stop the movement until the communication is understood.

23.9 Emergency Communications Procedures

1. An employee will transmit the word “EMERGENCY” three times at the beginning of a transmission to indicate the report of:

    - an accident involving injury to employees or others;
    - a condition, which may constitute a hazard to employees or others;
    - a condition, which may endanger the passage of engines, or
    - a derailment, which is fouling another track.

    When an “EMERGENCY” communication, which is directed to a specific person or movement, has not been acknowledged, any other employee hearing it will, if practicable, relay the communication by any means available.

2. Other employees must not interfere with such communication.
3. An “EMERGENCY” communication has absolute priority over all other transmissions.

24. Tracks and Track Equipment

24.1 Walking On or Near Track

Look in both directions for approaching rail equipment when preparing to foul tracks. Foul tracks only when necessary for the purposes of assigned duty.

24.2 Safe Distance from Rail Movements

Keep a safe distance from passing rail movements. Do not stand by a switch or switch stand if possible. Stand in the clear in the event of dragging lading, equipment or a derailment.

24.3 Walking On or About Tracks

Walk clear of the rail staying off head-block ties and looking in the direction of movement. Only walk in the gauge when duties require and only for the shortest amount of time necessary to complete the required work. If at all possible remain in the clear of all tracks unless protected as described in Rule 7.1

24.4 Sitting on, stepping on and walking on Rail

Sitting on, stepping on or walking on rail is prohibited. Sitting on any part of the track structure is prohibited. Whenever possible avoid walking on cross ties to prevent slipping on creosol, fuel oil and lubricants that may be present.

24.5 Crossing Over

Crossing over, under or between railcars or equipment is prohibited unless in performance of duty and only when proper protection is provided. When required to do so, use the proper running boards and hand-holds.

Never step between the coupler horn and striker casting or on the striker casting. When crossing between railcars or equipment, a distance of 50 ft or greater must be available unless under Blue Signal protection and only when such equipment is chocked. When crossing behind or around standing equipment, a distance of no less than 25 ft must be maintained.

24.6 Leaning Against Railcars or Rail Equipment

Leaning against railcars or rail equipment is prohibited.

24.7 Riding Rail Equipment

Riding railcars and rail equipment is prohibited unless designated in the requirements of the assigned work. Riding equipment should be avoided whenever possible. If necessary, ride only on the leading side ladder of a railcar in yard movement or the trailing side ladder on the last car of a train or cut of cars. **Crew members shall never ride equipment into a couple. They must stop short (a 50-foot safety stop minimum) and dismount prior to coupling.**

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25. Employee's Acknowledgment of Receipt

As an employee of Vancouver Energy Companies, I acknowledge receipt of this Operating Manual. I understand its contents and agree to comply with them while on duty or on company property. If in doubt about the meaning of a rule, I will request clarification from my operations manager.

_____

Employee Name

_____

Employee Signature

_____

Location

_____

Date

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Vancouver Energy

3.1 - Emergency Response Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

ERM West, Inc.
136 East South Temple, Suite 2150
Salt Lake City, Utah 84111

Revision Summary

No.	Date	Edits/Comments
00	30 April 2015	Submittal for Application Review

Vancouver Energy
Emergency Response Plan (Section 3.1)

Table of Contents

Section

1. General Information 5
1.1 Facility Description 5
1.2 Site Maps/Figures 11
1.3 Purpose/Scope 13
1.4 Regulatory Mandate 13
1.5 Plan Review and Update 13
1.6 Implementation/Relationship to Other Plans 14
1.7 Coordination with Response Agencies 14
1.8 Facility Owner/Operator Information 15
1.9 Authorization of Resources 15
1.10 Materials on Site 15
1.11 Incident Command Structure and Personnel 16
1.12 Emergency Operations Center 17
1.13 Communications Plan 18
2. Emergency Procedures 22
2.1 Evacuation Procedures 22
2.2 Fire and/or Explosion 24
2.3 Product Spill 27
2.4 Vapor/Gas Release or H_2S, LEL, or O_2 Gas Alarm 29
2.5 Severe Weather 31
2.6 Earthquake or Volcanic Activity 33
2.7 Medical Emergencies 34
2.8 Communicable Disease/Illnesses 35
2.9 Epidemic/Pandemic Outbreak 36
2.10 Security Incident and/or Suspicious Activity 37
2.11 Bomb and/or Terrorism Threat 38
2.12 Railcar Derail 39
3. Post Incident Activity 41
3.1 Incident Documentation 41
3.2 Response Critique and Plan Modification 41
4. Appendices 43
4.1 Emergency Equipment 43
4.2 Employee Emergency Responsibilities 45
4.3 Training 47
4.4 Drills 48
4.5 Definitions and Acronyms 49

4.6 Information Record 52
4.7 Emergency Phone Listing 53
4.8 Emergency Response Guidebook (ERG) Guide 55

List of Figures (Section 1.2)

Figure 1. Vicinity Map
Figure 2. Site Plan
Figure 3. Life Safety Site Plan
Figure 4A. Area 200 – Life Safety Site Plan
Figure 4B. Area 200 – Typical Life Safety Unloading Building Plans
Figure 4C. Area 200 – Life Safety Plans
Figure 5A. Area 300 – Life Safety Site Plan
Figure 5B. Area 300 – Life Safety Plans
Figure 6A. Area 400 – Life Safety Site Plan
Figure 6B. Area 400 – Life Safety Plans
Figure 7A. Area 600 – Life Safety Site Plan
Figure 7B. Area 600 – Life Safety Plans

In the event of an emergency:

CALL 911

Then

CALL Port of Vancouver on-duty Security Officer at 360-922-1120

The address for this facility is:

Vancouver Energy

5501 NW Old Lower River Road

Vancouver, Washington 98660

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1. General Information

1.1 Facility Description

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to aboveground storage tanks (ASTs) and from ASTs to marine vessels through interconnected pipelines. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5.

Operations at the Facility include

- Crude oil unloading from rail tank cars to bulk crude oil ASTs
- Filling of the crude oil ASTs via dedicated pipelines
- Operation of unit trains with dedicated yard locomotives
- Crude transfer from the crude oil ASTs to the Marine Terminal via dedicated pipelines

The Facility is approximately 47.4 acres in size and comprises elements within the following “area” groupings, as illustrated in the vicinity map and site plan shown in Figures 1 and 2 (in Section 1.2), respectively.

- Area 200 – Rail Unloading Building and Administration– located at Terminal 5 of the Port
- Area 300 – Storage Area (ASTs) – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at Berths 13 and 14 of the Port
- Area 500 –Transfer Pipelines – located in locations between areas 200, 300, and 400
- Area 600 – West Boiler– located at Terminal 5 of the Port
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives up to an average of four unit trains per day of crude oil and unloads up to an average of approximately 360,000 barrels (bbl) per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system conveys crude oil from Area 200 to Area 300 for storage and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility operates 24 hours per day, 7 days per week. The Facility is staffed with a total of up to approximately 48 employees on site during operational hours.

The area surrounding the Facility primarily consists of mixed-use industrial properties. The site is bounded on the north by NW Lower River Road, to the south by the Columbia River, to the east and west by industrial facilities. Example neighboring industrial facilities include Tidewater, Kelly Steel, Farwest Steel, CPU River Road Generating Plant, CalPortland, and the Subaru car lot. The Clark County Jail Work Center (JWC) is located between Area 200 and Area 400. The JWC is considered a residential facility. All Facility areas are located within the Port, which is in various states of industrial development.

Depending on the magnitude of a potential major emergency incident, the closure of surrounding roads may be required. Closure of surrounding roads would be under the direction of the lead response agency, such as the Clark Regional Emergency Services Agency (CRESA) or Vancouver Fire Department.

Traffic associated with the Facility primarily accesses the west end of Terminal 5 via NW Lower River Road (State Route 501 [SR 501]) to the west, NW Old Lower River Road to the south, and the Old Alcoa facility access road to the east. A limited amount of site traffic and all construction-related traffic use NW Gateway Avenue from NW Lower River Road (SR 501), as well as a private access drive just east of the Farwest Steel Corporation building.

Key roadways in the vicinity of the proposed Facility include

- State Route 501—Washington State Department of Transportation (WSDOT) operates and maintains SR 501. Beginning west of Interstate 5, this highway heads west out of the downtown Vancouver area as Mill Plain Boulevard and then transitions into NW Lower River Road, west of the Fourth Plain Boulevard/Mill Plain Boulevard intersection. As Mill Plain Boulevard, the highway operates as a one-way couplet through the downtown area before transitioning into a two-way, five-lane road west of Franklin Street. The roadway has urban design features, including landscaped medians, bicycle lanes, and sidewalks. West of the Fourth Plain Boulevard intersection, the highway becomes more rural in nature, where it reduces to two travel lanes with left-turn lanes provided at major intersections. The highway generally has wide paved shoulders and fog line striping for bicycle travel, and there is a multi-use path at intermittent locations along the south side of the road. Construction of a multi-purpose path is currently underway that would connect from the intersection of Mill Plain and Fourth Plain Boulevards at NW Lower River Road, to NW Gateway Avenue. Continued buildout of the Port would prompt this path to be extended to the Flushing Channel.
- NW Gateway Avenue—NW Gateway Avenue is the main entrance to the Port Terminal 5. The roadway is a private road with two travel lanes and partial sidewalks; on-street parking is allowed.
- Old Lower River Road—Old Lower River Road leads to the west end of Port Terminal 5 as it extends south from NW Lower River Road (SR 501). The roadway continues west to provide access to local industrial businesses before it circles back to SR 501 to the northwest. It is a public local road with two lanes of travel, no sidewalks or bicycle lanes, and no on-street parking.
- Old Alcoa Access Facility Road—The Old Alcoa access facility road extends east from where Old Lower River Road turns southbound to westbound. This private road has two travel lanes, a posted speed of 15 mph, and no sidewalks. It leads east to the NGL Energy Partners LP propane supply facility and a gate that prevents further travel east. This roadway serves as the primary local access road for the Facility.

1.1.1 Facility-Wide Fire/Safety Systems Overview

Firefighting equipment is installed and maintained throughout the Terminal and includes automatic and engineered controls, to allow control of fires should they occur. Fire suppression equipment and systems are designed to National Fire Protection Association (NFPA) and American Petroleum Institute (API) requirements, the more stringent Factory Mutual Global insurance requirements, and state and local regulations. Buildings are fireproofed, and emergency egress is provided in accordance with applicable fire and building codes. All automatic fire suppression systems are designed to activate automatically and will be equipped with manual trip stations. The design of fire suppression systems for each Facility area is discussed below.

Fire suppression systems, linear heat detection, manual release stations, and gas monitors are connected to local audible alarms and visual strobes located in areas 200, 300, 400, and 600. Each area has its own fire alarm system control panel that transmits to a supervising station at the e-house/control room for each area. **All alarm signals will also initiate the audible and visual alarm, transmit the alarm signal to the supervising station, and shut down the transfer operation, with all crude oil transfer valves closing within 30 seconds.**

The Facility also has a facility-wide fire/evacuation alarm that is activated from the Area 200 Control Room. Section 1.11 contains additional information about the facility alarms.

1.1.2 Area 200 – Fire/Safety Systems Overview

Area 200 (Rail Unloading Building and Administration), shown in Figure 4 (in Section 1.2), encompasses the main office, the employee change building, the rail off-loading structure, five e-houses (containing electrical equipment), the main control room, and a fire pump/foam building.

The railcar unloading area is served with a foam fire extinguishing system. A closed-head foam-water pre-action sprinkler system is installed inside the rail unloading structure at the roof level, under walkways (as required by code) and in the pump basin areas. The structure is divided into five zones; each zone will be

activated either manually from the foam manual release stations or automatically from the linear heat detection installed at the roof level and at the pump basin level for that associated zone. The pump basins are located in the center of each zone respectively between the tracks. Note that this system is a closed-head pre-action foam-water system; therefore, foam-water solution will only be discharged once the fire is large enough to activate the linear heat detection, trip the valve and then activate the sprinklers above the fire. In the event of a fire, foam would be used to control and extinguish the crude oil pool fire and will also provide cooling to the railcars and any adjacent equipment or building elements.

Manual foam release stations are located at the base and at the top of the stairs of the rail unloading structure and at every egress point of the rail unloading structure.

A closed-head wet-pipe sprinkler system (water only, no foam) is provided for the Fire Pump/Foam Building in accordance with NFPA 20, Section 4.12.1.1.2. The wetpipe system contains water under pressure; therefore, when a fire starts and grows large enough to trip a sprinkler at the ceiling/room, a sprinkler or sprinklers are expected to control the fire.

Manual fire pull stations are surface mounted, and typically located within 5 feet of every egress point, near the fire alarm control panel in the rail unloading structure and at exits from the fire pump/foam buildings and e-houses. These manual pull stations, when manually activated, will send an alarm signal to the fire alarm panel, activate the audible and visual alarms and transmit the alarm signal to the supervising station.

The system includes linear heat detectors, gas detectors, temperature monitors, pump monitors, automatic exterior alarm horns and strobes, manual alarm stations, automatic and manual foam release systems, and tamper-resistant systems. The manual foam release stations are mounted on catwalks near stairway exit paths. All systems interface with the Area 200 control room.

Fire hydrants supplied by the City of Vancouver water distribution system are located on the south side of the rail unloading structure, spaced at 300 foot intervals and are accessible to fire department apparatus. The office and support buildings are equipped with ABC-type fire extinguishers.

Hydrogen sulfide (H_2S) and lower explosive limit (LEL) monitors are located at each unloading station. H_2S, LEL, and oxygen (O_2) monitors are located in each pump pit basin. The high and low alarm set-points for the gas detector system are as follows.

Gas Detector	Low Alarm	High Alarm
H_2S	10 ppm	15 ppm
LEL	10% LEL	30% LEL
O_2	19%	24%

Eyewash and emergency shower stations are located near the pump pits and in the control room.

1.1.3 Area 300 – Fire/Safety Systems Overview

Area 300 (Storage Area), shown in Figure 5 (in Section 1.2), contains six crude oil ASTs. Area 300 also has a Fire Pump/Foam Building, Storage Building, e-house, and pump basin. All tanks are located inside a perimeter dike capable of containing 110 percent of the volume of the largest tank plus precipitation from a 24-hour, 100-year storm event. The tanks are positioned so that the distance between each tank is at least 120 feet in all directions. The distance from the tank to the dike varies from 33 to 150 feet.

An automatic fixed foam system is provided for each storage tank to protect the seal area of the internal floating roof. This system will be activated by the linear heat detection system installed at the foam dam of the floating roof or by the manual foam release stations associated with each respective tank. These

automatic fixed foam systems are specifically designed to control a potential fire inside a tank. The linear heat detection cable located around the foam dam is connected to the fire alarm system.

Manual foam release stations are located at the base of the stairs on the tanks, at the top of the dike near the closest fire hydrant for each tank, and on a bank of release stations located at the foam/pump house.

The fire pump/foam building is equipped with a closed-head wet-pipe sprinkler system (water only, no foam) in accordance with NFPA 20, Section 4.12.1.1.2. The wetpipe system contains water under pressure, therefore, if a fire starts and grows large enough to trip a sprinkler at the ceiling/room, a sprinkler or sprinklers are expected to control the fire.

Manual fire pull stations are surface mounted, and typically located at every exit from the fire pump/foam buildings and e-houses within Area 300. These manual pull stations, when manually activated, will send an alarm signal to the fire alarm panel, activate the audible and visual alarms and transmit the alarm signal to the supervising station.

Fire hydrants for fire department use are located around the perimeter of Area 300, spaced at 300-foot intervals. Two fire hydrants are located inside the dike area near the intersection of the intermediate dikes. These fire hydrants include a monitor nozzle that can be used to cool the tanks, reduce potential fire exposure and apply the self-healing biodegradable foam.

Each fire hydrant is equipped with a monitor nozzle and foam eductor and pick-up line that can be placed in a bucket, pail or other portable device of foam concentrate, which will draw foam concentrate from the pail/container to generate a foam solution. The flow of water from these monitor nozzles are provided to create a cooling effect on the tank wall. The foam eductor provided on each monitor nozzles will allow the fire hydrant to spray a foam water solution and control a small pool fire within the dike area. A predetermined size of foam concentrate will be kept in the Fire Pump/Foam Building. When the need arises for its use, such as a small spill or rubbish fire, the foam concentrate will be taken to the appropriate fire hydrant and the hose will be placed in the bucket, pail or other portable device. The nozzle will draw the foam in at the manufacturer determined proportioning rate to achieve the desired concentration of foam/water solution.

Additionally, an elevated monitor nozzle supplied with foam-water from the Fire Pump/Foam Building is located near the crude oil pump basin with the primary purpose of providing manual fire suppression to the pump basin. This monitor nozzle for the crude oil pump basin is capable of providing a 3 percent foam application to the pump basin area. Utilizing a flow rate of 750 gallons per minute will provide coverage of the crude oil pump basin.

Hydrogen sulfide (H_2S), LEL, and O_2 monitors are located in the pump basin. The high and low alarm set-points for the gas detector system are as follows:

Gas Detector	Low Alarm	High Alarm
H_2S	10 ppm	15 ppm
LEL	10% LEL	30% LEL
O_2	19%	24%

Eyewash and emergency shower stations are located in the storage building and on the north side of the e-house.

1.1.4 Area 400 – Fire/Safety Systems Overview

Area 400 (Marine Terminal Area), shown in Figure 6 (in Section 1.2), consists of berths 13 and 14, the control room/e-house, and the fire pump/foam building. Safety measures include automatic shutoff

valves, a line to return crude to the storage tanks, a marine vapor combustion unit, floating booms and manual fire protection features. Berth 14 is used for storage of and access to the boat that deploys the boom in the water around the vessel. There are no crude unloading operations planned for Berth 14. Other structures located at the Marine Terminal Area include a control room/e-house, vapor blower staging unit, fire pump/foam building, and a dock safety unit.

Two elevated fire monitors are installed at the marine loading dock. The monitor nozzles are supplied from a Pre-Action Foam System located in the fire pump/foam building. Activation of the foam-water monitor nozzles is by manual foam release stations located in the e-house and throughout Area 400. The controller for the nozzles will be located in the e-house located shore side. A fire hydrant is provided for fire department use near Area 400, supplied by the City of Vancouver water distribution system. This system is primarily for fires on the berth, but can be used to assist in the event of a vessel fire. Manual foam release stations are located at the loading berth.

The fire pump/foam building is equipped with a closed-head wet-pipe sprinkler system (water only, no foam) in accordance with NFPA 20, Section 4.12.1.1.2. The wetpipe system contain water under pressure, therefore, if a fire starts and grows large enough to trip a sprinkler at the ceiling/room a sprinkler or sprinklers are expected to control the fire.

Manual fire pull stations are surface mounted, and typically located at every exit from the fire pump/foam buildings and e-houses for Area 400. These manual pull stations, when manually activated, will send an alarm signal to the fire alarm panel, activate the audible and visual alarms and transmit the alarm signal to the supervising station.

The vessels berthing at the Marine Terminal are required to have on-board fire protection systems, as well as contracts with commercial marine firefighting companies, to respond in the event of a shipboard fire.

Eyewash and emergency shower stations are located on the east and west sides of Berth 13.

1.1.5 Area 500 – Fire/Safety Systems Overview

Area 500 (Transfer Pipelines) consist of transfer pipelines that run between areas 200, 300, and 400. The transfer pipelines are mainly aboveground and on supports. Where required to avoid interferences or cross over rail track, the pipeline is underground and is encased in a secondary containment pipe.

The pipeline area is served by existing and new (as constructed to serve specific Facility areas) fire hydrants in the vicinity of the pipeline alignment.

1.1.6 Area 600 – Fire/Safety Systems Overview

Area 600 (West Boiler), shown in Figure 7 (in Section 1.2), contains a boiler building with a natural-gas boiler. The boiler is utilized to generate steam for heated crude unloading operations inside Area 200. Area 600 also includes an e-house.

The boiler building and surrounding area are served by adjacent fire hydrants. Smoke detectors, automatic and manual alarms, and hand held fire extinguishers are located as appropriate inside and outside the boiler building as required by local fire code. Based on the construction type and occupancy classification, sprinkler systems are not necessary for fire control in the Area 600 boiler building.

Eyewash and emergency shower stations are located along the east, south, and west walls of the boiler building.

1.1.7 Rail Infrastructure – Fire/Safety Systems Overview

The rail infrastructure operated by the Facility is served by fire hydrants in the vicinity of the rail loop alignment. An overpass exists over the rail line on the east side of the rail loop; emergency services could use this overpass to access the interior of the rail loop.

1.2 Site Maps/Figures

List of Figures (Section 1.2)

Figure 1. Vicinity Map
Figure 2. Site Plan
Figure 3. Life Safety Site Plan
Figure 4A. Area 200 – Life Safety Site Plan
Figure 4B. Area 200 – Typical Life Safety Unloading Building Plans
Figure 4C. Area 200 – Life Safety Plans
Figure 5A. Area 300 – Life Safety Site Plan
Figure 5B. Area 300 – Life Safety Plans
Figure 6A. Area 400 – Life Safety Site Plan
Figure 6B. Area 400 – Life Safety Plans
Figure 7A. Area 600 – Life Safety Site Plan
Figure 7B. Area 600 – Life Safety Plans

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Figure 1 - Vicinity Map

LEGEND

- Project Boundary
- Vancouver, WA
- Portland, Oregon

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

N

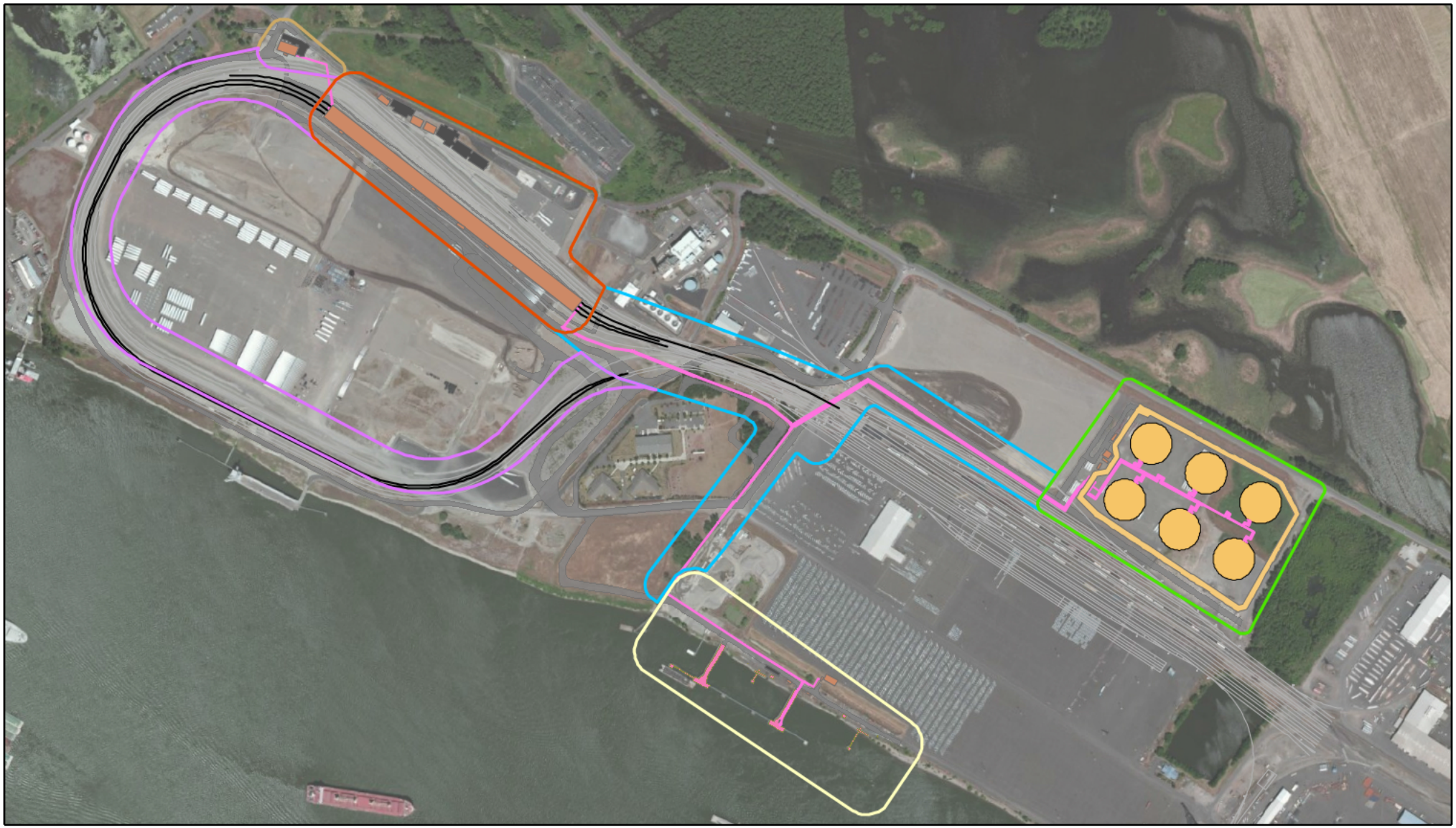

Figure 2 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000 Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

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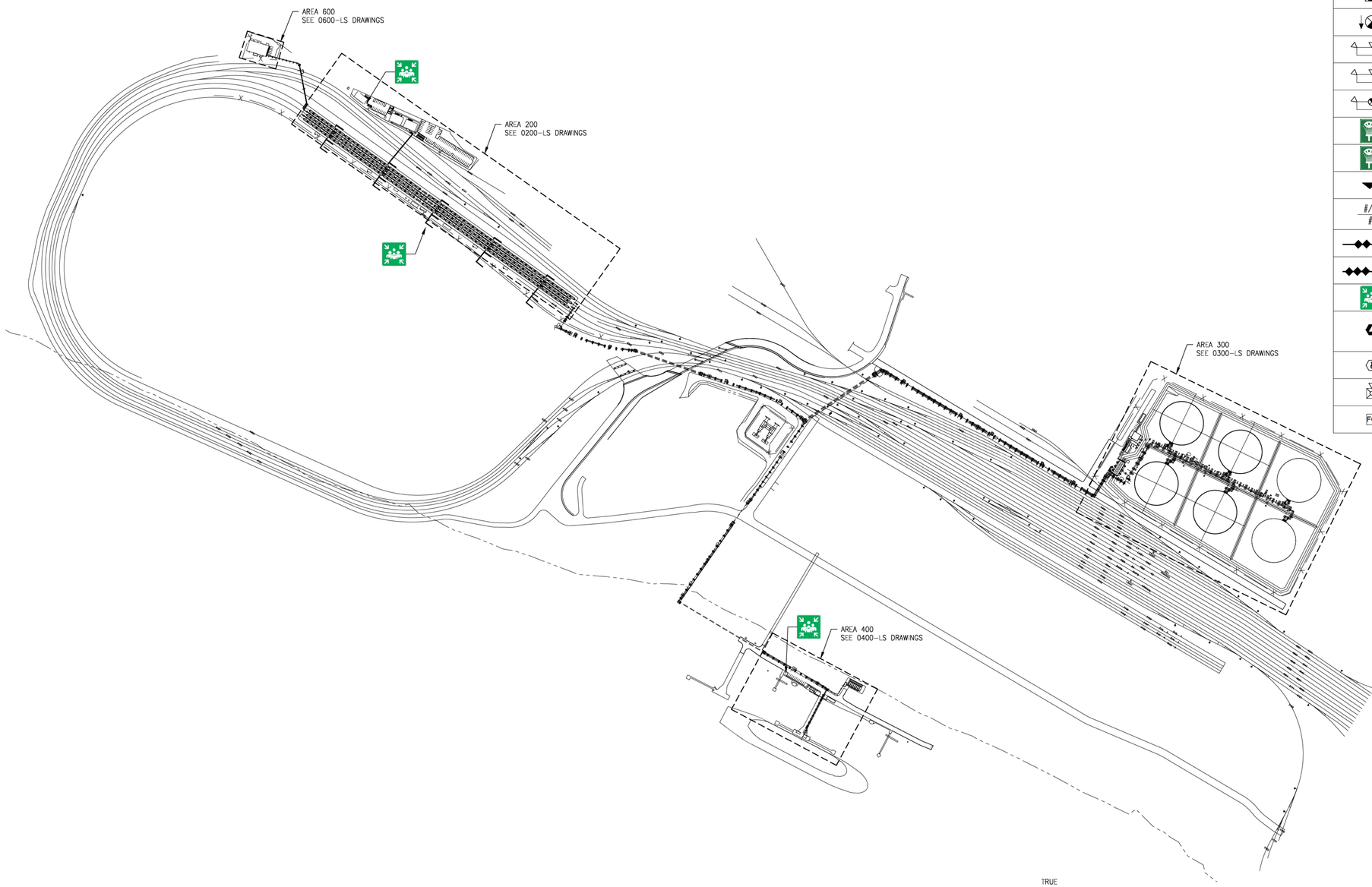
OFF-SITE EVACUTATION:
ALONG NW OLD LOWER RIVER
RD, APPROX. 500 FEET
NORTHWEST OF THE MAIN OFFICE



SYMBOLS LEGEND	DESCRIPTION	PROTECTIVE ELEMENTS
	DRY CHEMICAL EXTINGUISHER – ABC TYPE	
W	DRY CHEMICAL EXTINGUISHER – ABC TYPE – WHEELED	
	ILLUMINATED EXIT SIGN	
	EMERGENCY LIGHT – BATTERY POWERED	
EP	EMERGENCY LIGHT – BATTERY POWERED – EXPLOSION PROOF	
	COMBINED BATTERY POWERED EMERGENCY LIGHT AND ILLUMINATED EXIT SIGN	
	EYE WASH STATION – HEATED	
P	EYE WASH STATION – PORTABLE	
	EXIT – EXTERIOR	
#/#" #"	ACCUMULATED EXIT WIDTH AT REQUIRED EXIT (CLEAR WIDTH)	OCCUPANTS / REQUIRED WIDTH PROVIDED WIDTH (BASED ON MOST RESTRICTIVE EXIT COMPONENT)
	2 HOUR FIRE BARRIER	
	3 HOUR FIRE BARRIER	
	MUSTER POINT	
X	GAS DETECTOR	GAS DETECTOR SETTINGS: CH4: LOW/10%LEL HIGH/30%LEL H2S: LOW/10ppm HIGH/15ppm 02: LOW/19% HIGH/24%
	SMOKE DETECTOR	
	HORN/STROBE	
FO	FOAM RELEASE MANUAL SWITCH	

GENERAL NOTES:

1. THESE DRAWINGS ARE CONCEPTUAL IN NATURE AND ARE ONLY MEANT TO SHOW THE DESIGN INTENT.
2. THE EQUIPMENT PLACEMENT SHOWN IS FOR DIAGRAMMATIC PURPOSES ONLY. THE ENGINEER RESPONSIBLE FOR THE INSTALLATION SHALL MAKE ANY FINAL DETERMINATIONS ON DEVIATIONS FROM THIS LAYOUT.
3. ALL EQUIPMENT TO BE INSTALLED SHALL BE IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE (2012), INTERNATIONAL FIRE CODE (2012), NFPA 10 (2010), NFPA 30 (2012), ANSI Z358.1 (2009), AND OTHER APPLICABLE CODES AND STANDARDS, OR AS REQUIRED BY THE "AHJ".
4. EXTINGUISHERS LOCATED IN E-HOUSES ARE ALLOWED TO BE CO_2.
5. FIRE EXTINGUISHERS LOCATED OUTSIDE OR EXPOSED TO WEATHER SHALL BE PROTECTED BY AN ENCLOSURE OR PROTECTIVE COVER.

1 LIFE SAFETY SITE PLAN
SCALE: 1" = 300'

TRUE NORTH

0 300' 600'

Poole Fire Protection
19910 West 161st Street
Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

JOHN W. POOLE III
STATE OF WASHINGTON
14993
REGISTERED
PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

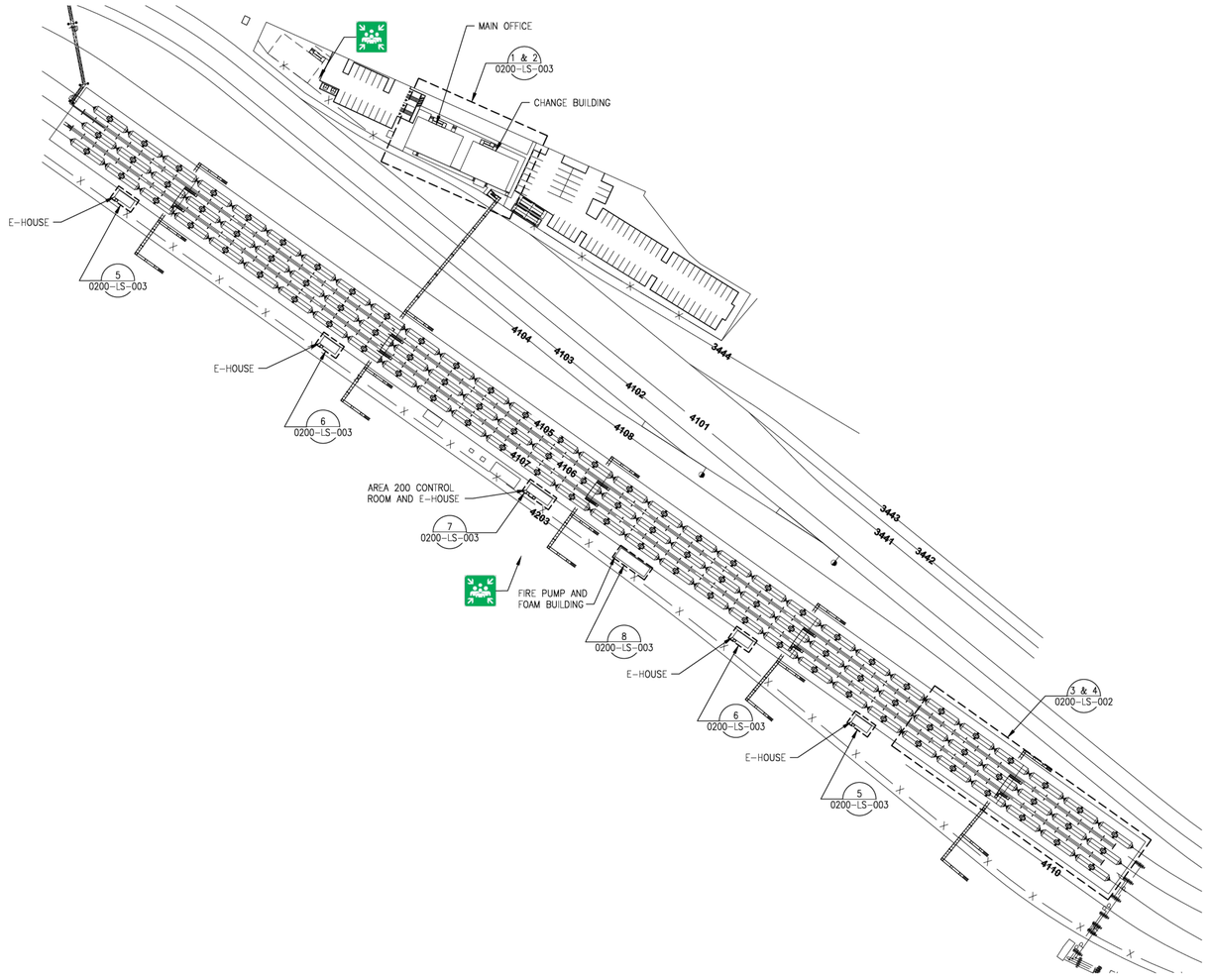
VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/31/2014	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0100-LS-001	1/1	A



1 AREA 200 – LIFE SAFETY SITE PLAN
SCALE: 1" = 100'

TRUE NORTH

0 100' 200'

Poole Fire Protection
19910 West 161st Street
Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

JOHN W. POOLE III
STATE OF WASHINGTON
34993
REGISTERED
PROFESSIONAL ENGINEER

PERMIT SET
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NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

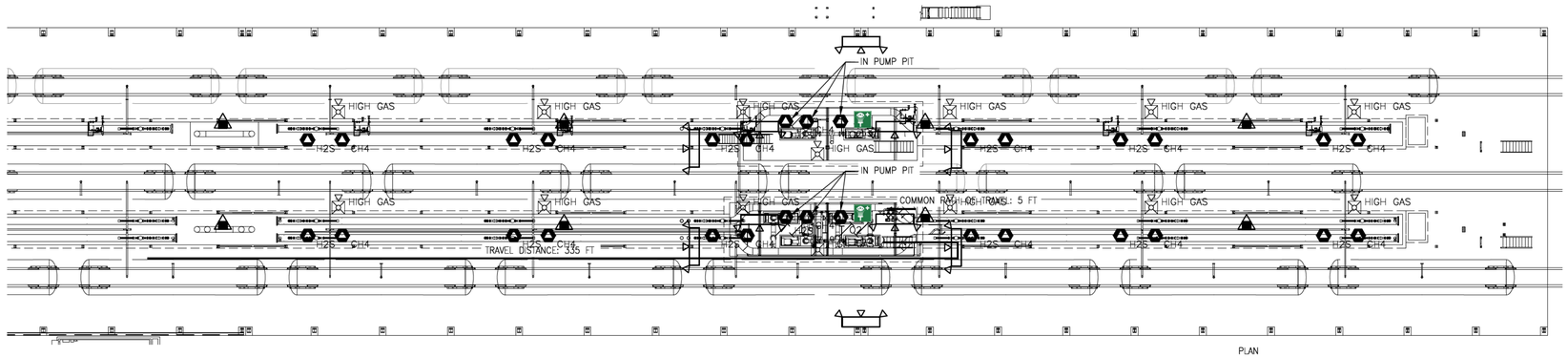
VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0200-LS-001	1/1	A



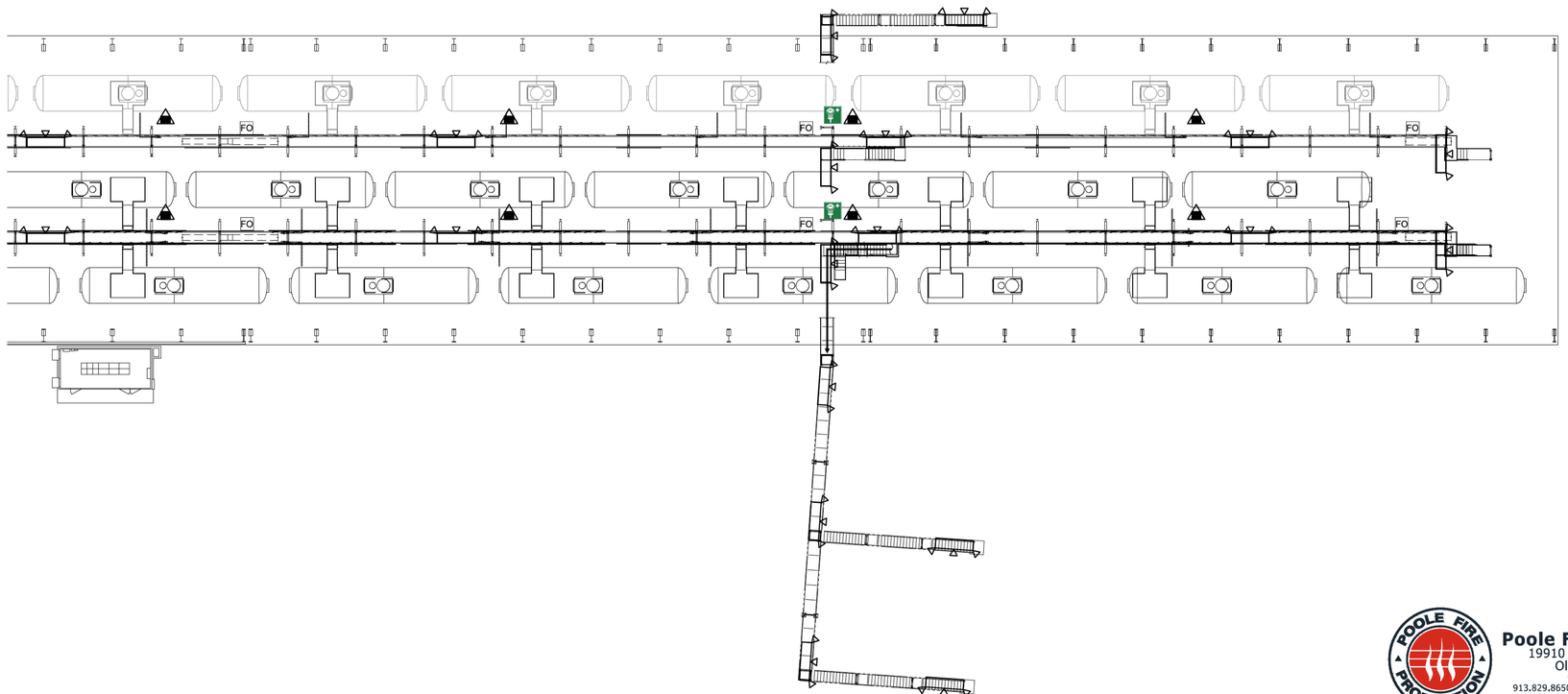
3 AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLAN @ T/RAIL EL 32'–6"

SCALE: 1" = 20'

0 20' 40'

PLAN TRUE NORTH

TRUE NORTH



4 AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLAN @ EL 57'–8"

SCALE: 1" = 20'

0 20' 40'

PLAN TRUE NORTH

TRUE NORTH

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19910 West 161st Street
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PERMIT SET
NOT FOR CONSTRUCTION

JOHN W. POOLE III — STATE OF WASHINGTON — 14992 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLANS

DESIGN:	R. BENNETT	START DATE:	4/29/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0200-LS-002	1/1	A

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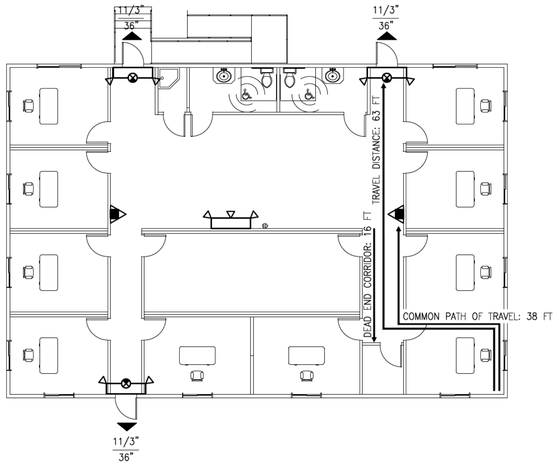
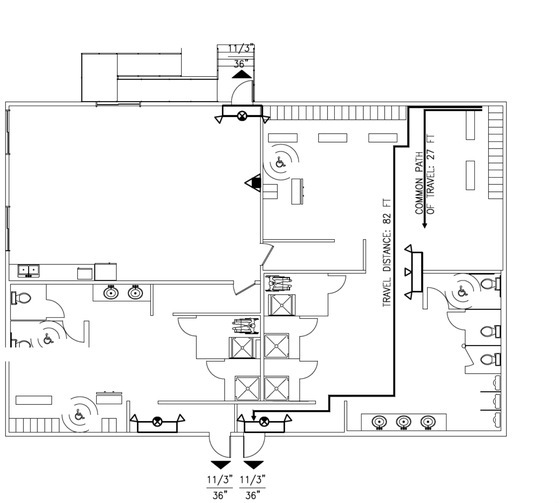
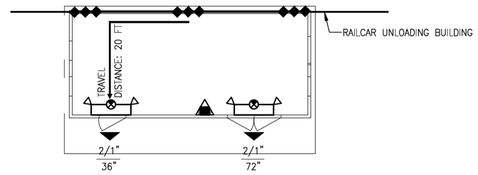


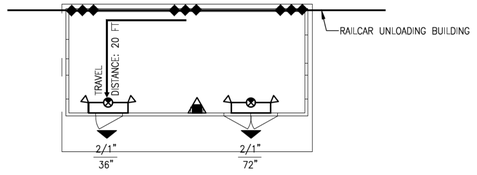
1 AREA 200 – LIFE SAFETY OFFICE BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN TRUE NORTH



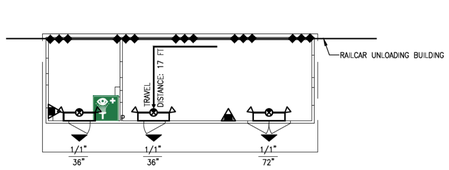
2 AREA 200 – LIFE SAFETY CHANGE BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN TRUE NORTH



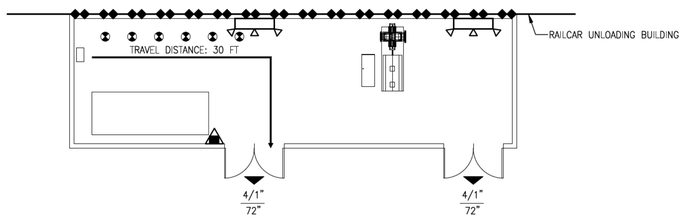
5 AREA 200 – LIFE SAFETY E-HOUSE 1 & 5 PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH



6 AREA 200 – LIFE SAFETY E-HOUSE 2 & 4 PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH



7 AREA 200 – LIFE SAFETY CONTROL ROOM/E-HOUSE 3 PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH



8 AREA 200 – LIFE SAFETY FIRE PUMP AND FOAM BUILDING PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH

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913.829.8650 office ▲ 913.829.8690 fax

JOHN W. POOLE III — STATE OF WASHINGTON — 14993 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

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700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200 – LIFE SAFETY PLANS

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER: 0200-LS-003 | SHEET: 1/1 | REV.: A

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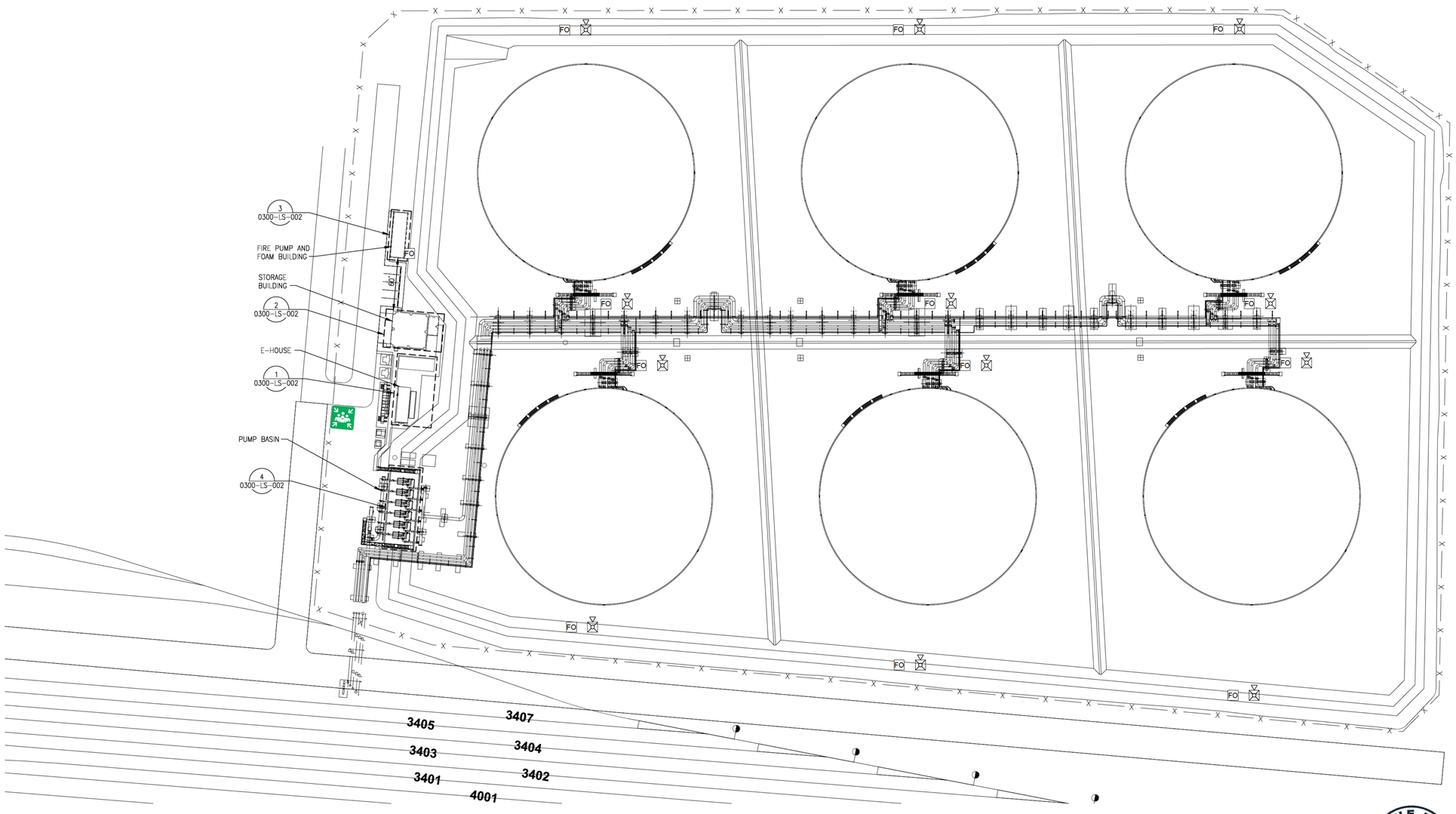

1 AREA 300 – LIFE SAFETY SITE PLAN
SCALE: 1" = 60'

PLAN NORTH
TRUE NORTH

0 60' 120'

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JOHN W. POOLE III
STATE OF WASHINGTON
14993
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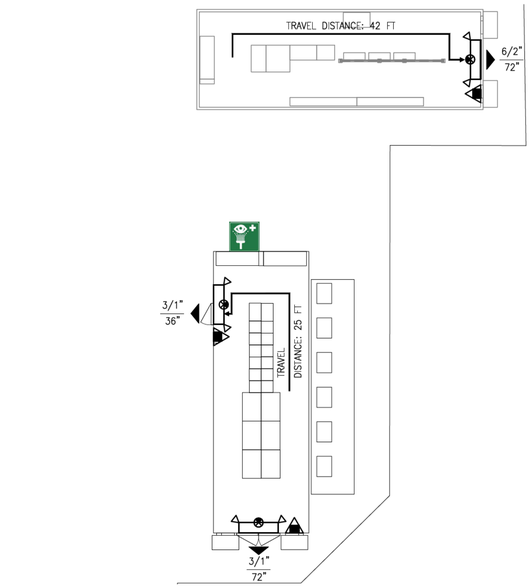
VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

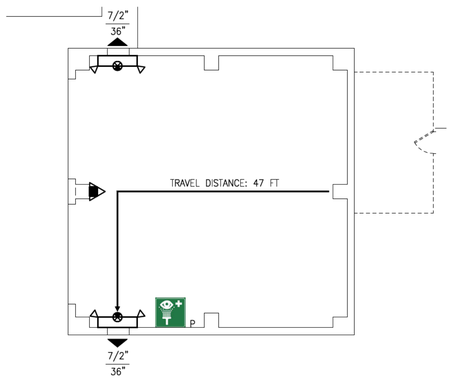
DESCRIPTION:
AREA 300 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

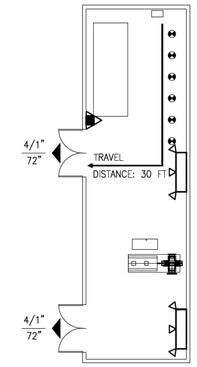
DRAWING NUMBER	SHEET	REV.
0300-LS-001	1/1	A



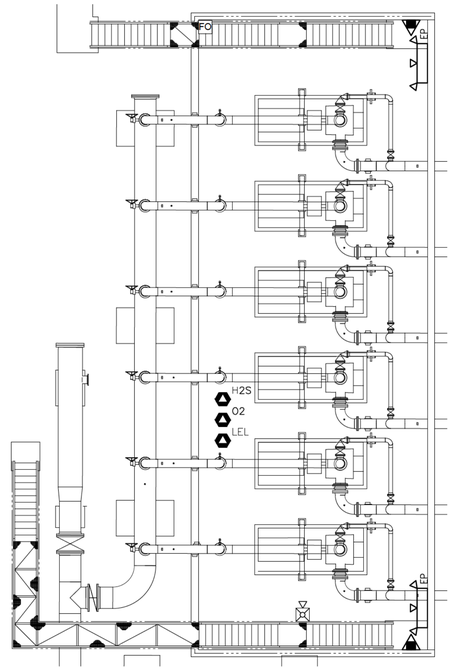
1 AREA 300 – LIFE SAFETY E-HOUSE PLAN
SCALE: 1" = 10'
0 10' 20'
TRUE NORTH
PLAN NORTH



2 AREA 300 – LIFE SAFETY STORAGE BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
TRUE NORTH
PLAN NORTH



3 AREA 300 – LIFE SAFETY FIRE PUMP AND FOAM BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
TRUE NORTH
PLAN NORTH



4 AREA 300 – LIFE SAFETY PUMP BASIN PLAN
SCALE: 1" = 10'
0 10' 20'
TRUE NORTH
PLAN NORTH

PERMIT SET
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JOHN W. POOLE III
STATE OF WASHINGTON
24991
REGISTERED
PROFESSIONAL ENGINEER

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19910 West 161st Street
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www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

NO.	DATE	REVISION	BY	CK'D	APP

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Portland, Oregon 97232-4189
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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 300 – LIFE SAFETY PLANS

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0300-LS-002	1/1	A

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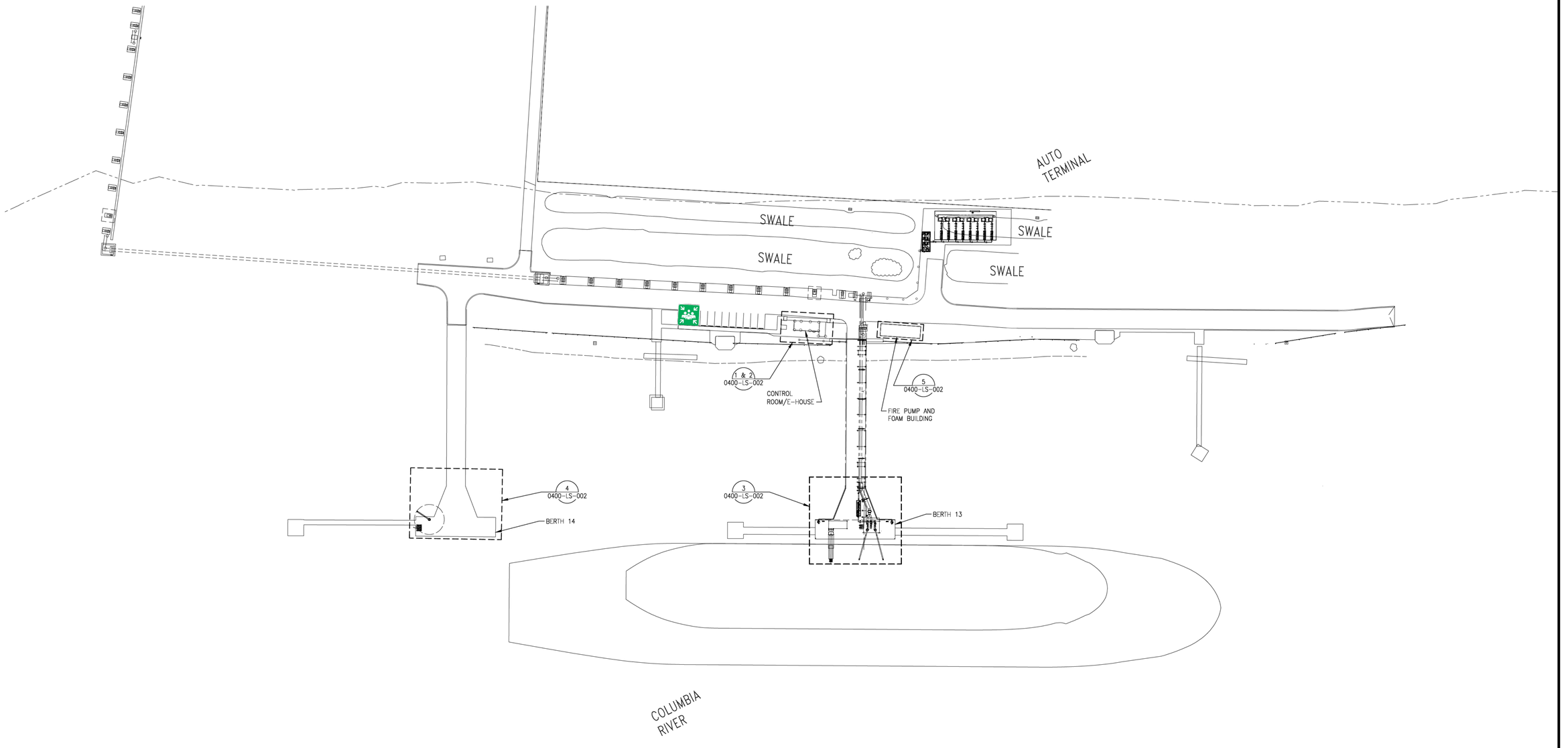

1 AREA 400 – LIFE SAFETY SITE PLAN
SCALE: 1" = 60'

PLAN NORTH
TRUE NORTH
0 60' 120'

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JOHN W. POOLE III — STATE OF WASHINGTON — 14993 — REGISTERED PROFESSIONAL ENGINEER

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NO.	DATE	REVISION	BY	CK'D	APP

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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 400 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	4/29/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0400-LS-001	1/1	A

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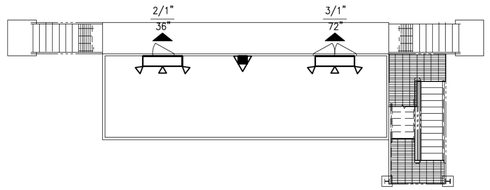
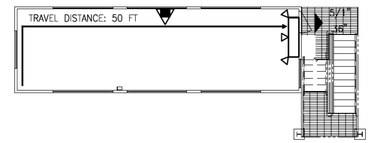
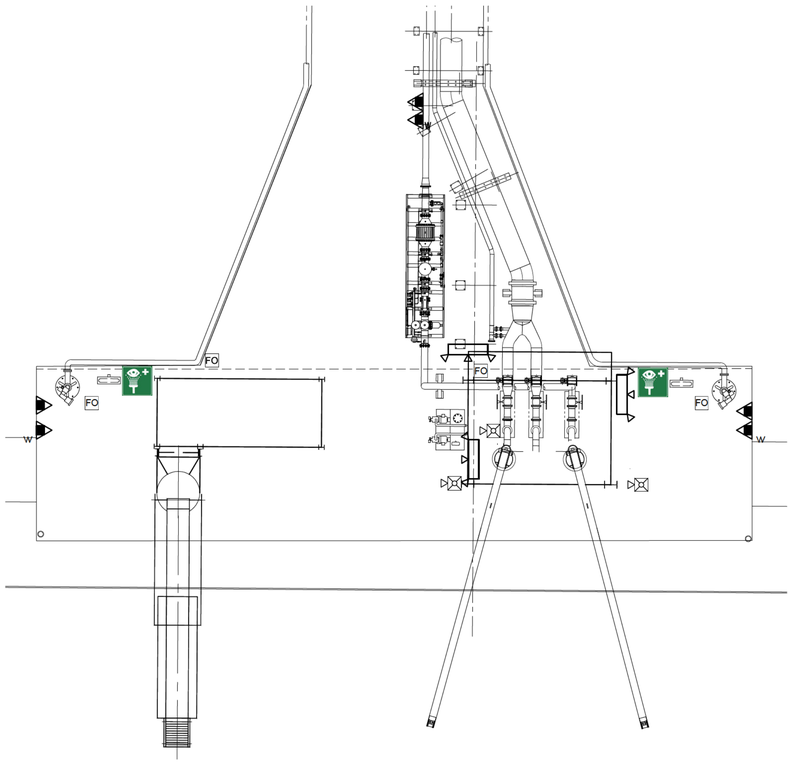


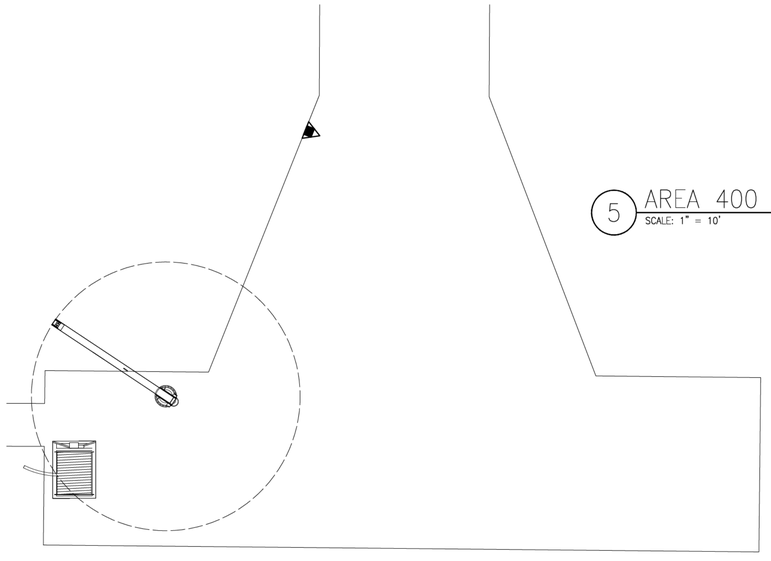
1 AREA 400 – LIFE SAFETY CONTROL ROOM/E-HOUSE BOTTOM FLOOR PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN NORTH / TRUE NORTH



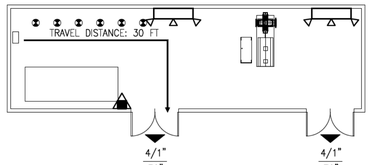
2 AREA 400 – LIFE SAFETY CONTROL ROOM/E-HOUSE UPPER FLOOR PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN NORTH / TRUE NORTH



3 AREA 400 – LIFE SAFETY BERTH 13 PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN NORTH / TRUE NORTH



4 AREA 400 – LIFE SAFETY BERTH 14 PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN NORTH / TRUE NORTH



5 AREA 400 – LIFE SAFETY FIRE PUMP AND FOAM BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN NORTH / TRUE NORTH

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JOHN W. POOLE III
STATE OF WASHINGTON
14993
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NO.	DATE	REVISION	BY	CK'D	APP

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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 400 – LIFE SAFETY PLANS

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0400-LS-002	1/1	A

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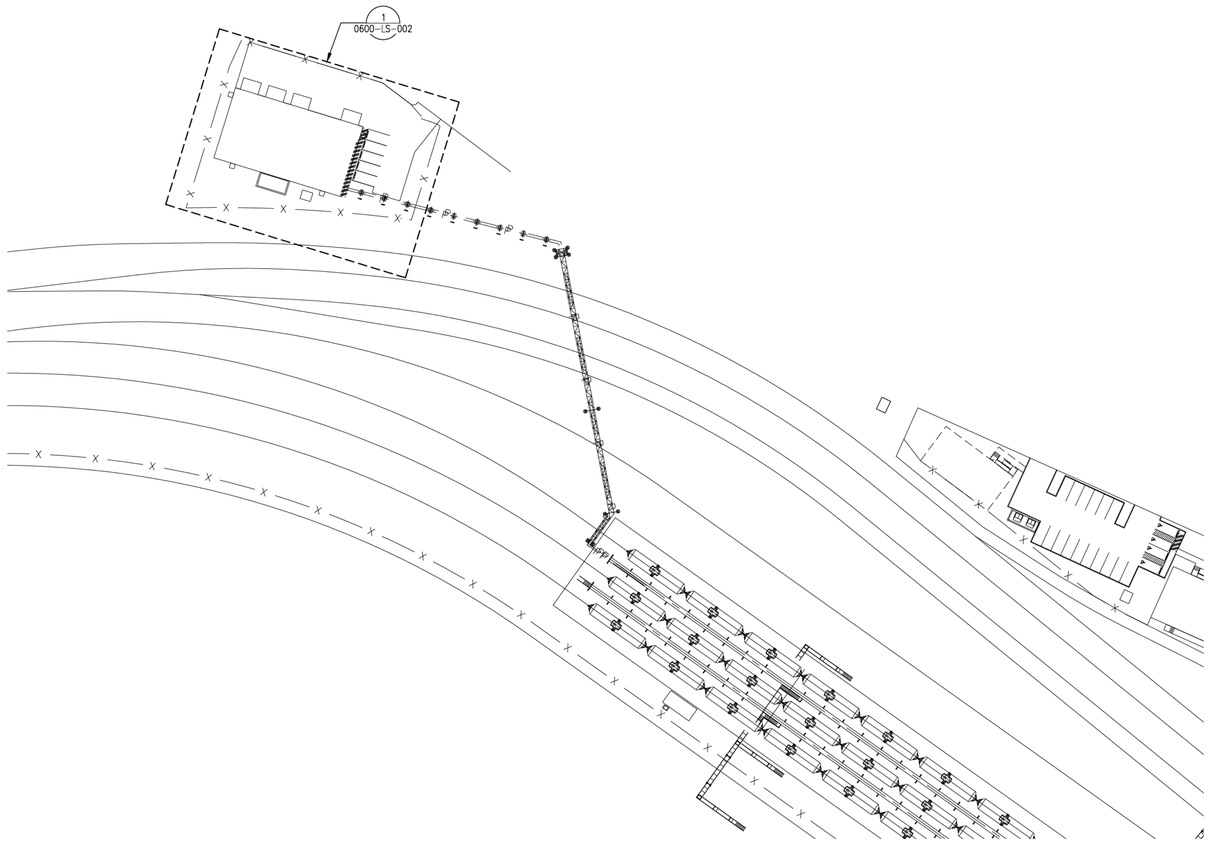

1 AREA 600 – LIFE SAFETY SITE PLAN
SCALE: 1" = 60'

TRUE NORTH

0 60' 120'

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JOHN W. POOLE III — STATE OF WASHINGTON — 34993 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 600 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0600-LS-001	1/1	A

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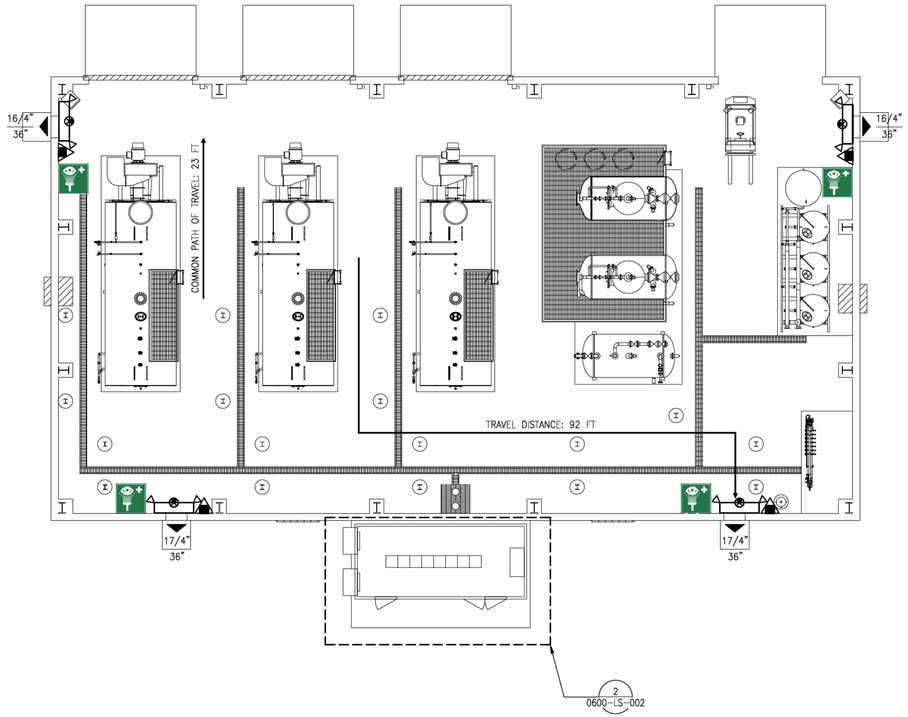
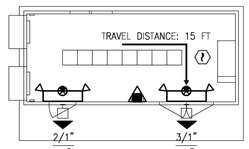


1 AREA 600 – LIFE SAFETY BOILER HOUSE PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN TRUE NORTH NORTH

EVACUATE TO AREA 200
ASSEMBLY AREA



2 AREA 600 – LIFE SAFETY E-HOUSE PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH NORTH

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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 600 – LIFE SAFETY PLANS

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER: 0600-LS-002 | SHEET: 1/1 | REV.: A

1.3 Purpose/Scope

This emergency response plan (ERP) is to be utilized by all personnel at the Facility (including Savage and Tesoro personnel) in the event of a fire, explosion, accidental release, or other natural or man-made emergencies. The purpose of this plan is to minimize hazards to human health, the environment and property, and to protect the work force, the surrounding community, the environment and property from fire, explosion, or any unplanned sudden or non-sudden accidental release of hazardous or flammable commodities at this location, or other natural disasters. This plan covers the entire Vancouver Energy Terminal. BNSF is responsible for railcar emergency response up until the point where the BNSF engineer parks the railcars at the Facility. Once parked, the Facility is responsible for railcar emergency response until BNSF engineers take control of the empty railcars to move them off site. This ERP does not include vessels docked at the Marine Terminal or adjacent properties; however, notification and evacuation resulting from a serious emergency will be coordinated with potentially impacted parties, including BNSF, vessels, the Port, and adjacent properties.

1.4 Regulatory Mandate

This plan is designed to satisfy the requirements of state and federal emergency response planning regulations.

- WAC 296-824, Emergency Response
- 29 CFR 1910.38, Emergency Action Plan
- 29 CFR 1910.120(q), Hazardous Waste Operations And Emergency Response
- 40 CFR 355, Emergency Planning and Notification (and WAC 118-40-300) requires that facilities that have an extremely hazardous substance (EHS) present at the facility in an amount equal to or greater than its threshold planning quantity (TPQ), or facilities that have been designated for emergency planning purposes by the Governor or the State Emergency Response Commission to provide information and conduct emergency planning with the Local Emergency Planning Committee (LEPC) and State Emergency Planning Committee. This facility has does not have an EHS over the TPQ, or has not been designated for emergency planning. However, the facility will provide a copy of this ERP to the LEPC, which is the CRESA.

Under 29 CFR 1910.120(q)(1), employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan in accordance with 29 CFR 1910.38.

Under 49 CFR 172, Section G (Emergency Response Information), facilities where hazardous materials are loaded for transportation, stored incidental to transportation or otherwise handled during any phase of transportation must provide emergency response information. This ERP does not address provision of shipping papers for materials shipped. For materials stored and handled at the Facility incidental to transportation, the emergency response information is provided in Section 1.10.

1.5 Plan Review and Update

The Operations Manager is responsible for reviewing, updating, and distributing this ERP. The ERP will be updated frequently throughout Facility construction and updates will be documented in the Management of Change plan. Plan review and updating will be done on an annual basis or more frequently if significant changes occur at the facility that may affect the Facility's emergency response capability. The ERP will also be reviewed and updated as necessary following an incident, per the procedures in Section 3.

1.6 Implementation/Relationship to Other Plans

This ERP is part of the Vancouver Energy Operations Facility Safety Program. Other plans that are part of the Vancouver Energy Operations Facility Safety Program that are referenced herein include

- Vancouver Energy Operations Facility Safety Program Section 3.2: Operations Facility Security Plan
- Vancouver Energy Operations Facility Safety Program Section 16: Fire Protection Plan

The following plans have also been developed for emergency response at the Facility and are referenced herein.

- Vancouver Energy Operations Spill Prevention, Control, and Countermeasures Plan (SPCC)
- Vancouver Energy Operations Facility Oil Spill Contingency Plan (OSCP)

In the event that an emergency situation occurs, this ERP will be implemented immediately. It is envisioned that this ERP would be utilized for the following types of incidents.

- Fire/Explosion: Any fire, potential fire or explosion that involves a commodity which has the potential to spread, or has the potential to release flammable or toxic fumes. Any explosion or potential explosion that occurs in, on, or near the facility.
- Product Spills: Releases or potential releases (small leaks, drips and spills) of hazardous material or any material that may cause undesirable environmental damage. In the event of an oil spill, the OSCP will govern for spill response and this ERP will define procedures if evacuation is required.
- Vapor Release: Any release of flammable or toxic fumes and/or vapors, which may be hazardous to the personnel of the facility or the surrounding community.
- Acts of God (severe weather, earthquake, volcanic activity): Any incidents related to weather or acts of God, which cause the facility to be in imminent danger.
- Medical Emergencies: Injury, illness, or epidemic outbreaks.
- Security Incidents / Suspicious Activities: For security incidents, refer to the Facility Security Plan, and this ERP will define procedures if evacuation is required.
- Railcar Derail: Railcar derail incidents that result in any of the emergencies above or pose an imminent threat of an emergency situation, such as fire or release, will trigger implementation of this ERP.

This ERP is intended to be consistent with the following local plans.

- Emergency Preparedness Plan for the Port of Vancouver
- Clark County Hazardous Materials Emergency Response Plan

1.7 Coordination with Response Agencies

A copy of this ERP will be provided to Vancouver City (for the reference of the Fire Department and Police Department) and the CRESA, which is the LEPC.

The Vancouver Fire Department, Vancouver Police Department, and CRESA will be invited to participate in annual ERP drills, as described in Section 4.4.

1.8 Facility Owner/Operator Information

Facility Information	
Name of Facility:	Vancouver Energy
Site Address:	5501 NW Old Lower River Road
City, State, Zip Code	Vancouver, WA 98660
County:	Clark
Contact Name:	To Be Determined, Operations Manager
Contact Phone:	Office: To Be Determined; Mobile: To Be Determined
Facility Owner/Lessee	
Name:	Tesoro Savage Petroleum Terminal, LLC (dba Vancouver Energy)
Address:	901 W Legacy Center Way
City, State, Zip Code	Midvale, UT 94047
Telephone Number:	(801) 944-6600
Fax Number:	To Be Determined
Email Address:	To Be Determined
Property Owner	
Name:	Port of Vancouver USA
Address:	3103 NW Lower River Road
City, State, Zip Code	Vancouver, WA 98660
Telephone Number:	(360) 922-1120 (24-hour on-duty Security Officer)
Fax Number:	(360) 735-1565
Email Address:	To Be Determined

1.9 Authorization of Resources

I hereby authorize the Incident Commander(s) at this facility to commit the necessary resources in order to prevent and minimize harm to human health, the environment and property in the event of an emergency at the facility.

Name to be determined
Operations Manager
Vancouver Energy

Date

1.10 Materials on Site

The only product transferred at this facility is North American crude oil.

Material Name (Trade Name)	DOT HM Y/N	Description	UN/NA No.	DOT ER Guide No.
Crude Oil	Y	Petroleum crude oil	1267	128
Crude Oil	Y	Combustible or Flammable liquids, n.o.s.	1993	128

For the material above, which is stored and handled incidental to transportation, a copy of DOT ER Guide No.128 is included in Section 4.8.

Smaller quantities of other materials are used/stored on site to facilitate operations, including diesel fuel for operation of fire pumps, lead-acid batteries, hydraulic and engine oils, utility provided natural gas for the boilers, boiler water treatment chemicals, and fire suppression foam. Safety Data Sheets (SDSs) for all products are maintained in the Facility Main Office, Area 400 (Marine Terminal), and Area 300 (Tank Farm).

1.11 Incident Command Structure and Personnel

The Incident Command System (ICS) is a management system designed to enable effective and efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure.

The roles and responsibilities listed below define the initial ICS following an emergency. For incidents that require outside emergency response agency assistance (Vancouver Fire Department, Vancouver Police Department, CRESA, etc.), the response agency ICS will take precedent once they are on site.

1.11.1 Incident Commander (IC)

In the event of an emergency, the Operations Manager or the on-duty Shift Supervisor is empowered to act as the Incident Commander (IC). The IC will coordinate all emergency response unless relieved by an outside response agency, at which time the Shift Supervisor or Operations Manager will manage internal resources, coordination with response agencies, and communications.

The IC is responsible for directing facility personnel and resources to safely mitigate any facility emergency. See Appendix 4.2 for roles and responsibilities.

Name	Title	Office Phone	Home Phone	Cell Phone
TBD	Shift Supervisor	TBD	TBD	TBD
TBD	Shift Supervisor	TBD	TBD	TBD
TBD	Shift Supervisor	TBD	TBD	TBD
TBD	Shift Supervisor	TBD	TBD	TBD
TBD	Operations Manager	TBD	TBD	TBD

There will be an IC available (either on the premises or on call) at ALL times.

1.11.2 Safety Officer

In the event of an emergency, the Safety Manager will act as the Safety Officer. If the Safety Manager is not on site, the IC will designate an alternate Safety Officer.

Name	Title	Office Phone	Home Phone	Cell Phone
TBD	Safety Manager	TBD	TBD	TBD

1.11.3 Communications Clerk

In the event of an emergency, the following individuals are empowered to act as the Communications Clerk (in order of preference).

Name	Title	Office Phone	Home Phone	Cell Phone
TBD	TBD	TBD	TBD	TBD

1.11.4 Facility Initial Response Team

The Facility Initial Response Team (IRT) is comprised of personnel trained in first aid/CPR and fire extinguisher use/incipient fire control. As described in the OSCP, the IRT is also responsible for

- Local planning and preparation activities to enable effective response actions.
- Providing first and sustained response to a spill originating from the Facility.

In the event of an emergency, the IC may direct the IRT to provide immediate assistance to injured personnel until outside emergency services arrive. The IRT may also respond to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release, as long as there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure).

IRT employees are not trained, equipped or qualified to act beyond their training in first aid/CPR and incipient fire control. Firefighting efforts that involve uncontrolled spills of flammable liquids, fires involving ordinary combustibles beyond the incipient stage or that require more than one fire extinguisher will require notification of the Vancouver Fire Department immediately.

The IRT will act under the direction of the Shift Supervisor and Operations Manager, along with receiving guidance from the Safety Manager (SHE&Q Manager). The Safety Manager will be part of the IRT, and lead the IRT preparation and training.

Name	Title	Office Phone	Home Phone	Cell Phone
TBD	TBD	TBD	TBD	TBD

1.12 Emergency Operations Center

The office in Area 200 will serve as the emergency operations center (EOC) for any emergency affecting the Facility. If the office is untenable due to fire, vapor release or Facility evacuation, a temporary EOC will be established at the Port of Vancouver EOC which is located at the Port Commissioner's Chambers.

The EOC will be stocked with the following materials.

1. Copy of this ERP.
2. Copy of Facility SDS book.
3. Customer contact list.
4. Means of communication (cellular telephone, portable radio).
5. Visitor sign-in sheet for personnel accountability at the gathering point in the event of an evacuation.

If an off-site EOC must be established, the IC will take these materials with them to ensure continuity of communications and response.

1.13 Communications Plan

All Facility employees must know how to report an emergency.

ALL EMPLOYEES are authorized to immediately call 911 in the event of an emergency; however, the employee should also immediately initiate the ERP by pulling a manual fire alarm pull or designating someone else to contact the Area 200 Control Room or the IC.

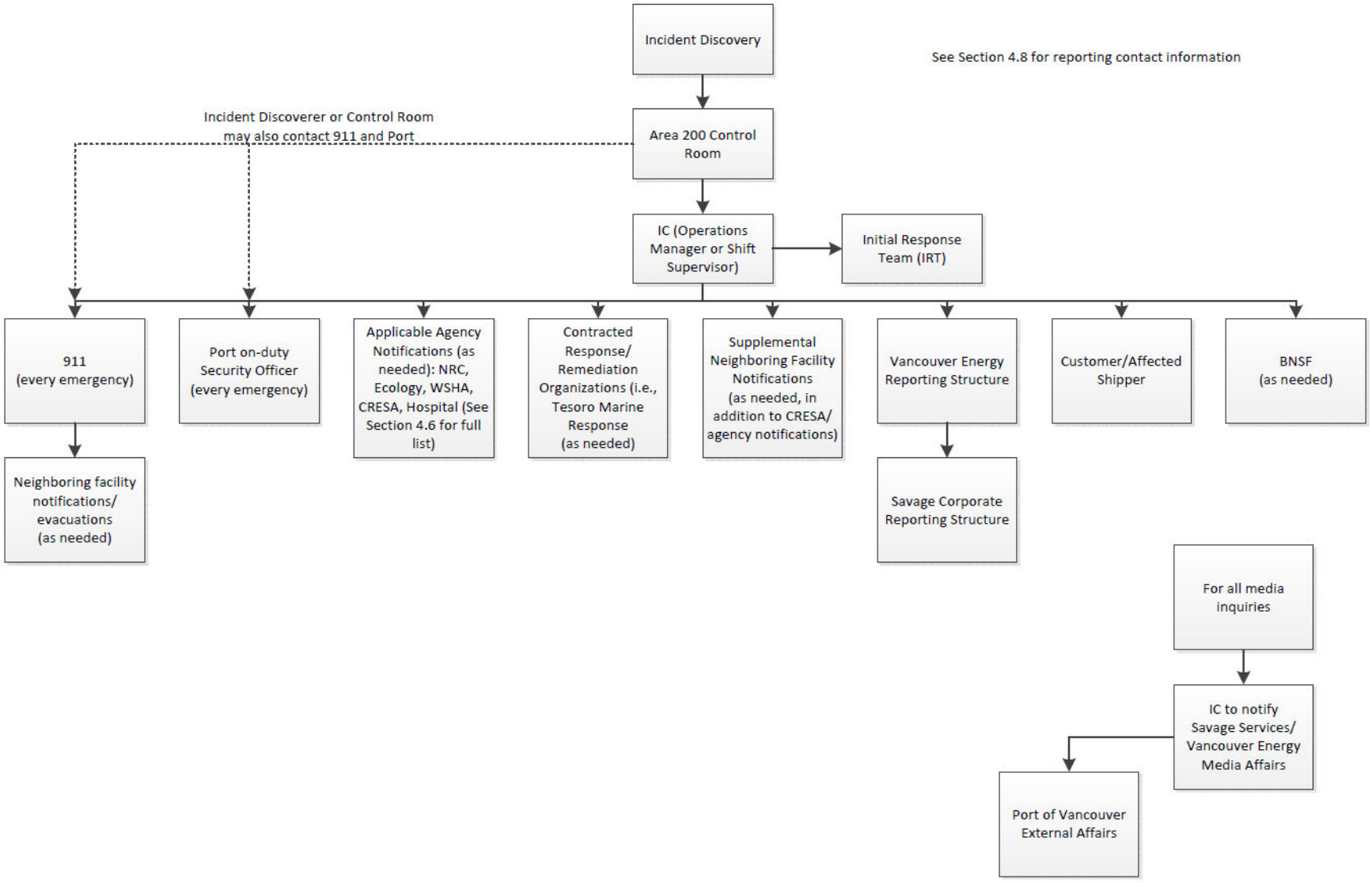
The procedures below are intended to provide for safe and timely evacuation of employees and proper notification of the Port to ensure emergency services are directed to the proper location.

Reporting procedures are outlined below.

- Any employee that discovers an emergency or suspects an emergency is imminent shall **immediately** notify the Area 200 Control Room by radio or telephone.
- The Area 200 Control Room contacts the Operations Manager or on-duty Shift Supervisor (the IC).
- The IC will immediately call (or delegate the following calls to the Area 200 Control Room):
  - 911
  - Port of Vancouver on-duty Security Officer (360-922-1120)
- The IC will make or delegate additional notifications per the Communication Flowchart below.

All employees are authorized to contact 911 and the Port on-duty Security Officer in the event that the Operations Manager, Shift Supervisor, or Control Room cannot be reached or would result in additional delays.

Communications Flowchart



1.13.1 External Communications

1.13.1.1 External Agencies

For all emergencies, the IC or a delegated individual must immediately contact 911 and the Port on-duty Security Officer at 360-922-1120.

Depending on the type of emergency, additional agency notifications may be required (see Section 2, Response Procedures and OSCP). Section 4.8 contains a list of external agencies and contact information.

1.13.1.2 Neighboring Properties

Depending on the type of emergency, notification or evacuation of neighboring properties may be required. CRESA should be involved anytime neighboring facility evacuations are required, and evacuation should be done under the direction of the directing agency, such as Vancouver Fire Department or CRESA. Factors to consider include

- Type of emergency
- Magnitude of emergency
- Location of emergency
- Wind direction
- Potential for escalation (such as a release that may result in a fire or explosion)

The nearest residential facility is the Clark County JWC. The JWC in-custody and work release buildings are housing units with a total of 224 beds, with associated kitchen, warehouse, and laundry facilities, along with occasional visitors. The JWC is located between Area 200 and Area 400, immediately adjacent to the rail loop. Due to the proximity of this facility, the Facility will provide the JWC with a copy of this ERP, will provide information on the alarms and emergency signals, and will invite the JWC to participate in drills.

Section 4.8 contains a list of neighboring property contacts.

1.13.1.3 Corporate Notifications

The communications flowchart and Section 4.8 contain a list of Facility and other corporate contacts that are to be notified in the event of an emergency. The Corporate notifications should take place as soon as possible, but in no circumstances should they be allowed to delay notification to emergency response or external agencies.

1.13.2 Internal Communication/Emergency Notification System

1.13.2.1 Alarms/Notification Codes

The Facility-wide fire and evacuation alarm is an audible alarm with separate tones for fire, evacuation, and all-clear. In addition, the following local alarms exist in various areas of the Facility.

- Area 200: Rail Unloading Building and Administration
- Local alarms (horn / strobe) for initiation of fire suppression system
- Local alarms (horn / strobe) for low and high gas detector settings (LEL, H_2S, O_2)
- Area 300: Storage Area (Tanks)
- Local alarms (horn / strobe) for initiation of fire suppression system.
- Local alarms (horn / strobe) for low and high gas detector settings (LEL, H_2S, O_2)
- Area 400: Marine Terminal
- Local alarms (horn / strobe) for initiation of fire suppression system
- Area 500: Transfer Pipelines
- There are no local alarms for Area 500

- Area 600: West Boiler
- Local alarm for e-house smoke detector

During the initial construction phase, the facility-wide and local alarms may not yet be functional. During this time, an alternate alarm/notification system will be used that may be a combination of radios, air horns, or equivalent method capable of alerting all personnel on site of an emergency condition. All personnel on site must be trained on the notification system and notified of any changes.

Personnel may communicate additional or supplementary emergency information by radio, when necessary. When communicating by radio, the following notification codes will be used. Employees are trained upon hire and will receive re-training at least annually on incident reporting and the notification code system. Records of this training will be maintained as part of the Facility safety training procedures. Prior to being allowed in the Facility, all contractors and visitors will be provided with a safety briefing, which includes this notification system and incident coding.

COLOR CODE	DEFINITION	REQUIRED ACTION
RED	Immediately Evacuate	Shut down all equipment, all personnel assemble at the muster point(s)
YELLOW	Spill Response	Call Vancouver Energy Safety Department. Every available trained person respond to the given location of the incident
BLUE	Fire	Zone C Channel 5 Telephone 911/ (360)293-9145
GREEN	Personal Injury	Closest person respond to the given incident location, contact the Manager
CLEAR	All Clear	Incident has ended, return back to normal work

1.13.2.2 Radios

The Facility uses portable radios for normal operating communications. These radios operate on a designated private frequency. The Facility emergency notification system uses these portable radios to communicate additional or supplementary emergency information, such as for notification of both initial emergency on the Facility and personnel notification of emergency type.

1.13.3 Media Interaction

No person at the Facility is authorized to speak or respond to the media when this plan is enacted. All inquiries by the media shall be referred to the following individuals within the Facility.

- Vancouver Energy: TBD, Phone Number

In addition, for all media inquiries, the following should also be contacted

- Port of Vancouver External Affairs: TBD, Phone Number

The only appropriate response to the media is as follows.

“No one at this facility, including myself, is authorized to respond to a media inquiry”. Any request for information should be addressed to the Public Affairs Contact of Vancouver Energy; refer to the above contact information.

In accordance with Port procedures, media interactions should be set up at a designated location, and media are not allowed on site. The staff at the facility should be in place to keep all spectators, including the media, at a safe distance.

Unless specifically authorized by the above individual, at no time will the media be allowed on the facility property to take photographs, video or audio recordings.

2. Emergency Procedures

Upon notification or realization of an emergency condition, the IC will use the emergency procedures in this section to take protective actions and make notifications to necessary off-site resources and internal chain of command contacts.

Incident Termination: The IC will have the sole authority and responsibility to sound the all clear based upon incident conditions, local responders or other authority.

During ANY emergency condition, the IC's actions must be based upon the following decision factors:

1. Protection of life, health and safety of employees, contractors, visitor and the general public
2. Protection of the environment including surface water, air and land receptors
3. Protection of property, equipment and customer products
4. System and business restoration

In no case will business restoration take priority over the protection of human health and safety, the environment or property protection.

2.1 Evacuation Procedures

2.1.1 Facility Evacuation

All Facility employees must be alert at all times for the warning of an emergency that may require evacuation of the facility.

Upon hearing the facility-wide alarm and/or a notification via radio of CODE RED, all Vancouver Energy Personnel will do the following unless otherwise instructed by the IC:

- Shut down all ongoing systems (valves, motors, pumps, etc.)
- Clear aisles and drives for emergency traffic/vehicles
- If driving a vehicle, pull over to a safe location, turn off the vehicle, and leave the keys in the ignition
- Report to the area assembly locations shown on the figures in Section 1.2

2.1.1.1 Evacuation Routes

The safe evacuation of facility personnel is critical during an emergency. Individual building/area evacuation route maps are posted around meeting places, around the interior of buildings, and in locations frequented by visitors who may be unfamiliar with the facility. The evacuation routes shall not be removed except to be immediately serviced and replaced. The evacuation routes will note the reader's location, the exits, and the assembly locations. Depending on the type of emergency (such as weather emergencies), it may be appropriate for the IC to call for personnel to shelter in place or take shelter in the nearest permanent structure. In such instances, as soon as the danger has passed, the IC should have all personnel report to the nearest assembly area so that personnel can be accounted for.

2.1.1.2 Off-site Evacuation

Although the call for an off-site evacuation is rare, the IC will determine if this is necessary given the conditions of the emergency and will notify all personnel by radio.

The off-site assembly location, as shown or described on Figure 3, is designated to be far enough away from the Facility so as to provide protection from the cause for evacuation. The off-site assembly location for the Facility is along NW Old Lower River Rd, approximately 500 feet northwest of the Main Office at Area 200. As soon as you reach the assembly area, stay close to other personnel and do not re-enter the Facility.

If for some reason the designated assembly location is unsafe, the IC will notify all personnel to move to a location away from the danger at a safe distance, and out of the way of traffic and emergency vehicles. The IC will keep in mind to stay up-wind by observing a wind sock.

2.1.2 Accounting for Personnel

Once employees, contractors, and visitors reach the nearest assembly area, they should scan their badges at the card reader (or manually sign in if a badge cannot be scanned for any reason). The Shift Supervisor will bring a copy of the Facility Main Office sign-in sheet to the assembly area. The designated employee at each assembly area is responsible for contacting the Shift Supervisor (or designee) via radio or cell phone with a list of visitors and contractors, which the Shift Supervisor will check against the sign-in sheet. In the event that a “roll-call” is not available, the IC should question other personnel about any missing personnel.

The IC can then provide emergency response personnel (Police and Fire Departments) with an informed opinion on whether anyone is still in the Facility.

2.1.3 Neighboring Property Evacuation

If the IC judges that the threat may extend outside the facility, the IC will notify, or cause to be notified, the Port of Vancouver and proper authorities for evacuation. Only the proper emergency services (such as CRESA, Vancouver Police Department, or Vancouver Fire Department) will direct evacuation of persons outside this Facility.

2.1.4 All-Clear/Return to Work

Only the IC may determine when the emergency situation has abated and employees may return to work. The “All-Clear” signal will be announced by radio or the facility-wide alarm system, or by direct communication for personnel that are not contacted by radio or the facility-wide alarm system. Depending on the type of emergency (such as fire, release, or earthquake), the integrity of equipment may need to be evaluated prior to restarting transfers.

2.2 Fire and/or Explosion

Entity/Agency Name	Phone Nos.
Vancouver Energy Radio Channel	5
Control Room (Area 200)	TBD
Fire Department	911
Police Department	911
Ambulance	911
Port of Vancouver Security	(360) 922-1120
Washington Hazard Material Spill Report	800-472-2121
Vancouver Fire Department Hazardous Material Spill Report (For Marine Dock Response)	800-258-5990 360- 487-7212
National Response Center	800-424-8802
Washington Emergency Management Division	800-258-5990
Washington Department of Ecology	360-407-6300
BNSF Emergency Hotline	800-832-5452
Response Contractors: MSRC	800-259-6772

Procedure

STEP 1: Incident discovery through activation of local alarm (smoke alarm or fire suppression system activation alarm) or through employee observation and notification of Area 200 Control Room via radio or telephone.

STEP 1a: If safe to do so, the incident discoverer may also do the following **ONLY AFTER NOTIFYING THE AREA 200 CONTROL ROOM:**

- Pull a manual fire alarm handle, or for areas covered by foam fire suppression system where system has not automatically activated, pull manual foam release handle (locations shown on maps in Section 1.2).
- For areas not covered by an automatic fire suppression system, the Vancouver Fire Department will respond as needed, such as with manual firefighting including foam suppression.
- For small, incipient fires ("trash-can" sized fires), IRT employees trained in incipient fire control may use a portable fire extinguisher to prevent personal injury or property damage.
- The incident discoverer must then immediately evacuate.

STEP 2: After receiving notification of the incident, the Area 200 Control Room must:

- Notify the IC.
- Activate the Facility-wide evacuation alarm.
- Immediately notify: 911 and Port of Vancouver on-duty Security Officer at: 360-922-1120 (they will help direct emergency services to the correct location).

STEP 3: If any personnel are injured, the IC may call the IRT to initiate first aid until outside responders arrive.

STEP 4: The IC coordinates the Facility evacuation per the evacuation procedures and initiates the communication plan described in Section 1.13 (including calls to additional outside responders to obtain assistance and protect sensitive receptors, as required). The IC may delegate the Communications Clerk or other personnel to make notification telephone calls.

STEP 5: Secure perimeter during response. If necessary, obtain assistance from Port security.

STEP 6: The IC should perform a hazard assessment of the situation considering the following.

- Nature of the situation?
- Accountability for personnel?
- Wind direction?
- Involved equipment?
- Required response equipment?
- Ambulance assistance needed?
- Mutual aid required?
- Have 911 and the Port of Vancouver on-duty Security Officer been notified?

Based on the assessment, the IC may direct off-site evacuation (per evacuation procedures), neighboring facility notification (per communication plan), or call in additional emergency response. The IC may also direct personnel to move loaded railcars away from danger zones, only if safe to do so.

STEP 7: Take steps to direct emergency responders to location of fire. Once the Fire Department arrives on site, the Fire Department will become the IC, and the Vancouver Energy IC will manage internal response, coordination with response agencies, and communications.

STEP 7A: If neighboring facilities are required to evacuate, the evacuation will be under the direction of the response agency (such as CRESA, Vancouver Fire Department, etc.). If directed by the response agency, Vancouver Energy may assist with neighboring facility notifications.

Post-Incident

STEP 1: Terminate Incident

STEP 2: Conduct investigation and complete incident report per procedures in Section 3.

STEP 3: Complete remediation of any spilled materials and assure proper disposal of wastes.

All soil, debris, wastes, and liquids resulting from a release must be treated as Hazardous Waste until testing determines the waste to be non-hazardous. Any hazardous waste must be removed in accordance to Federal, State and Local laws. No waste should be removed without the knowledge and consent of the IC.

Liquid residues from fires or leaks will be solidified with appropriate inert absorbent and placed in appropriate DOT-approved containers for transportation by an authorized disposal firm to permitted disposal facilities. Pumps, absorbents, and salvage containers are to be maintained at the facility for these purposes.

STEP 4: Prior to resuming any transfer operations, equipment integrity will be evaluated. Safety equipment used in an emergency will also be inspected, cleaned and/or replaced and returned to a state of readiness.

NOTE: The Facility is equipped with portable A/B/C fire extinguishers and IRT employees receive documented annual fire extinguisher training.

IRT employees are not trained, equipped or qualified to act beyond their training in first aid/CPR and incipient fire control. Firefighting efforts that involve uncontrolled spills of flammable liquids, fires involving ordinary combustibles beyond the incipient stage or that require more than one fire extinguisher will require notification of the Vancouver Fire Department in a timely manner.

Delay in notification will result in a larger fire and possible injury to Facility personnel.

In no case will the IC direct or allow employees to perform spill containment, fire suppression, clean up or offensive leak control beyond their training or personal protective equipment (PPE) capability. Only properly equipped and trained responders will be used for these activities.

2.3 Product Spill

Entity/Agency Name	Phone Nos.
Vancouver Energy Radio Channel	5
Control Room (Area 200)	TBD
Fire Department	911
Police Department	911
Ambulance	911
Washington Hazard Material Spill Report	800-472-2121
Port of Vancouver Security	(360) 922-1120
National Response Center	800-424-8802
Washington Emergency Management Division	800-258-5990
Washington Department of Ecology	360-407-6300
BNSF Emergency Hotline	800-832-5452
Response Contractors: MSRC	800-259-6772

Procedure

In the event of a release of oil or releases of hazardous materials, follow the procedures described in the SPCC Plan and the OSCP. For releases that may result in a vapor cloud, follow the procedures in Section 2.4 Vapor/Gas Release or H2S, LEL, or O2 Gas Alarm in addition to the release response procedures in the SPCC Plan and OSCP.

For other releases not covered by the OSCP (such as very small leaks, drips, and spills – whether crude oil or another fluid) follow these steps:

STEP 1: Incident discovery through employee observation and notification of Area 200 Control Room via radio or telephone. The Area 200 Control Room will notify the IC.

STEP 2: The IC will determine whether the release is an "incidental release" that may be safely cleaned up by employees who are familiar with the hazards of the chemicals with which they are working with available PPE, or a release that requires emergency response. For incidental releases, trained employees may clean up the release as long as it is safe to do so.

An incidental release is a release of a hazardous substance which does not pose a significant safety or health hazard to employees in the immediate vicinity or to the employee cleaning it up, nor does it have the potential to become an emergency within a short time frame.

STEP 3: For releases that require an emergency response:

The IC must:

- Activate the Facility-wide evacuation alarm
- Immediately notify: 911 and Port of Vancouver on-duty Security Officer at: 360-922-1120 (they will help direct emergency services to the correct location).

STEP 3A: The IC coordinates the Facility evacuation per the evacuation procedures and initiates the communication plan described in Section 1.11 (including calls to additional outside responders to obtain assistance and protect sensitive receptors, as required). The IC may delegate the Communications Clerk or other personnel to make notification telephone calls.

STEP 3B: If any personnel are injured, the IC may call the IRT to initiate first aid until outside responders arrive.

STEP 3C: Secure perimeter during response. If necessary, obtain security.

STEP 3D: The IC should perform a hazard assessment of the situation considering the following. Based on the assessment, the IC may direct off-site evacuation (per evacuation procedures), neighboring facility notification (per communication plan), or call in additional emergency response. The IC may also direct personnel to move full railcars away from danger zones, only if safe to do so.

- What is the nature of the situation
- Accountability for personnel
- Wind direction
- What equipment is involved?
- What response equipment will be required?
- Do we need ambulance assistance?
- Will mutual aid be required?
- Have 911 and the Port of Vancouver on-duty Security Officer been notified?

STEP 3E: Take steps to direct emergency responders to location of product release.

STEP 3F: If neighboring facility evacuations are required to evacuate, the IC will directly notify them by telephone.

Post-Incident

STEP 1: Terminate Incident.

STEP 2: Conduct investigation, completes incident report per procedures in Section 3.

STEP 3: Complete remediation of any spilled materials and assure proper disposal of wastes.

All soil, debris, wastes, and liquids resulting from the release must be treated as Hazardous Waste until testing determines the waste to be non-hazardous. Any hazardous waste must be removed in accordance to Federal, State and Local laws. No waste should be removed without the knowledge and consent of the IC.

Residues from leaks will be solidified with appropriate inert absorbent and placed in appropriate DOT approved containers for transportation by an authorized disposal firm to permitted disposal facilities. Pumps, absorbents, and salvage containers are to be maintained at the facility for these purposes.

STEP 4: Prior to resumption of any transfer operation, equipment integrity will be evaluated and any safety equipment used in an emergency will be cleaned or replaced and returned to a state of readiness.

NOTE: In no case will the IC direct or allow employees to perform spill containment, fire suppression, clean up or offensive leak control beyond their training or PPE capability. Only properly equipped and trained responders will be used for these activities.

2.4 Vapor/Gas Release or H_2S, LEL, or O_2 Gas Alarm

Entity/Agency Name	Phone Nos.
Vancouver Energy Radio Channel	5
Control Room (Area 200)	TBD
Fire Department	911
Police Department	911
Port of Vancouver Security	(360) 922-1120
Ambulance	911
Washington Hazard Material Spill Report	800-472-2121
National Response Center	800-424-8802
BNSF Emergency Hotline	800-832-5452
Response Contractors: MSRC	800-259-6772

Procedure

Note: For releases that result or would likely result in a vapor cloud, eliminate all ignition sources. Vancouver Energy personnel are authorized to pull manual foam release handles while evacuating, when it is safe to do so. For areas not covered by an automatic fire suppression system, the Vancouver Fire Department will respond with foam suppression as per their judgement of the situation.

STEP 1: Incident discovery through automatic LEL/H_2S/O_2 alarms, personal H_2S monitors, or through employee observation and notification of Area 200 Control Room via radio or telephone.

STEP 2: After receipt of alarm or notification, the Area 200 Control Room must:

- Verify the type of alarm (LEL or H_2S) and notify the IC of alarm type
- Activate the Facility-wide evacuation alarm for vapor clouds/gas releases, high level LEL or H_2S detection alerts
- Immediately notify: 911 and Port of Vancouver on-duty Security Officer at: 360-922-1120 (they will help direct emergency services to the correct location).

STEP 3: In the event of a crude oil release that results or would likely result in a vapor cloud:

- If the release is in an area covered by a foam suppression system, and it is safe to do so, an employee in the area should pull a manual foam release handle to begin covering the area with foam.
- If it is safe to do so, turn off all electrical and eliminate potential ignition sources (including turning off vehicles in the affected area).
- Evacuate the area (If driving a vehicle, pull over to a safe location, turn off the vehicle, and leave the keys in the ignition).

STEP 4A: If Low Level LEL alarm alerts, the incident discoverer may do the following:

- Inspect the work area(s) for liquid leaks, possible vapor leaks and/or used absorbent pads in the area of the LEL/H_2S detectors before continuing operations.
- Report findings to IC.

STEP 4B: If High Level LEL alarm alerts, the incident discoverer **must immediately evacuate** the affected area following evacuation procedures in Section 2.1.

STEP 5: If H_2S detection alarm alerts (regardless of whether it is an area monitor or a personal monitor), the incident discoverer **must immediately evacuate** the affected area following evacuation procedures in Section 2.1. In the event of a personal H_2S monitor alarm, the

employee should also verbally alert others in the immediate vicinity to evacuate and once out of the area, notify the Area 200 Control Room.

- The IC or designee will sweep the affected building with the hand held 4 Gas monitor. Self-contained breathing apparatus (SCBAs) are available on site and are only to be used by trained and authorized personnel.
- Once IC has ensured no H_2S remains in the building, they will issue an "ALL CLEAR" over the radio.
- All personnel may then return to normal duties.

STEP 6: The IC coordinates the Facility evacuation per the evacuation procedures and initiates the communication plan described in Section 1.11 (including calls to additional outside responders to obtain assistance and protect sensitive receptors, as required). The IC may delegate the Communications Clerk or other personnel to make notification telephone calls.

STEP 6A: The IC should consider wind direction (see figures in Section 1.2 for wind sock locations) in directing the evacuation.

STEP 7: If any personnel are injured, the IC may call the IRT to initiate first aid until outside responders arrive.

STEP 8: Secure perimeter during response. If necessary, obtain assistance from Port security.

STEP 9: The IC should perform a hazard assessment of the situation considering the following. Based on the assessment, the IC may direct off-site evacuation (per evacuation procedures), neighboring facility notification (per communication plan), or call in additional emergency response. The IC may also direct personnel to move full railcars away from danger zones, only if safe to do so.

- What is the nature of the situation
- Accountability for personnel
- Wind direction
- What equipment is involved?
- What response equipment will be required?
- Do we need ambulance assistance?
- Will mutual aid be required?
- Have 911 and the Port of Vancouver on-duty Security Officer been notified?

STEP 10: Take steps to direct emergency responders to location of release.

STEP 10A: If neighboring facility evacuations are required to evacuate, the IC will directly notify them by telephone.

Post-Incident

STEP 1: Terminate incident

STEP 2: Conduct investigation, completes incident report per procedures in Section 3.

STEP 3: Complete remediation of any spilled materials and assure proper disposal of wastes.

STEP 4: Prior to resumption of any transfer operation, any safety equipment used in an emergency will be cleaned or replaced and returned to a state of readiness.

NOTE: In no case will the IC direct or allow employees to perform spill containment, fire suppression, clean up or offensive leak control beyond their training or PPE capability. Only properly equipped and trained responders will be used for these activities.

2.5 Severe Weather

Entity/Agency Name	Phone Nos.
Vancouver Energy Radio Channel	5
Control Room (Area 200)	TBD
Fire Department	911
Police Department	911
Ambulance	911
Port of Vancouver Security	(360) 922-1120
Washington Hazard Material Spill Report	800-472-2121
National Response Center	800-424-8802
BNSF Emergency Hotline	800-832-5452
Response Contractors: Clean Harbors	800-259-6772

Procedure

STEP 1: In times of potential severe weather including thunderstorms, high winds, dangerous lightning, hail, tornadoes, and flash flooding, the IC will monitor the local weather broadcasts (NOAA Weather Radio) and severe weather additional advisories and will report watches and warnings to the Area 200 Control Room.

STEP 1A: In the event of severe weather, personnel will be updated by radio, or directly by the Shift Supervisor or IRT. The following precautions to be taken by personnel could include:

- Work on top of storage tanks, columns, or isolated structures will be terminated.
- Loading or unloading of flammable liquids will be stopped.

STEP 1B: In the event of a tornado **warning**, or the sighting of a tornado, immediate action needs to be taken. Tornado **watches** will be handled in the same manner as other severe weather.

- Area 200 Control Room will sound the emergency alarm and notify personnel via the radio system, or directly by the Shift Supervisor or IRT.
- Personnel are advised to shelter-in-place until the danger has passed. Personnel are to shelter in small rooms if possible, and stay away from glass windows and doors. If personnel cannot get to a shelter area, they should proceed to a low-lying area (such as a ditch). All personnel should evacuate vehicles.

STEP 1C: In the event of a **flood**, personnel should move immediately to higher ground

- Do not wait for instructions to move.
- Do not walk through moving water. For example, six inches of moving water can readily make you fall. If you have to walk in water, walk where the water is not moving. Use a stick to check the firmness of the ground in front of you.
- If located in a vehicle at the time of the alarm, do not drive into flooded areas. If floodwaters rise around your vehicle, abandon the vehicle and move to higher ground if you can do so safely. You and the vehicle can be swept away quickly.

STEP 1D: In the event of a **thunderstorm** which can produce strong wind, hail, and dangerous lightning, personnel will be updated by radio. Personnel are advised to

- Avoid contact with power cords.
- Seek covered shelter from hail.
- Watch for flying debris.

- **FOR SEVERE THUNDERSTORM OR DANGEROUS LIGHTNING**: USE 30/30 Lightning Safety Rule: Personnel shall seek covered shelter if, after seeing lightning, you cannot count to 30 before hearing thunder. Stay under covered shelter for 30 minutes after hearing the last clap of thunder per the 30/30 Lightning Safety Rule.

Post-Incident

STEP 1: Terminate incident.

STEP 2: Inspect the Facility for damaged equipment; secure damaged equipment as necessary.

STEP 3: Conduct investigation, completes incident report per procedures in Section 3.

STEP 2: Complete a report describing property and equipment damage, customer product damage or possible contaminations, theft of Vancouver Energy equipment, or other loss and damages.

STEP 4: Conduct investigation, completes incident report per procedures in Section 3.

2.6 Earthquake or Volcanic Activity

Entity/Agency Name	Phone Nos.
Vancouver Energy Radio Channel	5
Control Room (Area 200)	TBD
Fire Department	911
Police Department	911
Ambulance	911
Port of Vancouver Security	(360) 922-1120
Washington Hazard Material Spill Report	800-472-2121
National Response Center	800-424-8802
BNSF Emergency Hotline	800-832-5452
Response Contractors: Clean Harbors	800-259-6772

Procedure

STEP 1: In the event of an earthquake or volcanic activity (ash fall), personnel shall immediately find shelter. If in a vehicle, personnel should stay inside the vehicle.

STEP 1A: For an earthquake, personnel should DROP, COVER, and HOLD. Stay away from windows. Desks, tables, or supported doorways may provide protection. Do not attempt to exit a building while tremors are occurring. When tremors have stopped, personnel should evacuate to the nearest assembly area immediately.

STEP 1B: For volcanic activity, if ash is falling personnel should stay indoors until the ash settles, unless there is a risk of the roof collapsing.

STEP 2: Once the ground movement or ash fall has subsided the IC will take the following actions:

- Direct employees to remain sheltered or at the designated evacuation assembly areas until directed otherwise. Once the danger has passed, the IC should direct personnel to report to an assembly area or find an alternate means to account for all personnel.
- Monitor local and regional media sources and emergency frequency scanners for up-to-minute information and instruction.
- Dispatch a damage assessment team to survey the damage.

STEP 3: Any needed life/safety threatening damages must be stabilized or repaired before allowing the work force to return to the affected areas.

Post-Incident

STEP 1: Terminate incident.

STEP 2: Inspect the Facility for damaged equipment; secure damaged equipment as necessary.

STEP 3: Conduct investigation, completes incident report per procedures in Section 3.

STEP 2: Complete a report describing property and equipment damage, customer product damage or possible contaminations, theft of Vancouver Energy equipment, or other loss and damages.

STEP 4: Conduct investigation, completes incident report per procedures in Section 3.

2.7 Medical Emergencies

Entity/Agency Name	Phone Nos.
Vancouver Energy Health Services	TBD
Fire Department	911
Police Department	911
Ambulance	911
Medical Facilities: PeaceHealth Southwest Medical Center, 400 Northeast Mother Joseph Place, Vancouver, WA 98664	911; 360-299-1300

Procedure

STEP 1: In the event of any personal injury or first aid emergency, the incident discoverer shall notify the Area 200 Control Room via radio or telephone.

If the Area 200 Control Room cannot be reached and urgent medical care is required, dial "911" on the closest telephone, and inform the operator of the emergency and facility location. Follow-up with the Area 200 Control Room and call to Port of Vancouver on-duty Security Officer so they are aware of the emergency and the arrival of medical services, and Port Security can direct emergency services to the correct location within the Port.

STEP 2: The Area 200 Control Room will call "911" (and Port of Vancouver on-duty Security Officer) if the situation warrants outside medical services or will notify IC to respond to the emergency. They will also sound the appropriate Emergency Code throughout the Facility.

CODE: GREEN

STEP 3: IC sends TRAINED First Aid/CPR personnel to assess and assist the injured. First aid kits and automated external defibrillator (AED) locations are noted on the Figures in Section 1.2. AED locations and use should be kept away from crude oil and potential vapors, to avoid the potential risk of fire.

STEP 4: The personnel assisting injured communicates to IC on the condition and need for outside assistance.

STEP 5: IC notifies outside assistance, if necessary OR injured is transported to nearest medical facility (PeaceHealth Southwest Medical Center, 400 Northeast Mother Joseph Place, Vancouver, WA 98664) if injury is not serious.

STEP 7: IC notifies family or employee's company.

Post-Incident

STEP 1: IC completes initial injury/accident report and begins investigations as per Vancouver Energy incident investigation process before resuming operation or use of equipment involved in the injury.

2.8 Communicable Disease/Illnesses

Entity/Agency Name	Contact Info
Vancouver Energy Health Services	360-293-9142
Centers for Disease Control (CDC)	800-232-4636 cdcinfo@cdc.gov http://www.cdc.gov
World Health Organization	http://www.who.int/en
Vancouver Energy Employee Assistance Program	(866) 468-9461 http://www.shepellfgi.com
Medical Facilities: PeaceHealth Southwest Medical Center, 400 Northeast Mother Joseph Place, Vancouver, WA 98664	911 or (360) 256-2000

Procedure

STEP 1: The media alerts the public of severe health risk, such as a government declaration of a health emergency, threat of a local epidemic or widespread pandemic.

STEP 2: Vancouver Energy People Development Department issues notification to IC, including relevant facts, list of potential symptoms, and resources.

STEP 3: The IC communicates this information to all employees at the Facility via radio communication.

STEP 4: The IC ensures all appropriate precautions are taken, as recommended by applicable and credible sources.

STEP 5: If an employee at the Facility is ill, the IC notifies Savage corporate for support and to ensure the following:

- Any ill employee affected by the specific symptoms of a communicable disease/illness is immediately sent home.
- An employee sent home for symptoms is not allowed to return to work without written medical clearance from a doctor or medical clinic.
- An ill employee experiencing symptoms that are not specific to a communicable disease/illness may be allowed to continue handling non-sensitive commodities, at the discretion of the manager. The employee should be advised that he/she will be observed under close scrutiny for any developing symptoms and may be sent home if conditions warrant. An employee affected by any illness is not allowed to perform transfers of sensitive products such as food-grade commodities.

STEP 6: If any employee is properly diagnosed/confirmed with the communicable disease/illness, the IC immediately puts the Epidemic/Pandemic Outbreak Response Plan into action.

2.9 Epidemic/Pandemic Outbreak

Entity/Agency Name	Contact Info
Vancouver Energy Health Services	360-293-9142
Centers for Disease Control (CDC)	800-232-4636 cdcinfo@cdc.gov http://www.cdc.gov
World Health Organization	http://www.who.int/en
Vancouver Energy People Development	801-944-6600
Vancouver Energy Employee Assistance Program	(866) 468-9461 http://www.shepellfgi.com
Medical Facilities: PeaceHealth Southwest Medical Center, 400 Northeast Mother Joseph Place, Vancouver, WA 98664	911; (360) 256-2000

Procedure

STEP 1: An employee is properly diagnosed/confirmed with the communicable disease/illness.

STEP 2: The IC notifies Savage corporate for support. The Operations Manager or Savage corporate notify all customers and all carriers, informing them of the estimated down time while the Facility is decontaminated.

STEP 3: The IC immediately contracts a janitorial/cleaning service to conduct a thorough decontamination/sanitation/sterilization of the potentially affected office(s), break room, equipment, work stations, and/or personal protective equipment using antibacterial cleaning supplies. At the Operations Manager's discretion, all operational activities may be temporarily ceased and employees may be sent home until the completion of this process.

STEP 4: Upon completion of the decontamination process, Vancouver Energy Management shall coordinate and assemble an emergency coverage team to staff the operation during the recovery of the normal staff. This emergency coverage team shall be comprised of individuals (e.g. Regional Operations Management, Operations Management, CSRs/Coordinators, Transfer Operators) who have the capabilities of managing the day-to-day administrative and operational duties to handle the transfer and accessorial services. Vancouver Energy Management will ensure the emergency coverage team has adequate computer access and training to perform their assigned duties, as well as a list of primary and alternate phone numbers for each team member.

STEP 5: Any staff that is diagnosed/confirmed with the communicable disease/illness shall not be allowed to return to work without written medical clearance from a doctor or medical clinic.

2.10 Security Incident and/or Suspicious Activity

Entity/Agency Name	Phone Nos.
Vancouver Energy Radio Channel	5
Control Room (Area 200)	TBD
Fire Department	911
Police Department	911
Ambulance	911
Port of Vancouver Security	(360) 922-1120

Anyone that becomes aware of a bomb, terrorist, or hostage situation will immediately contact Port Security at: 360-922-1120 and "911." THEN, notify the Area 200 Control Room so that they can notify all personnel at the facility.

Note: Refer to Site Security Plan for specific procedures to be followed.

2.11 Bomb and/or Terrorism Threat

Entity/Agency Name	Phone Nos.
Vancouver Energy Radio Channel	5
Control Room (Area 200)	TBD
Fire Department	911
Police Department	911
Ambulance	911
Port of Vancouver Security	(360) 922-1120

Anyone that becomes aware of a bomb, terrorist, or hostage situation will immediately contact Port Security at: 360-922-1120 and "911." THEN, notify the Area 200 Control Room so that they can notify all personnel at the facility.

Note: Refer to Site Security Plan for specific procedures to be followed.

2.12 Railcar Derail

Entity/Agency Name	Phone Nos.
Vancouver Energy Radio Channel	5
Control Room (Area 200)	TBD
Fire Department	911
Police Department	911
Ambulance	911
Port of Vancouver Security	(360) 922-1120
BNSF Emergency Hotline	800-832-5452
Rerailing Services: RFC Rick Franklin Corporation, Lebanon, OR Hulcher Services, Pasco, WA	 (541) 451-1275 (509) 545-4040

This procedure is intended to respond to railcar derailing incidents that are or will likely result in an emergency situation. In an non-emergency situation, such as a wheel that comes off a track in an area where the railcar is unlikely to overturn, be struck by another railcar or vehicle, or result in a spill, personnel shall block off the area and call a rerailing service.

PROCEDURE

STEP 1: Incident discovery through employee observation and notification of Area 200 Control Room via radio or telephone.

NOTE: If railcar incident results in a fire/explosion, spill, vapor cloud, or injury, refer to procedures in Sections 2.2, 2.3, 2.4 and 2.8, respectively.

STEP 2: After receipt of notification, Area 200 Control Room must:

- Notify the IC
- Sound the appropriate Emergency Warning Notification throughout the Facility
- Immediately notify: 911 and Port of Vancouver on-duty Security Officer at: 360-922-1120 (they will help direct emergency services to the correct location).

STEP 3: The IC coordinates the Facility evacuation per the evacuation procedures and initiates the communication plan described in Section 1.11 (including calls to additional outside responders to obtain assistance and protect sensitive receptors, as required). The IC may delegate the Communications Clerk or other personnel to make notification telephone calls.

STEP 4: The IC should perform a hazard assessment of the situation considering the following. Based on the assessment, the IC may direct off-site evacuation (per evacuation procedures), neighboring facility notification (per communication plan), or call in additional emergency response. The IC may also direct personnel to move full railcars away from danger zones, only if safe to do so.

- What is the nature of the situation
- Accountability for personnel
- Wind direction
- What equipment is involved?
- What response equipment will be required?

- Do we need ambulance assistance?
- Will mutual aid be required?
- Have 911 and the Port of Vancouver on-duty Security Officer been notified?

STEP 7: Take steps to direct emergency responders to location of emergency communications.

Post-Incident

STEP 1: Terminate Incident

STEP 2: Conduct investigation, completes incident report per procedures in Section 3.

STEP 3: Prior to resumption of any transfer operation, equipment integrity will be evaluated and any safety equipment used in an emergency will be cleaned or replaced and returned to a state of readiness.

3. Post Incident Activity

3.1 Incident Documentation

Required Reports - Written Notification

Within 24 to 36 hours of an incident necessitating implementation of the ERP, the IC shall prepare an initial written report and forward it to the Facility, where it will be distributed internally within 10 days. The required reports for this site are to be made to:

Savage corporate Safety Director: TBD

Copies of the incident report will be maintained with the facility operating record. The report shall include:

A. Name, Address and Telephone number for Vancouver Energy management

B. Name, Address and Telephone number of the facility

C. Date, Time and Type of incident (for example; fire, spill, explosion, etc.)

D. Name and quantity of materials involved

E. Extent of injuries, if any

F. An assessment of actual or potential hazards to human health of the environment, where applicable

G. Estimated quantity and disposition of recovered material that resulted from the incident

H. A report of all notifications that were made including who was called, time of calls, and any other information obtained or derived from the notification calls

Written reports will be filed to State and Federal government agencies as required, with copies provided to the person(s) above.

3.2 Response Critique and Plan Modification

After all response and mitigation activities have been completed the Facility and associated owner/operator management will complete an incident response critique to identify elements of the response system that failed or were ineffective and elements that worked well. The critique and corrective actions will be documented. Documentation of corrective actions must include the corrective action taken to resolve any findings, the date of the corrective action, and the signature of the Operations Manager.

Key baseline rules for any critique:

- To be effective as learning tools critiques must be honest.
- A clear review of the facts leading to the incident must be established.
- A step-by-step review of response actions or timeline should be established.
- Critical control points such as incident discovery, reporting, communication/notification and response activities need to identified and measured for timeliness, completeness and effectiveness.
- Critical control points that were not effective should be flagged for review and modification as necessary.
- Corrective action plans and responsibility for implementing corrective action are established and tracked until completed.
- Applicability to other terminals or facilities should be identified.
- All participant interaction must be done to find ways to make improvements, not to find fault or blame those persons who performed incident management roles.

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4. Appendices

4.1 Emergency Equipment

The following is a list of emergency equipment maintained by this facility (additional oil spill response equipment is listed in the SPCC Plan and OSCP). Locations of equipment are noted. A site plan located in Section 1.2 identifies all major buildings at the facility. Any response equipment that is utilized in an emergency must be replenished as quickly as possible.

A. Personal Protective Equipment

The maximum level of personal protective clothing employees are trained to use is EPA and OSHA Level D (as per 1910.120 HAZWOPER regulations).

The personal protective equipment used at this facility is:

1. Chemical protective clothing (compatible with products handled in the Facility)
2. Fire-resistant protective clothing
3. Personal H_2S monitors
4. Hard Hats
5. Goggles and Face shields
6. Hearing protection
7. Chemical resistant gloves
8. Chemical resistant steel toed boots

B. Facility Spill and Response Materials – See OSCP for

1. Windsocks at several locations in Facility
2. Safety Data Sheet Book(s)
3. Bulk Chemical Inventory list
4. A current National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards
5. A current DOT Emergency Response Guidebook

C. First Aid Kit(s)/AED

To provide care for sick or injured personnel prior to transportation for treatment (if required), First Aid Kit(s) can be found in the Office, Training/Locker building, Railcar Unloading Building, and various light vehicles at the facility. An AED will be located in the main office at Area 200.

D. Non-sparking bung wrench and 36” pipe wrench

E. Non-sparking synthetic brush brooms

If cleaning up loose absorbents used on small spills.

F. Non sparking (plastic) grain /scoop shovel

For cleanup of loose absorbents used for small spills.

G. Oil Sorb to absorb spills

Oil sorbs is located in 85 Gallon over pack drums at several accessible locations

H. Absorbent Pillows/Socks/Dikes/Sheets

To create temporary dikes to retain and absorb any liquid commodity. Absorbent Pillows/Sock/Dikes are located inside over pack drums at several accessible locations

I. 85 Gallon over pack drums

To provide containment for absorbent used to contain spills. Over pack drums can be found at several accessible locations

NOTE: Any drums used to contain or clean up spilled hazardous materials must be properly labeled with DOT warning label, product name, UN number, date placed into container and fully sealed.

J. *4 – SCBAs with 4500 psi cylinders

The SCBAs are located: To Be Determined

* = emergency response equipment that is not on site for start-up.

K. 4-Gas Monitors (H_2S, oxygen (O_2), carbon monoxide (CO), LEL)

4.2 Employee Emergency Responsibilities

4.2.1 Incident Commander(s)

- Evaluate and assess the hazards of an incident and direct the appropriate emergency response
- Coordinate with external response agencies
- Direct internal resources in the event of an emergency
- Initiate facility evacuations, accounting for employees, and determining when to sound the “all clear”
- Notifying emergency contacts and external agencies (see Communication Plan)
- If an incident grows in size and complexity the IC will be augmented with corporate employees and outside agency representatives
- Participate in annual exercises

4.2.2 Safety Manager (SHE&Q Manager)

- Assist the IC with hazard assessment, PPE selection
- Leads IRT preparation, planning, and training

4.2.3 Communication Clerk (Coordinator)

- Assist with documentation of internal and external communications

4.2.4 All Employees

- Be familiar with this ERP and know the initial actions to be taken in an emergency
- Track and maintain adequate stocks of response materials
- Check all release containment devices monthly
- Know the evacuation routes and command post locations

4.2.5 Initial Response Team

- Understand what to do when an emergency occurs
- Keep first aid and CPR training up to date
- Monitor activities by other agencies
- Maintain adequate stocks of response materials
- Know the evacuation routes and command post locations
- Maintain portable eyewash units
- Participate in an annual ERP exercise
- Be available to respond during operations hours
- Contact 911 and Port Security using procedures in this ERP in case of emergency

4.2.6 Operations Manager

- Ensure personnel are sufficiently trained to perform transfers
- Train all employees, including new employees or those with new responsibilities (with documentation of training)
- Check communications systems monthly (with documentation)
- Ensure that adequate stocks of response material are available
- Contact appropriate agencies identified in ERP contact list
- Conduct post emergency review and documentation (documented timeline of events)
- Initiate ERP exercise at least annually
- Contact the railroad as necessary
- Ensure remediation is completed, including proper disposal of wastes generated
- Be available during routine operating hours
- Be the primary point of contact with the First Responder
- Report all findings to the personnel identified in the Incident Documentation Section within two business days

- Perform the functions of the Director of Operations / General Manager (or equivalent) in their absence
- Ensure all necessary immediate and written follow-up reporting (EPA, DOT, State & Local) is completed in the prescribed time

4.2.7 Director of Operations/General Manager

- Be able to be contacted during normal operations hours
- Perform the functions of the Operations Manager in his/her absence
- Contact the customer and primary contact for the customer
- Make a reasonable effort to contact the Manager
- Participate in the annual ERP exercise

4.2.8 Savage Corporate Structure

- Communicate all relative information to the company senior management
- Assist in the post incident review process
- Participate in the annual ERP exercise

4.3 Training

All contractors and visitors will receive a general facility awareness training that includes:

- Hazard awareness
- Contents of this ERP
- Incident notification, alarms
- Evacuation procedures

All employees of Vancouver Energy are trained according to the policies outlined below:

1. DOT HM-126C Hazardous Materials Worker

- Hazard awareness
- Safety training
- Function specific training

2. OSHA 1910.1200/WISHA WAC 296-800-170: Hazard Communication Awareness:

- What constitutes a hazardous commodity?
- What hazardous materials are handled at this Facility?
- How are each of these transferred?
- How is hazardous waste handled and disposed of?
- Which chemicals/commodities are present at the Facility?
- How are materials identified by the placard?
- What are the hazards of the materials located at this Facility?
- How to read a MSDS (Material Safety Data Sheet)

3. OSHA 1910.38/WISHA WAC 296-824 Emergency Response Plan:

- Implementation
- Emergency Response Procedures
- Emergency Equipment
- Coordination Agreements
- Evacuation Plan
- Storage/treatment of spilled materials
- Incompatible Wastes
- Emergency Notification
- Fire and Response Drills

4. OSHA 1910.57 Fire Extinguishers/WISHA WAC 296-800-300: Annual fire extinguisher training
5. OSHA 1910.120/WISHA WAC 296-843: Hazardous Waste Operations and Emergency Response: Facility employees are trained to the Awareness level only.
6. First Aid, CPR, and Bloodborne Pathogens: For Trained Response Personnel Only
7. Incipient Fire Response: For Trained Response Personnel Only

Training is conducted initially, with refresher training at least annually.

RECORD KEEPING: All training records must be kept on file and retained at the Facility, in the individuals training files.

4.4 Drills

In addition to drills specified in the OSCP, the Facility will conduct annual drills (each calendar year) of this ERP. The Port, the JWC, BNSF Railway, and relevant response agencies (such as Vancouver Fire Department, Vancouver Police Department, and CRESA) will be invited to participate in annual drills. Tabletop drills may be conducted more frequently.

Drills will be critiqued and documented in the same manner as the post-incident critique described in Section 3.2

4.5 Definitions and Acronyms

List of Definitions

Communications Clerk (CC): That person designated to make notifications, manage communications with outside resources and agencies and to document response activities and notifications during an emergency.

Emergency Operations Center (EOC): A location identified pre-emergency to serve as a communications, command, and control point during the emergency. This is the location where the EC and Communication clerk will management incident from and where outside responders and resources will stage during the emergency.

Emergency Notification System: A code spoken over the paging or Facility radio communication system, recognized by all personnel, to mean general alarm requiring immediate response. A General Alarm for this facility is;

CODE RED	EVACUATE IMMEDIATELY
CODE YELLOW	SPILL RESPONSE
CODE BLUE	FIRE
CODE GREEN	INJURY
CODE CLEAR	ALL CLEAR

Emergency Response Plan (ERP): This plan.

Incident Commander (IC): That person designated to act in the event of an emergency to bring events under control, and to notify or cause to be notified the proper authorities. The IC is empowered to commit all resources that are needed, including commitment of funds for outside help.

Incipient Fire: "Incipient stage fire" means a fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

Incipient Fire Responder: An individual who is knowledgeable, trained, and skilled in fire extinguisher use and responding to an incipient stage fire.

Oil Spill Contingency Plan (OSCP): Plan developed to satisfy Washington State statutes and the federal oil spill planning requirements of the U.S. Coast Guard (USCG) and Environmental Protection Agency (EPA) as set forth by the Oil Pollution Act of 1990. The purpose of the OSCP is to provide guidelines to respond to a spill that originates from the facility.

Over Pack Drum: A drum or drums, which are large enough to hold an entire 55-gallon, drum of material. The Over pack drums used at BIDS facilities are filled with various haz sorbs and spill containment and clean up materials and equipment.

Director of Operations/General Manager (DO/GM): An employee of Vancouver Energy who oversees the operations of the various terminals in a given geographic area or region. The DO/GM's function is to oversee that the terminals operate the facilities in accordance with the standards set by Vancouver Energy and its customers.

Reportable Quantity (RQ): A quantity of material, which when spilled causes a Legal requirement of the person in charge, to call the National Response Center. Different commodities will have different RQs. See appropriate MSDS (Material Safety Data Sheets) for RQ (reportable quantity) amounts.

Spill Prevention, Control, and Countermeasures (SPCC) Plan: Plan developed to comply with 40 CFR Part 112.

Wind Sock: A lightweight material, which is usually mounted to a pole for the purposes of determining direction and strength of the wind, for emergencies involving vapor releases.

List of Acronyms

AED: automated external defibrillator

API: American Petroleum Institute

AST: Aboveground storage tank

CC: communications clerk

CDC: Centers for Disease Control

CFR: Code of Federal Regulations

CRESA: Clark Regional Emergency Response Agency

DO/GM: Director of Operations/General Manager

DOT: Department of Transportation

EHS: extremely hazardous substance

EOC: emergency operations center

EPA: Environmental Protection Agency

ER: Emergency Response

ERP: Emergency Response Plan

Facility: Vancouver Energy

H_2S: hydrogen sulfide

HAZWOPER: Hazardous Waste Operations and Emergency Response

IC: Incident Commander

ICS: Incident Command System

IRT: Initial Response Team

JWC: Jail Work Center

LEL: Lower explosive limit

LEPC: Local Emergency Planning Committee

MSDSs: Material Safety Data Sheets

NFPA: National Fire Protection Association

NOAA: National Oceanic and Atmospheric Administration

O_2: oxygen

OSCP: Oil Spill Contingency Plan

OSHA: Occupational Safety and Health Administration

Port: Port of Vancouver USA

PPE: Personal protective equipment

RQ: reportable quantity

SCBA: self-contained breathing apparatus

SDSs: Safety Data Sheets

SHE&Q: Safety, Health, Environment, and Quality

SPCC: Spill Prevention, Control, and Countermeasures

SR 501: State Route 501

TPQ: threshold planning quantity

USCG: U.S. Coast Guard

WAC: Washington Administrative Code

WISHA: Washington Industrial Safety and Health Act

WSDOT: Washington State Department of Transportation

4.6 Information Record

Name: _____ Date/Time: _____

Telephone Numbers: _____

Physical Location: _____

_____

Type of Incident: Accidental Release, Fire, or Explosion _____

Name/Quantity of Material Released: _____

Potential Health/Environmental Hazards: _____

Injuries, (Number, and type) if any: _____

Reporting Log:

Local Fire/Rescue/Police Notification: _____

Spill Hotline Report: _____

Vancouver Energy DO/GM: _____

Vancouver Energy Support Center: _____

4.7 Emergency Phone Listing

Primary Contact List

Contacts	Day Time Numbers	After Hour Numbers
FIRST RESPONDER		
TBD, Operations Manager Vancouver Energy Services Corporation	---------- (Office) (Mobile)	(Mobile)
BNSF Emergency Hotline (e.g., reporting unusual or suspicious activity on BNSF trains or property)	(800) 832-5452	
Vancouver Police Department 605 E Evergreen Blvd, Vancouver, WA 98661	911 (360) 487-7400	
Vancouver Fire Department 7110 NE 63rd St, Vancouver, WA 98661	911 (360)487-7212	
AMBULANCE	911	
PeaceHealth Southwest Medical Center 400 NE Mother Joseph Pl, Vancouver, WA 98664	911 (360) 256-2000	
NATIONAL RESPONSE CENTER	(800) 424-8802	
CHEMTREC	(800) 262-9300	
STATE/MUNICIPAL REGULATORY AGENCY	State of Washington DOE (Southwest Regional Office) 360-407-6300	
	Washington Division of Emergency Management 800-258-5990	
	Clark Regional Emergency Services Agency (360)-737-1911	
	Washington State Department Labor & Industries (800)-423-7233	
	Vancouver USCG Recruiting Office (360)-699-1045	
Clark Regional Emergency Services Agency (CRESA) - LEPC	360-737-1911	
RESPONSE/REMEDIATION CONTRACTORS TBD	Emergency: Office:	

Secondary Contact List

Contacts	Day Time Numbers	After Hour Numbers
TBD Director of Operations / General Manager, Vancouver Energy	(Office Direct) (Mobile)	(Mobile)
TBD Savage corporate structure	(Office Direct) (Mobile)	(Mobile)
TBD Div Trainmaster, BNSF Railroad	(Office Direct) (Mobile)	(Mobile)
SHIPPER	Shippers Contact will be notified of any severe security breach involving their respective products	

Customer Emergency Contact List

Note: if any customers on this list are contacted in the event of an emergency, operations manager is to be contacted immediately.

Additional Contacts

BNSF Response	Patrick M Brady	(817) 740-7358 (Office) (817) 821-1325 (Mobile)
Tesoro Response	Eric. A. Haugstad	(210) 626-4636 (Office) (210) 865-9018 (Mobile)
Port of Vancouver USA	Mike Schiller	(360) 992-1113 (Office) (360) 518-1257 (Mobile)

Stakeholder/Neighboring Facility Contact List

Contacts	Primary Contact #1 (e.g. name, address, phone, email)	Alternative Contact
BNSF Railway	1310 West 11th Street, Vancouver, WA 98660; 360-418-6233	
City of Vancouver	415 West 6th Street, Vancouver, WA 98660; 360-487-8600	
Clark County Jail Work Center	5197 NW Lower River Road, Vancouver, WA 98660; 360-397-2138; sheriff@clark.wa.gov	
Clark County Sheriff's Boat House	707 West 13th Street, Vancouver, WA 98660; 360-397-2211; ccsomarine@clark.wa.gov	
Clark Public Utilities	1200 Fort Vancouver Way, Vancouver, WA 98660; 360-992-3000; mailbox@clarkpud.com	
Clark Regional Emergency Services Agency (CRESA)	710 West 13th Street, Vancouver, WA 98660; 360-737-1911; cresa@clark.wa.gov	
Farwest Steel	3703 NW Gateway Avenue, Vancouver, WA 98660; 360-735-8744	

Contacts	Primary Contact #1 (e.g. name, address, phone, email)	Alternative Contact
Glacier NW/CalPortland	2327 West Mill Plain Blvd, Vancouver, WA 98660; 360-892-5100	360-907-9607; 360-694-9420, ext. 1
NGL Supply Terminal Company	5701 NW Old Lower River Road, Vancouver, WA 98660; 360-694-2844	
Port of Vancouver USA	3103 NW Lower River Road, Vancouver, WA 98660; 360-693-3611	
Port of Vancouver Security	3103 NW Lower River Road, Vancouver, WA 98660; 360-992-1120	
Subaru	3309 NW Gateway Avenue, Vancouver, WA 98660; 360-737-7630	
TriStar	3702 NW Gateway Avenue, Vancouver, WA 98660; 360-823-1000	503-807-2952 (24-hour)
United Harvest	1927 Elevator Way #A, Vancouver, WA 98682; 360-693-1521	
Washington Department of Transportation	11018 NE 51st Circle, Vancouver, WA 98682; 360-905-2000	

4.8 Emergency Response Guidebook (ERG) Guide

See attached.

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POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.
- Substance may be transported hot.
- For UN3166, if Lithium ion batteries are involved, also consult GUIDE 147.
- **If molten aluminum is involved, refer to GUIDE 169.**

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL EMERGENCY RESPONSE Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

CAUTION: For mixtures containing alcohol or polar solvent, alcohol-resistant foam may be more effective.

Small Fire

- Dry chemical, CO_2, water spray or regular foam.

Large Fire

- Water spray, fog or regular foam.
- **Do not use straight streams**.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Vancouver Energy

3.2 - Operations Site Security Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

Mark A. Burris
Regional Security Manager, NW
Tesoro Companies Inc. LLC

Revision Summary

No.	Date	Edits/Comments
00	30 April 2015	Submittal for Application Review

Vancouver Energy
Operations Site Security Plan (Section 3.2)

Table of Contents

Section

1. Introduction and Background 3
1.1 Purpose of Plan 3
1.2 Regulatory Requirements 3
1.3 Related Plans and Documents 6
2. Threat Assessment 6
2.1 International and National Assessment 6
2.2 Local Assessment 6
2.3 Summary 6
3. Roles and Responsibilities 6
3.1 Operators 6
3.2 Management 6
3.3 Corporate Security 7
3.4 Security Administration and Organization of the Facility 7
3.5 Personnel Training 7
3.6 Drills and Exercises 11
3.7 Records and Documentation 12
3.8 Response to Change in MARSEC Level 13
3.9 Procedures for Interfacing with Vessels 13
3.10 Declaration of Security (DOS) 14
3.11 Communications 15
3.12 Security Systems and Equipment Maintenance 15
3.13 Security Measures for Access Control, including designated public access areas 15
3.14 Security Measures for Restricted Areas 19
3.15 Security Measures for Handling Cargo 21
3.16 Security Measures for Delivery of Vessel Stores and Bunkers 23
3.17 Security Measures for Monitoring 24
3.18 Security Incident Procedures 25
3.19 Audits and Security Plan Amendments 26
3.20 Facility Security Assessment (FSA) Report 27
3.21 Facility Vulnerability and Security Measures Summary 28
4. List of Acronyms and Abbreviations 28

List of Figures

Figure 1. Vicinity Map 4
Figure 2. Site Plan 5

List of Appendices

Appendix A. 49 CFR 1520 SSI
Appendix B. Crime Cast Report (CAP)
Appendix C. Emergency Contacts
Appendix D. Bomb Threat

1. Introduction and Background

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1 and Figure 2.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility operates 24 hours per day, 7 days per week.

1.1 Purpose of Plan

The operations security plan describes security measures and procedures implemented at the Facility to secure equipment and operations[1]. This plan covers post-construction operational security.

1.2 Regulatory Requirements

Regulatory determination assumptions have been made based on terminal facilities with similar attributes but are subject to final determination of the federal regulators. It is assumed the entire Facility is subject to the Maritime Transportation Security Act of 2002, 33 CFRs 101 and 105 (MTSA).

Security plans for facilities subject to these regulations are considered Security Sensitive Information (SSI) under 49 CFR 1520 and subject to protection from general release. See Appendix A. Where applicable, this plan provides a general description of how the Facility meets these requirements without disclosure of SSI.

The Marine Terminal (Area 400) lies within the MTSA-regulated area of the Port and is also subject to the Port Facility Security Plan on file with the U.S. Coast Guard (USCG) in accordance with 33 CFR 105. This Facility Security Plan is SSI and not subject to release. General reference to the requirements are made without disclosure of Port SSI.

[1] This plan has been prepared in response to the review of the Application for Site Certification (ASC). It is a preliminary plan based on the Applicant's current understanding of the Facility, as described in the ASC submitted to EFSEC. It is a draft and subject to change as the project develops. Changes in engineering and construction may impact later versions and editions of this security plan. This plan is current as of the date as listed in the footer.

Further, the Port is a vibrant dynamic economic engine with multiple tenants and customers. The Port makes changes to physical and procedural security to facilitate their various customers and tenants. The Facility would be only one of these tenants. Changes to physical and procedural security are subject to change and may impact later versions and editions of this plan. For example, perimeter fencing or gates may be changed or added. Security routes may be changed or added.

Figure 1 - Vicinity Map

LEGEND

- Project Boundary
- Vancouver, WA
- Portland, Oregon

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

N

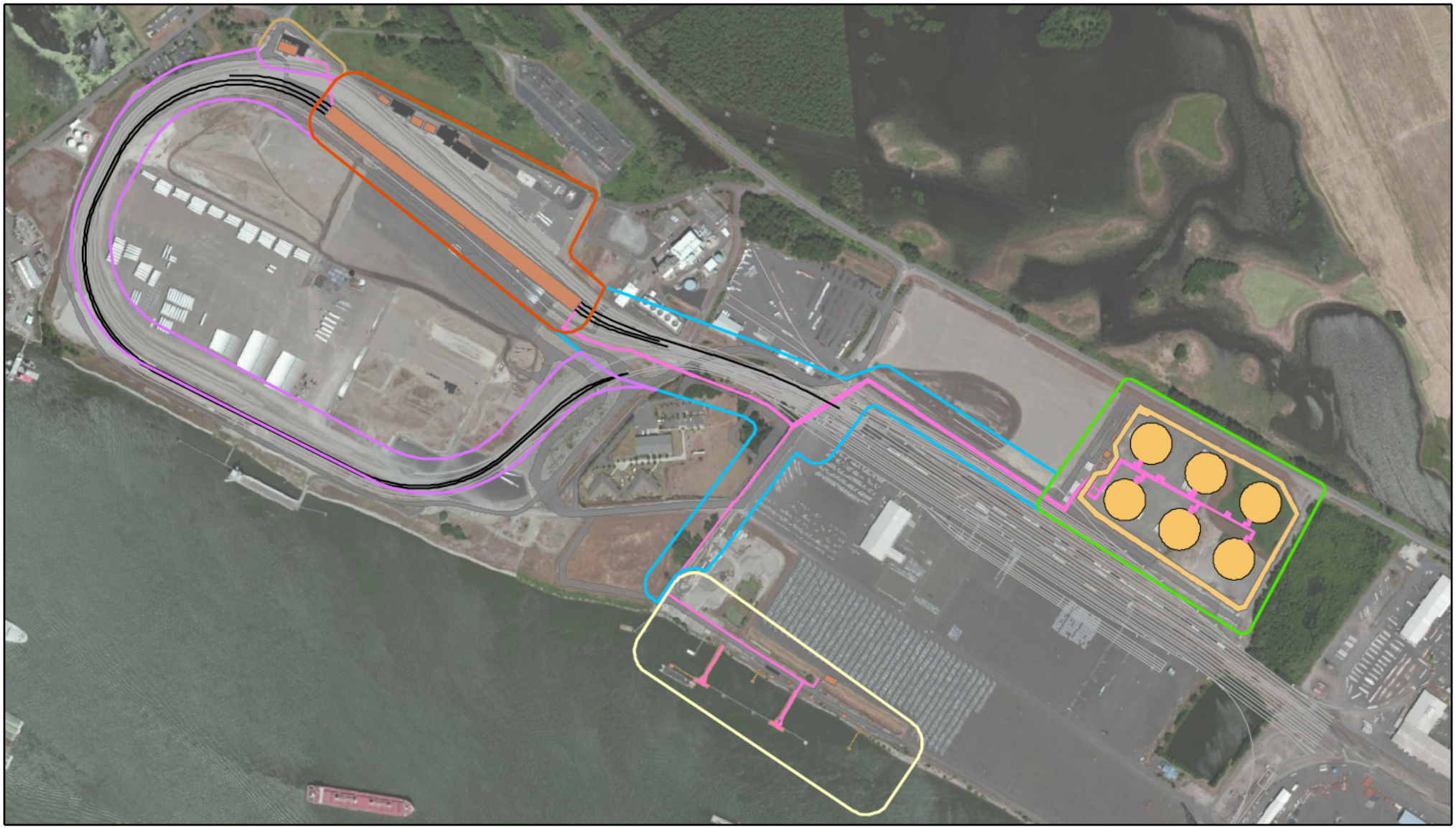

Figure 2 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000 Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: February 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

1.3 Related Plans and Documents

Other plans prepared for the Facility that address components related to security during operations include the following.

- Oil Spill Contingency Plan – This plan includes security measures to be implemented during oil spill response activities.

2. Threat Assessment

The basis for measures and mitigations proposed in this security plan is a result of a basic threat assessment of the proposed facility location at the Port. Various tools were used in assessing the threats.

2.1 International and National Assessment

Various Department of Homeland Security (DHS) products were reviewed to assess the national level threat to Vancouver Energy. The “DHS Energy Sector – Specific Plan, an Annex to the National Infrastructure Plan 2010,” and the DHS “Homeland Security Threat Assessment: Evaluating Threats 2008-2013” were reviewed.

Extra national terror organizations have focused on U.S. domestic targets that would maximize damage and loss of life. U.S. transportation and energy sectors and U.S. iconic targets remain the most likely targets. No specific threats to U.S. domestic energy infrastructure were listed nor were any specific geographic references made to the Pacific Northwest.

2.2 Local Assessment

Vancouver Police Department crime statistics and Crime Map were referenced for historical criminal threat data. A Crimecast CAP index report for 2014 for the Port was reviewed. Port Security staff were consulted regarding past incidents. Vancouver Energy is located in an area with statistically average general crime threats. General property crimes are the most common but at national averages. The general crime threat has been evaluated as low severity and low likelihood. See Appendix B. The protest threat has been evaluated as likely but with a low level of severity .

2.3 Summary

With no specific threat, mitigations and measures as required by MTSA are deemed adequate mitigations to general threats to critical energy infrastructure. General crime and protest disruption mitigation measures are exceeded by the regulatory requirements of MTSA.

3. Roles and Responsibilities

3.1 Operators

Vancouver Energy is staffed 24/7/365 by professional operators. These operators conduct safety and security rounds as part of their shift routines.

3.2 Management

Vancouver Energy management have responsibility for day-to-day implementation of security plans and procedures. Suspicious event and incident reporting to regulatory authorities are conducted by site management in a timely manner consistent with regulatory expectations.

3.3 Corporate Security

Savage Companies and Tesoro Companies Inc. LLC corporate security support the Facility with regulatory compliance support through intelligence sharing, security plan reviews, site visits, and audits.

Operational Security Potential threats include property crimes related to equipment and materials as detailed in the threat assessment.

After review of similar terminal operations, it is assumed the Facility is subject to MTSA security regulations as detailed 33 CFRs 101 and 105. Terminal 4, berths 13 and 14, are within the Port MTSA-regulated area. A facility security plan (FSP) to meet the specific requirements of 33 CFR 105 will be developed and submitted to the USCG for approval prior to commissioning of the Facility. This FSP is SSI as detailed in the Scope section and not releasable. The following is an outline of the basic 18-part FSP requirements as detailed in 33 CFR 105. Each section of the plan must be addressed. If the section is not applicable due to the nature of the operations of the Facility, it must be detailed as to how the section requirements will not apply.

3.4 Security Administration and Organization of the Facility

1. Introduction
2. Purpose
3. Facility Profile
4. Facility Plot Plan
5. Security Organization of Facility, Points Of Contact (POCs)
6. Facility Security Officer Duties

The submitted FSP provides a general description of the facility with a plot plan. The FSP defines the security organizational structure. The points of contact for the facility, including manager and facility security officer (FSO) if different from the manager, are listed with contact information. This section also includes a specific listing of duties to be performed by the FSO.

33§105.200 Owner or operator[2]

(a) Each facility owner or operator must ensure that the facility operates in compliance with the requirements of this part.

(b) For each facility, the facility owner or operator must:

(1) Define the security organizational structure and provide each person exercising security duties and responsibilities within that structure the support needed to fulfill those obligations;

(2) Designate, in writing, by name or by title, a Facility Security Officer (FSO) and identify how the officer can be contacted at any time

3.5 Personnel Training

1. Facility Personnel with Security Duties
2. Facility Security Officers (FSOs)
3. Security Training for All Other Facility Personnel

The submitted FSP details the required training for the various positions at the facility. It is anticipated that Vancouver Energy will not retain Facility Personnel with Security Duties (Security Officers) but as a tenant will rely on the Port to provide perimeter security and random security patrols. This facility has a named

[2] Text in blue italics is directly excerpted from 33 CFR.

FSO and each employee receives security training. This training is recorded as detailed in Section 4 Records and Documentation.

33§105.205 Facility Security Officer (FSO).

(a) General. (1) The FSO may perform other duties within the owner's or operator's organization, provided he or she is able to perform the duties and responsibilities required of the FSO.

(2) The same person may serve as the FSO for more than one facility, provided the facilities are in the same COTP[3] zone and are not more than 50 miles apart. If a person serves as the FSO for more than one facility, the name of each facility for which he or she is the FSO must be listed in the Facility Security Plan (FSP) of each facility for which or she is the FSO.

(3) The FSO may assign security duties to other facility personnel; however, the FSO retains the responsibility for these duties.

(4) The FSO must maintain a TWIC.

(b) Qualifications. (1) The FSO must have general knowledge, through training or equivalent job experience, in the following:

(i) Security organization of the facility;

(ii) General vessel and facility operations and conditions;

(iii) Vessel and facility security measures, including the meaning and the requirements of the different MARSEC Levels;

(iv) Emergency preparedness, response, and contingency planning;

(v) Security equipment and systems, and their operational limitations; and

(vi) Methods of conducting audits, inspections, control, and monitoring techniques.

(2) In addition to knowledge and training required in paragraph (b)(1) of this section, the FSO must have knowledge of and receive training in the following, as appropriate:

(i) Relevant international laws and codes, and recommendations;

(ii) Relevant government legislation and regulations;

(iii) Responsibilities and functions of local, State, and Federal law enforcement agencies;

(iv) Security assessment methodology;

(v) Methods of facility security surveys and inspections;

(vi) Instruction techniques for security training and education, including security measures and procedures;

(vii) Handling sensitive security information and security related communications;

(viii) Current security threats and patterns;

(ix) Recognizing and detecting dangerous substances and devices;

(x) Recognizing characteristics and behavioral patterns of persons who are likely to threaten security;

[3] COTP = Captain of the Port

(xi) Techniques used to circumvent security measures;

(xii) Conducting physical searches and non-intrusive inspections;

(xiii) Conducting security drills and exercises, including exercises with vessels; and

(xiv) Assessing security drills and exercises.

(xv) Knowledge of TWIC requirements.

(c) Responsibilities. In addition to those responsibilities and duties specified elsewhere in this part, the FSO must, for each facility for which he or she has been designated:

(1) Ensure that the Facility Security Assessment (FSA) is conducted;

(2) Ensure the development and implementation of a FSP;

(3) Ensure that an annual audit is conducted, and if necessary that the FSA and FSP are updated;

(4) Ensure the FSP is exercised per §105.220 of this part;

(5) Ensure that regular security inspections of the facility are conducted;

(6) Ensure the security awareness and vigilance of the facility personnel;

(7) Ensure adequate training to personnel performing facility security duties;

(8) Ensure that occurrences that threaten the security of the facility are recorded and reported to the owner or operator;

(9) Ensure the maintenance of records required by this part;

(10) Ensure the preparation and the submission of any reports as required by this part;

(11) Ensure the execution of any required Declarations of Security with Masters, Vessel Security Officers or their designated representatives;

(12) Ensure the coordination of security services in accordance with the approved FSP;

(13) Ensure that security equipment is properly operated, tested, calibrated, and maintained;

(14) Ensure the recording and reporting of attainment changes in MARSEC Levels to the owner or operator and the cognizant COTP;

(15) When requested, ensure that the Vessel Security Officers receive assistance in confirming the identity of visitors and service providers seeking to board the vessel through the facility;

(16) Ensure notification, as soon as possible, to law enforcement personnel and other emergency responders to permit a timely response to any transportation security incident;

(17) Ensure that the FSP is submitted to the cognizant COTP for approval, as well as any plans to change the facility or facility infrastructure prior to amending the FSP; and

(18) Ensure that all facility personnel are briefed of changes in security conditions at the facility.

(19) Ensure the TWIC program is being properly implemented.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003; USCG-2006-24196, 72 FR 3583, Jan. 25, 2007]

§105.210 Facility personnel with security duties.

Facility personnel responsible for security duties must maintain a TWIC, and must have knowledge, through training or equivalent job experience, in the following, as appropriate:

(a) Knowledge of current security threats and patterns;

(b) Recognition and detection of dangerous substances and devices;

(c) Recognition of characteristics and behavioral patterns of persons who are likely to threaten security;

(d) Techniques used to circumvent security measures;

(e) Crowd management and control techniques;

(f) Security related communications;

(g) Knowledge of emergency procedures and contingency plans;

(h) Operation of security equipment and systems;

(i) Testing, calibration, and maintenance of security equipment and systems;

(j) Inspection, control, and monitoring techniques;

(k) Relevant provisions of the Facility Security Plan (FSP);

(l) Methods of physical screening of persons, personal effects, baggage, cargo, and vessel stores; and

(m) The meaning and the consequential requirements of the different MARSEC Levels.

(n) Familiar with all relevant aspects of the TWIC program and how to carry them out.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended by USCG-2006-24196, 72 FR 3583, Jan. 25, 2007]

§105.215 Security training for all other facility personnel.

All other facility personnel, including contractors, whether part-time, full-time, temporary, or permanent, must have knowledge of, through training or equivalent job experience, in the following, as appropriate:

(a) Relevant provisions of the Facility Security Plan (FSP);

(b) The meaning and the consequential requirements of the different MARSEC Levels as they apply to them, including emergency procedures and contingency plans;

(c) Recognition and detection of dangerous substances and devices;

(d) Recognition of characteristics and behavioral patterns of persons who are likely to threaten security; and

(e) Techniques used to circumvent security measures.

(f) Familiar with all relevant aspects of the TWIC program and how to carry them out.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003; USCG-2006-24196, 72 FR 3583, Jan. 25, 2007]

3.6 Drills and Exercises

1. General
2. Drills
3. Exercises

The submitted FSP details how often the facility conducts drills and exercises. This section details how a drill tests select parts of the FSP at least every 90 days. The facility exercises multiple parts of the FSP at least annually. These drills and exercises are evaluated to determine if the FSP should be revised. These drills and exercises are recorded as detailed in Section 4 Records and Documentation. All functional areas of the Facility are included in the required drills and exercises. Drills and Excercises are coordinated with Port safety and security staff when applicable.

33§105.220 Drill and exercise requirements.

(a) General. (1) Drills and exercises must test the proficiency of facility personnel in assigned security duties at all MARSEC Levels and the effective implementation of the Facility Security Plan (FSP). They must enable the Facility Security Officer (FSO) to identify any related security deficiencies that need to be addressed.

(2) A drill or exercise required by this section may be satisfied with the implementation of security measures required by the FSP as the result of an increase in the MARSEC Level, provided the facility reports attainment to the cognizant COTP.

(b) Drills. (1) The FSO must ensure that at least one security drill is conducted every 3 months. Security drills may be held in conjunction with non-security drills, where appropriate.

(2) Drills must test individual elements of the FSP, including response to security threats and incidents. Drills should take into account the types of operations of the facility, facility personnel changes, the type of vessel the facility is serving, and other relevant circumstances. Examples of drills include unauthorized entry to a restricted area, response to alarms, and notification of law enforcement authorities.

(3) If a vessel is moored at the facility on the date the facility has planned to conduct any drills, the facility cannot require the vessel or vessel personnel to be a part of or participate in the facility's scheduled drill.

(c) Exercises. (1) Exercises must be conducted at least once each calendar year, with no more than 18 months between exercises.

(2) Exercises may be:

(i) Full scale or live;

(ii) Tabletop simulation or seminar;

(iii) Combined with other appropriate exercises; or

(iv) A combination of the elements in paragraphs (c)(2)(i) through (iii) of this section.

(3) Exercises may be facility-specific or part of a cooperative exercise program with applicable facility and vessel security plans or comprehensive port exercises.

(4) Each exercise must test communication and notification procedures, and elements of coordination, resource availability, and response.

(5) Exercises are a full test of the security program and must include substantial and active participation of FSOs, and may include government authorities and vessels visiting the facility.

Requests for participation of Company and Vessel Security Officers in joint exercises should consider the security and work implications for the vessel.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003]

3.7 Records and Documentation

1. Requirements

The submitted FSP details that the FSO must keep records of the activities for at least two years and makes them available to the USCG upon request. These records include training, drills and exercises, security incidents and breaches of security, changes in MARSEC level, security equipment repairs and maintenance, threats, declarations of security, and audits. These records are SSI and must be safeguarded in accordance with 49 CFR 1520.

33§105.225 Facility recordkeeping requirements.

(a) Unless otherwise specified in this section, the Facility Security Officer (FSO) must keep records of the activities as set out in paragraph (b) of this section for at least 2 years and make them available to the Coast Guard upon request.

(b) Records required by this section may be kept in electronic format. If kept in an electronic format, they must be protected against unauthorized deletion, destruction, or amendment. The following records must be kept:

(1) Training. For training under §105.210, the date of each session, duration of session, a description of the training, and a list of attendees;

(2) Drills and exercises. For each drill or exercise, the date held, description of drill or exercise, list of participants, and any best practices or lessons learned which may improve the Facility Security Plan (FSP);

(3) Incidents and breaches of security. For each incident or breach of security, the date and time of occurrence, location within the facility, description of incident or breaches, to whom it was reported, and description of the response;

(4) Changes in MARSEC Levels. For each change in MARSEC Level, the date and time of notification received, and time of compliance with additional requirements;

(5) Maintenance, calibration, and testing of security equipment. For each occurrence of maintenance, calibration, and testing, record the date and time, and the specific security equipment involved;

(6) Security threats. For each security threat, the date and time of occurrence, how the threat was communicated, who received or identified the threat, description of threat, to whom it was reported, and description of the response;

(7) Declaration of Security (DoS) A copy of each single-visit DoS and a copy of each continuing DoS for at least 90 days after the end of its effective period; and

(8) Annual audit of the FSP. For each annual audit, a letter certified by the FSO stating the date the audit was completed.

(c) Any record required by this part must be protected from unauthorized access or disclosure.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003]

3.8 Response to Change in MARSEC Level

1. General
2. MARSEC Security Level I
3. MARSEC Security Level II
4. MARSEC Security Level III

The submitted FSP details what actions the facility takes in response to an increase in MARSEC level. This section details reporting to the cognizant USCG COTP compliance or noncompliance with MARSEC measures within 12 hours of a change in MARSEC level.

33§105.230 Maritime Security (MARSEC) Level coordination and implementation.

(a) The facility owner or operator must ensure the facility operates in compliance with the security requirements in this part for the MARSEC Level in effect for the port.

(b) When notified of an increase in the MARSEC Level, the facility owner and operator must ensure:

(1) Vessels moored to the facility and vessels scheduled to arrive at the facility within 96 hours of the MARSEC Level change are notified of the new MARSEC Level and the Declaration of Security is revised as necessary;

(2) The facility complies with the required additional security measures within 12 hours; and

(3) The facility reports compliance or noncompliance to the COTP.

(c) For MARSEC Levels 2 and 3, the Facility Security Officer must inform all facility personnel about identified threats, and emphasize reporting procedures and stress the need for increased vigilance.

(d) An owner or operator whose facility is not in compliance with the requirements of this section, must inform the COTP and obtain approval prior to interfacing with a vessel or continuing operations.

(e) At MARSEC Level 3, in addition to the requirements in this part, a facility owner or operator may be required to implement additional measures, pursuant to 33 CFR part 6, 160, or 165, as appropriate, which may include but are not limited to:

(1) Use of waterborne security patrol;

(2) Use of armed security personnel to control access to the facility and to deter, to the maximum extent practical, a transportation security incident; and

(3) Examination of piers, wharves, and similar structures at the facility for the presence of dangerous substances or devices underwater or other threats. [USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003]

3.9 Procedures for Interfacing with Vessels

1. Requirements
2. Procedures
3. Vessel Arrival & Security Procedures While Moored at Dock
4. Coordination of crew shore leave and access

The submitted FSP details procedures for vessel interfaces at all MARSEC levels. This section details that Terminal 4, berths 13 and 14 lie within the Port MTSA-regulated area and are subject to the Port FSP on file with the USCG. This section details coordination of vessel crew exchanges and shore leave with the Port, Vancouver Energy, and any moored vessel.

33§105.240 Procedures for interfacing with vessels.

The facility owner or operator must ensure that there are measures for interfacing with vessels at all MARSEC Levels. [USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003]

3.10 Declaration of Security (DOS)

1. Requirements

The submitted FSP details when and how a Declaration of Security (DOS) is completed between Vancouver Energy and any visiting vessel. The DOS makes clear roles and responsibilities for security between the facility and visiting vessels. Vancouver Energy implements Tesoro Marine policy which exceeds MTSA requirements in that a DOS will be completed at all MARSEC levels to ensure security protocols are clearly understood at all times. It is anticipated that no continuing DOS will be issued by the Facility.

33§105.245 Declaration of Security (DoS).

(a) Each facility owner or operator must ensure procedures are established for requesting a DoS and for handling DoS requests from a vessel.

(b) At MARSEC Level 1, a facility receiving a cruise ship or a manned vessel carrying Certain Dangerous Cargo, in bulk, must comply with the following:

(1) Prior to the arrival of a vessel to the facility, the Facility Security Officer (FSO) and Master, Vessel Security Officer (VSO), or their designated representatives must coordinate security needs and procedures, and agree upon the contents of the DoS for the period of time the vessel is at the facility; and

(2) Upon the arrival of the vessel at the facility, the FSO and Master, VSO, or their designated representative, must sign the written DoS.

(c) Neither the facility nor the vessel may embark or disembark passengers, nor transfer cargo or vessel stores until the DoS has been signed and implemented.

(d) At MARSEC Levels 2 and 3, the FSOs, or their designated representatives, of facilities interfacing with manned vessels subject to part 104, of this subchapter must sign and implement DoSs as required in (b)(1) and (2) of this section.

(e) At MARSEC Levels 1 and 2, FSOs of facilities that frequently interface with the same vessel may implement a continuing DoS for multiple visits, provided that:

(1) The DoS is valid for a specific MARSEC Level;

(2) The effective period at MARSEC Level 1 does not exceed 90 days; and

(3) The effective period at MARSEC Level 2 does not exceed 30 days.

(f) When the MARSEC Level increases beyond that contained in the DoS, the continuing DoS is void and a new DoS must be executed in accordance with this section.

(g) A copy of all currently valid continuing DoSs must be kept with the Facility Security Plan.

(h) The COTP may require, at any time, at any MARSEC Level, any facility subject to this part to implement a DoS with the VSO prior to any vessel-to-facility interface when he or she deems it necessary.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003]

3.11 Communications

1. General

The submitted FSP details how security communications occur within the facility. Radio and telephones are most common methods of timely communication. Appendix C provides a sample security incident reporting call list used to provide timely and comprehensive notification of any security incident. Current 24-hour contact numbers with name and title are included in the reporting procedure. Telephonic threats or bomb threats are reported to law enforcement. A bomb threat record sheet is kept near the public or main listed telephone for the construction site. See Appendix D.

33§105.235 Communications.

(a) The Facility Security Officer must have a means to effectively notify facility personnel of changes in security conditions at the facility.

(b) Communication systems and procedures must allow effective and continuous communications between the facility security personnel, vessels interfacing with the facility, the cognizant COTP, and national and local authorities with security responsibilities.

(c) At each active facility access point, provide a means of contacting police, security control, or an emergency operations center, by telephones, cellular phones, and/or portable radios, or other equivalent means.

(d) Facility communications systems must have a backup means for both internal and external communications. [USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003]

3.12 Security Systems and Equipment Maintenance

1. General
2. Procedures for Repair of Failed or Malfunctioning Security Equipment

The submitted FSP details how security systems and equipment must be in good working order and inspected, tested, calibrated, and maintained according to manufacturer's recommendations. Records of maintenance and repair are maintained to IAW Section 4 Records.

33§105.250 Security systems and equipment maintenance.

(a) Security systems and equipment must be in good working order and inspected, tested, calibrated, and maintained according to manufacturers' recommendations.

(b) Security systems must be regularly tested in accordance with the manufacturers' recommendations; noted deficiencies corrected promptly; and the results recorded as required in §105.225 of this subpart.

(c) The FSP must include procedures for identifying and responding to security system and equipment failures or malfunctions. [USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003]

3.13 Security Measures for Access Control, including designated public access areas

1. General
2. Acceptable Identification Documents
3. TWIC Validation
4. Escorts

5. Vehicle Access Controls
6. Deliveries
7. Designated Public Access Areas

The submitted FSP details security measures for access control. This section details what identification documents, including a Transportation Workers Identification Credential (TWIC) are acceptable. This section includes validation methods of acceptable documents. A valid TWIC is required for unescorted access to the MTSA-regulated portions of Vancouver Energy. This section details conditions for when escorts of non TWIC holders are accepted and the provisions of escort. This section details personnel and vehicle screening at access points to the facility. Random entry screening of personnel and vehicles is conducted to prevent the introduction of unauthorized individuals, substances, and devices to Vancouver Energy. Screening rates are in alignment with current MARSEC levels and directives. It is anticipated that Vancouver Energy will NOT have designated public access areas.

§105.255 Security measures for access control.

(a) General. The facility owner or operator must ensure the implementation of security measures to:

(1) Deter the unauthorized introduction of dangerous substances and devices, including any device intended to damage or destroy persons, vessels, facilities, or ports;

(2) Secure dangerous substances and devices that are authorized by the owner or operator to be on the facility;

(3) Control access to the facility; and

(4) Prevent an unescorted individual from entering an area of the facility that is designated as a secure area unless the individual holds a duly issued TWIC and is authorized to be in the area.

(b) The facility owner or operator must ensure that the following are specified:

(1) The locations where restrictions or prohibitions that prevent unauthorized access are applied for each MARSEC Level, including those points where TWIC access control provisions will be applied. Each location allowing means of access to the facility must be addressed;

(2) The types of restrictions or prohibitions to be applied and the means of enforcing them;

(3) The means used to establish the identity of individuals not in possession of a TWIC, in accordance with §101.515 of this subchapter, and procedures for escorting them;

(4) Procedures for identifying authorized and unauthorized persons at any MARSEC level; and

(5) The locations where persons, personal effects and vehicle screenings are to be conducted. The designated screening areas should be covered to provide for continuous operations regardless of the weather conditions.

(c) The facility owner or operator must ensure that a TWIC program is implemented as follows:

(1) All persons seeking unescorted access to secure areas must present their TWIC for inspection before being allowed unescorted access, in accordance with §101.514 of this subchapter. Inspection must include:

(i) A match of the photo on the TWIC to the individual presenting the TWIC;

(ii) Verification that the TWIC has not expired; and

(iii) A visual check of the various security features present on the card to determine whether the TWIC has been tampered with or forged.

(2) If an individual cannot present a TWIC because it has been lost, damaged or stolen, and he or she has previously been granted unescorted access to the facility and is known to have had a valid TWIC, the individual may be given unescorted access to secure areas for a period of no longer than 7 consecutive calendar days if:

(i) The individual has reported the TWIC as lost, damaged, or stolen to TSA as required in 49 CFR 1572.19(f);

(ii) The individual can present another identification credential that meets the requirements of §101.515 of this subchapter; and

(iii) There are no other suspicious circumstances associated with the individual's claim of loss or theft.

(3) If an individual cannot present his or her TWIC for any other reason than outlined in paragraph (c)(2) of this section, he or she may not be granted unescorted access to the secure area. The individual must be under escort, as that term is defined in part 101 of this subchapter, at all times when inside of a secure area.

(4) With the exception of persons granted access according to paragraph (c)(2) of this section, all persons granted unescorted access to secure areas of the facility must be able to produce his or her TWIC upon request.

(5) There must be disciplinary measures in place to prevent fraud and abuse.

(6) The facility's TWIC program should be coordinated, when practicable, with identification and TWIC access control measures of vessels or other transportation conveyances that use the facility.

(d) If the facility owner or operator uses a separate identification system, ensure that it complies and is coordinated with TWIC provisions in this part.

(e) The facility owner or operator must establish in the approved Facility Security Plan (FSP) the frequency of application of any access controls, particularly if they are to be applied on a random or occasional basis.

(f) MARSEC Level 1. The facility owner or operator must ensure the following security measures are implemented at the facility:

(1) Implement TWIC as set out in paragraph (c) of this section.

(2) Screen persons, baggage (including carry-on items), personal effects, and vehicles, for dangerous substances and devices at the rate specified in the approved FSP, excluding government-owned vehicles on official business when government personnel present identification credentials for entry;

(3) Conspicuously post signs that describe security measures currently in effect and clearly state that:

(i) Entering the facility is deemed valid consent to screening or inspection; and

(ii) Failure to consent or submit to screening or inspection will result in denial or revocation of authorization to enter.

(4) Check the identification of any person not holding a TWIC and seeking entry to the facility, including vessel passengers, vendors, personnel duly authorized by the cognizant government authorities, and visitors. This check shall include confirming the reason for boarding by examining at least one of the following:

(i) Joining instructions;

(ii) Passenger tickets;

(iii) Boarding passes;

(iv) Work orders, pilot orders, or surveyor orders;

(v) Government identification; or

(vi) Visitor badges issued in accordance with an identification system implemented under paragraph (d) of this section.

(5) Deny or revoke a person's authorization to be on the facility if the person is unable or unwilling, upon the request of facility personnel or a law enforcement officer, to establish his or her identity in accordance with this part or to account for his or her presence. Any such incident must be reported in compliance with this part;

(6) Designate restricted areas and provide appropriate access controls for these areas;

(7) Identify access points that must be secured or attended to deter unauthorized access;

(8) Deter unauthorized access to the facility and to designated restricted areas within the facility;

(9) Screen by hand or device, such as x-ray, all unaccompanied baggage prior to loading onto a vessel; and

(10) Secure unaccompanied baggage after screening in a designated restricted area and maintain security control during transfers between the facility and a vessel.

(g) MARSEC Level 2. In addition to the security measures required for MARSEC Level 1 in this section, at MARSEC Level 2, the facility owner or operator must ensure the implementation of additional security measures, as specified for MARSEC Level 2 in their approved FSP. These additional security measures may include:

(1) Increasing the frequency and detail of the screening of persons, baggage, and personal effects for dangerous substances and devices entering the facility;

(2) X-ray screening of all unaccompanied baggage;

(3) Assigning additional personnel to guard access points and patrol the perimeter of the facility to deter unauthorized access;

(4) Limiting the number of access points to the facility by closing and securing some access points and providing physical barriers to impede movement through the remaining access points;

(5) Denying access to visitors who do not have a verified destination;

(6) Deterring waterside access to the facility, which may include, using waterborne patrols to enhance security around the facility; or

(7) Except for government-owned vehicles on official business when government personnel present identification credentials for entry, screening vehicles and their contents for dangerous substances and devices at the rate specified for MARSEC Level 2 in the approved FSP.

(h) MARSEC Level 3. In addition to the security measures required for MARSEC Level 1 and MARSEC Level 2, at MARSEC level 3, the facility owner or operator must ensure the implementation of additional security measures, as specified for MARSEC Level 3 in their approved FSP. These additional security measures may include:

(1) Screening all persons, baggage, and personal effects for dangerous substances and devices;

(2) Performing one or more of the following on unaccompanied baggage:

(i) Screen unaccompanied baggage more extensively; for example, x-raying from two or more angles;

(ii) Prepare to restrict or suspend handling of unaccompanied baggage; or

(iii) Refuse to accept unaccompanied baggage.

(3) Being prepared to cooperate with responders and facilities;

(4) Granting access to only those responding to the security incident or threat thereof;

(5) Suspending access to the facility;

(6) Suspending cargo operations;

(7) Evacuating the facility;

(8) Restricting pedestrian or vehicular movement on the grounds of the facility; or

(9) Increasing security patrols within the facility.

[USCG-2006-24196, 72 FR 3583, Jan. 25, 2007]

3.14 Security Measures for Restricted Areas

1. Restricted Areas
2. Security Measures for Restricted Areas Implemented at Increased MARSEC Level

The submitted FSP details what areas are Restricted Areas within Vancouver Energy. This section details additional security measures implemented at each MARSEC level within these designated restricted areas.

33§105.260 Security measures for restricted areas.

(a) General. The facility owner or operator must ensure the designation of restricted areas in order to:

(1) Prevent or deter unauthorized access;

(2) Protect persons authorized to be in the facility;

(3) Protect the facility;

(4) Protect vessels using and serving the facility;

(5) Protect sensitive security areas within the facility;

(6) Protect security and surveillance equipment and systems; and

(7) Protect cargo and vessel stores from tampering.

(b) Designation of Restricted Areas. The facility owner or operator must ensure restricted areas are designated within the facility. They must also ensure that all restricted areas are clearly marked and indicate that access to the area is restricted and that unauthorized presence within the area constitutes a breach of security. The facility owner or operator may also designate the entire facility as a restricted area. Restricted areas must include, as appropriate:

(1) Shore areas immediately adjacent to each vessel moored at the facility;

(2) Areas containing sensitive security information, including cargo documentation;

(3) Areas containing security and surveillance equipment and systems and their controls, and lighting system controls; and

(4) Areas containing critical facility infrastructure, including:

(i) Water supplies;

(ii) Telecommunications;

(iii) Electrical system; and

(iv) Access points for ventilation and air-conditioning systems;

(5) Manufacturing or processing areas and control rooms;

(6) Locations in the facility where access by vehicles and personnel should be restricted;

(7) Areas designated for loading, unloading or storage of cargo and stores; and

(8) Areas containing cargo consisting of dangerous goods or hazardous substances, including certain dangerous cargoes.

(c) The owner or operator must ensure that all restricted areas have clearly established security measures to:

(1) Identify which facility personnel are authorized to have access;

(2) Determine which persons other than facility personnel are authorized to have access;

(3) Determine the conditions under which that access may take place;

(4) Define the extent of any restricted area;

(5) Define the times when access restrictions apply;

(6) Clearly mark all restricted areas and indicate that access to the area is restricted and that unauthorized presence within the area constitutes a breach of security;

(7) Control the entry, parking, loading and unloading of vehicles;

(8) Control the movement and storage of cargo and vessel stores; and

(9) Control unaccompanied baggage or personal effects.

(d) MARSEC Level 1. At MARSEC Level 1, the facility owner or operator must ensure the implementation of security measures to prevent unauthorized access or activities within the area. These security measures may include:

(1) Restricting access to only authorized personnel;

(2) Securing all access points not actively used and providing physical barriers to impede movement through the remaining access points;

(3) Assigning personnel to control access to restricted areas;

(4) Verifying the identification and authorization of all persons and all vehicles seeking entry;

(5) Patrolling or monitoring the perimeter of restricted areas;

(6) Using security personnel, automatic intrusion detection devices, surveillance equipment, or surveillance systems to detect unauthorized entry or movement within restricted areas;

(7) Directing the parking, loading, and unloading of vehicles within a restricted area;

(8) Controlling unaccompanied baggage and or personal effects after screening;

(9) Designating restricted areas for performing inspections of cargo and vessel stores while awaiting loading; and

(10) Designating temporary restricted areas to accommodate facility operations. If temporary restricted areas are designated, the FSP must include a requirement to conduct a security sweep of the designated temporary restricted area both before and after the area has been established.

(e) MARSEC Level 2. In addition to the security measures required for MARSEC Level 1 in this section, at MARSEC Level 2, the facility owner or operator must also ensure the implementation of additional security measures, as specified for MARSEC Level 2 in their approved FSP. These additional security measures may include:

(1) Increasing the intensity and frequency of monitoring and access controls on existing restricted access areas;

(2) Enhancing the effectiveness of the barriers or fencing surrounding restricted areas, by the use of patrols or automatic intrusion detection devices;

(3) Reducing the number of access points to restricted areas, and enhancing the controls applied at the remaining accesses;

(4) Restricting parking adjacent to vessels;

(5) Further restricting access to the restricted areas and movements and storage within them;

(6) Using continuously monitored and recorded surveillance equipment;

(7) Enhancing the number and frequency of patrols, including waterborne patrols undertaken on the boundaries of the restricted areas and within the areas; or

(8) Establishing and restricting access to areas adjacent to the restricted areas.

(f) MARSEC Level 3. In addition to the security measures required for MARSEC Level 1 and MARSEC Level 2, at MARSEC Level 3, the facility owner or operator must ensure the implementation of additional security measures, as specified for MARSEC Level 3 in their approved FSP. These additional security measures may include:

(1) Restricting access to additional areas;

(2) Prohibiting access to restricted areas, or

(3) Searching restricted areas as part of a security sweep of all or part of the facility.

3.15 Security Measures for Handling Cargo

1. General
2. Security measures at each MARSEC level

- MARSEC Level I
- MARSEC Level II
- MARSEC Level III

The submitted FSP details Security measures for handling of cargo. The facility handles bulk liquid crude oil as cargo. Cargo interface occurs within MTSA regulated areas of the Port. Cargo storage is within anticipated MTSA-regulated areas of Vancouver Energy. This section details security measures for cargo handling at each MARSEC level.

33§105.265 Security measures for handling cargo.

(a) General. The facility owner or operator must ensure that security measures relating to cargo handling, some of which may have to be applied in liaison with the vessel, are implemented in order to:

(1) Deter tampering;

(2) Prevent cargo that is not meant for carriage from being accepted and stored at the facility without the knowing consent of the facility owner or operator;

(3) Identify cargo that is approved for loading onto vessels interfacing with the facility;

(4) Include cargo control procedures at access points to the facility;

(5) Identify cargo that is accepted for temporary storage in a restricted area while awaiting loading or pick up;

(6) Restrict the entry of cargo to the facility that does not have a confirmed date for loading, as appropriate;

(7) Ensure the release of cargo only to the carrier specified in the cargo documentation;

(8) When there are regular or repeated cargo operations with the same shipper, coordinate security measures with the shipper or other responsible party in accordance with an established agreement and procedure; and

(9) Create, update, and maintain a continuous inventory of all dangerous goods and hazardous substances from receipt to delivery within the facility, giving the location of those dangerous goods and hazardous substances.

(b) MARSEC Level 1. At MARSEC Level 1, the facility owner or operator must ensure the implementation of measures to:

(1) Unless unsafe to do so, routinely check cargo, cargo transport units, and cargo storage areas within the facility prior to, and during, cargo handling operations for evidence of tampering;

(2) Check that cargo, containers, or other cargo transport units entering the facility match the delivery note or equivalent cargo documentation;

(3) Screen vehicles; and

(4) Check seals and other methods used to prevent tampering upon entering the facility and upon storage within the facility.

(c) MARSEC Level 2. In addition to the security measures required for MARSEC Level 1 in this section, at MARSEC Level 2, the facility owner or operator must also ensure the implementation of additional security measures, as specified for MARSEC Level 2 in the approved FSP. These additional security measures may include:

(1) Conducting check of cargo, containers or other cargo transport units, and cargo storage areas within the facility for evidence of tampering;

(2) Intensifying checks, as appropriate, to ensure that only the documented cargo enters the facility, is temporarily stored there, and then loaded onto the vessel;

(3) Intensifying the screening of vehicles;

(4) Increasing frequency and detail in checking of seals and other methods used to prevent tampering;

(5) Coordinating enhanced security measures with the shipper or other responsible party in accordance with an established agreement and procedures;

(6) Increasing the frequency and intensity of visual and physical inspections; or

(7) Limiting the number of locations where dangerous goods and hazardous substances, including certain dangerous cargoes, can be stored.

(d) MARSEC Level 3. In addition to the security measures required for MARSEC Level 1 and MARSEC Level 2, at MARSEC Level 3, the facility owner or operator must ensure the implementation of additional security measures, as specified for MARSEC Level 3 in the approved FSP. These additional security measures may include:

(1) Restricting or suspending cargo movements or operations within all or part of the facility or specific vessels;

(2) Being prepared to cooperate with responders and vessels; or

(3) Verifying the inventory and location of any dangerous goods and hazardous substances, including certain dangerous cargoes, held within the facility and their location.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60541, Oct. 22, 2003]

3.16 Security Measures for Delivery of Vessel Stores and Bunkers

1. General
2. Areas for Loading or Unloading of Bunkers
3. Loading or Unloading of Vessel Stores

- MARSEC Level I
- MARSEC Level II
- MARSEC Level III

The submitted FSP details security measures for delivery of vessel stores and bunkers. It is anticipated this facility will not allow vessel stores to be delivered to a vessel. This facility will not deliver bunkers.

33§105.270 Security measures for delivery of vessel stores and bunkers.

(a) General. The facility owner or operator must ensure that security measures relating to the delivery of vessel stores and bunkers are implemented to:

(1) Check vessel stores for package integrity;

(2) Prevent vessel stores from being accepted without inspection;

(3) Deter tampering;

(4) For vessels that routinely use a facility, establish and execute standing arrangements between the vessel, its suppliers, and a facility regarding notification and the timing of deliveries and their documentation; and

(5) Check vessel stores by the following means:

(i) Visual examination;

(ii) Physical examination;

(iii) Detection devices, such as scanners; or

(iv) Canines.

(b) MARSEC Level 1. At MARSEC Level 1, the facility owner or operator must ensure the implementation of measures to:

(1) Screen vessel stores at the rate specified in the approved Facility Security Plan (FSP);

(2) Require advance notification of vessel stores or bunkers delivery, including a list of stores, delivery vehicle driver information, and vehicle registration information;

(3) Screen delivery vehicles at the frequencies specified in the approved FSP; and

(4) Escort delivery vehicles within the facility at the rate specified by the approved FSP.

(c) MARSEC Level 2. In addition to the security measures required for MARSEC Level 1 in this section, at MARSEC Level 2, the facility owner or operator must also ensure the implementation of additional security measures, as specified for MARSEC Level 2 in the approved FSP. These additional security measures may include:

(1) Detailed screening of vessel stores;

(2) Detailed screening of all delivery vehicles;

(3) Coordinating with vessel personnel to check the order against the delivery note prior to entry to the facility;

(4) Ensuring delivery vehicles are escorted within the facility; or

(5) Restricting or prohibiting the entry of vessel stores that will not leave the facility within a specified period.

(d) MARSEC Level 3. In addition to the security measures for MARSEC Level 1 and MARSEC Level 2, at MARSEC Level 3, the facility owner and operator must ensure implementation of additional security measures, as specified for MARSEC Level 3 in the approved FSP. Examples of these additional security measures may include:

(1) Checking all vessel stores more extensively;

(2) Restricting or suspending delivery of vessel stores; or

(3) Refusing to accept vessel stores on the facility.

3.17 Security Measures for Monitoring

1. General
2. Monitoring of the Facility and Approaches
3. Security Patrols (‘Routine Rounds’)

The submitted FSP details how monitoring of the facility is accomplished. Vancouver Energy lies within the Port. The Port uses CCTV, fixed, and mobile security to monitor the Port and approaches to the Port. This section details the partnership between Vancouver Energy operations and Port security.

33§105.275 Security measures for monitoring.

(a) General. The facility owner or operator must ensure the implementation of security measures in this section and have the capability to continuously monitor, through a combination of lighting, security guards, waterborne patrols, automatic intrusion-detection devices, or surveillance equipment, as specified in the approved Facility Security Plan (FSP), the:

(1) Facility and its approaches, on land and water;

(2) Restricted areas within the facility; and

(3) Vessels at the facility and areas surrounding the vessels.

(b) MARSEC Level 1. At MARSEC Level 1, the facility owner or operator must ensure the security measures in this section are implemented at all times, including the period from sunset to sunrise and periods of limited visibility. For each facility, ensure monitoring capability that:

(1) When automatic intrusion-detection devices are used, activates an audible or visual alarm, or both, at a location that is continuously attended or monitored;

(2) Is able to function continually, including consideration of the possible effects of weather or of a power disruption;

(3) Monitors the facility area, including shore and waterside access to it;

(4) Monitors access points, barriers and restricted areas;

(5) Monitors access and movements adjacent to vessels using the facility, including augmentation of lighting provided by the vessel itself; and

(6) Limits lighting effects, such as glare, and their impact on safety, navigation, and other security activities.

(c) MARSEC Level 2. In addition to the security measures for MARSEC Level 1 in this section, at MARSEC Level 2, the facility owner or operator must also ensure the implementation of additional security measures, as specified for MARSEC Level 2 in the approved FSP. These additional measures may include:

(1) Increasing the coverage and intensity of surveillance equipment, including the provision of additional surveillance coverage;

(2) Increasing the frequency of foot, vehicle or waterborne patrols;

(3) Assigning additional security personnel to monitor and patrol; or

(4) Increasing the coverage and intensity of lighting, including the provision of additional lighting and coverage.

(d) MARSEC Level 3. In addition to the security measures for MARSEC Level 1 and MARSEC Level 2, at MARSEC Level 3, the facility owner or operator must also ensure implementation of additional security measures, as specified for MARSEC Level 3 in the approved FSP. These additional security measures may include:

(1) Switching on all lighting within, or illuminating the vicinity of, the facility;

(2) Switching on all surveillance equipment capable of recording activities within or adjacent to the facility;

(3) Maximizing the length of time such surveillance equipment can continue to record; or

(4) Complying with the instructions issued by those responding to the security incident.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60542, Oct. 22, 2003]

3.18 Security Incident Procedures

1. General
2. Incident-Specific Threat Procedures
3. Reporting of Incidents

The submitted FSP details security incident response and reporting. Security incident reporting is completed in a timely manner to include Vancouver Energy management, the Port, law enforcement, and regulators. Security incident response evaluates Vancouver Energy operations, including possible securing of noncritical operations and possible facility evacuation.

33§105.280 Security incident procedures.

For each MARSEC Level, the facility owner or operator must ensure the Facility Security Officer and facility security personnel are able to:

(a) Respond to security threats or breaches of security and maintain critical facility and vessel-to-facility interface operations;

(b) Evacuate the facility in case of security threats or breaches of security;

(c) Report security incidents as required in §101.305 of this subchapter;

(d) Brief all facility personnel on possible threats and the need for vigilance, soliciting their assistance in reporting suspicious persons, objects, or activities; and

(e) Secure non-critical operations in order to focus response on critical operations.

3.19 Audits and Security Plan Amendments

1. Audits
2. Security Plan Amendments

The submitted FSP details annual audits of the FSP. This section details the circumstances when an amendment to the existing FSP is required. Tesoro Corporate Security schedules annual audits and follow audit findings to closure.

§105.415 Amendment and audit.

(a) Amendments. (1) Amendments to a Facility Security Plan (FSP) that is approved by the cognizant COTP may be initiated by:

(i) The facility owner or operator; or

(ii) The cognizant COTP upon a determination that an amendment is needed to maintain the facility's security. The cognizant COTP, who will give the facility owner or operator written notice and request that the facility owner or operator propose amendments addressing any matters specified in the notice. The facility owner or operator will have at least 60 days to submit its proposed amendments. Until amendments are approved, the facility owner or operator shall ensure temporary security measures are implemented to the satisfaction of the COTP.

(2) Proposed amendments must be submitted to the cognizant COTP. If initiated by the facility owner or operator, the proposed amendment must be submitted at least 30 days before the amendment is to take effect unless the cognizant COTP allows a shorter period. The cognizant COTP will approve or disapprove the proposed amendment in accordance with §105.410 of this subpart.

(3) Nothing in this section should be construed as limiting the facility owner or operator from the timely implementation of such additional security measures not enumerated in the approved FSP as necessary to address exigent security situations. In such cases, the owner or operator must notify the cognizant COTP by the most rapid means practicable as to the nature of the additional measures, the circumstances that prompted these additional measures, and the period of time these additional measures are expected to be in place.

(4) If there is a change in the owner or operator, the Facility Security Officer (FSO) must amend the FSP to include the name and contact information of the new facility owner or operator and submit the affected portion of the FSP for review and approval in accordance with §105.410 if this subpart.

(b) Audits. (1) The FSO must ensure an audit of the FSP is performed annually, beginning no later than one year from the initial date of approval, and attach a letter to the FSP certifying that the FSP meets the applicable requirements of this part.

(2) The FSP must be audited if there is a change in the facility's ownership or operator, or if there have been modifications to the facility, including but not limited to physical structure, emergency response procedures, security measures, or operations.

(3) Auditing the FSP as a result of modifications to the facility may be limited to those sections of the FSP affected by the facility modifications.

(4) Unless impracticable due to the size and nature of the company or the facility, personnel conducting internal audits of the security measures specified in the FSP or evaluating its implementation must:

(i) Have knowledge of methods for conducting audits and inspections, and security, control, and monitoring techniques;

(ii) Not have regularly assigned security duties; and

(iii) Be independent of any security measures being audited.

(5) If the results of an audit require amendment of either the FSA or FSP, the FSO must submit, in accordance with §105.410 of this subpart, the amendments to the cognizant COTP for review and approval no later than 30 days after completion of the audit and a letter certifying that the amended FSP meets the applicable requirements of this part.

[USCG-2003-14732, 68 FR 39322, July 1, 2003, as amended at 68 FR 60542, Oct. 22, 2003]

3.20 Facility Security Assessment (FSA) Report

1. FSA Summary
2. On-Scene Survey Descriptions
3. On-Scene Survey Elements
4. Supplemental FSA Information

The submitted FSP includes a completed USCG Facility Security Assessment report. This report is completed to IAW USCG Navigation and Inspection Circular, NVIC, 11-02 Enclosure 5. The report details critical facility assets to protect, including personnel and infrastructure. This report details existing security measures to protect those assets.

§105.300 General.

(a) The Facility Security Assessment (FSA) is a written document that is based on the collection of background information, the completion of an on-scene survey and an analysis of that information.

(b) A common FSA may be conducted for more than one similar facility provided the FSA reflects any facility-specific characteristics that are unique.

(c) Third parties may be used in any aspect of the FSA if they have the appropriate skills and if the Facility Security Officer (FSO) reviews and accepts their work.

(d) Those involved in a FSA must be able to draw upon expert assistance in the following areas, as appropriate:

(1) Knowledge of current security threats and patterns;

(2) Recognition and detection of dangerous substances and devices;

(3) Recognition of characteristics and behavioral patterns of persons who are likely to threaten security;

(4) Techniques used to circumvent security measures;

(5) Methods used to cause a security incident;

(6) Effects of dangerous substances and devices on structures and facility services;

(7) Facility security requirements;

(8) Facility and vessel interface business practices;

(9) Contingency planning, emergency preparedness, and response;

(10) Physical security requirements;

(11) Radio and telecommunications systems, including computer systems and networks;

(12) Marine or civil engineering; and

(13) Facility and vessel operations.

3.21 Facility Vulnerability and Security Measures Summary

The submitted FSP includes a completed Form CG 6025. This form lists facility vulnerabilities as described in section 17, their vulnerability category, and mitigations.

4. List of Acronyms and Abbreviations

Applicant: Tesoro Savage Petroleum Terminal LLC

ASC: Application for Site Certification

CCTV: closed-circuit television

CFR: Code of Federal Regulations

COTP: Captain of the Port

DHS: Department of Homeland Security

DOS: Declaration of Security

EFSEC: Energy Facility Site Evaluation Council

FSO: facility security officer

FSA: facility security assessment

FSP: facility security plan

MARSEC: Maritime Security

MTSA: Maritime Transportation Security Act

Port: Port of Vancouver USA

SSI: Security Sensitive Information

TSA: Transportation Security Administration

TWIC: Transportation Workers Identification Credential

USCG: U.S. Coast Guard

VPD: Vancouver Police Department

Vancouver Energy
Operations Site Security Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix A
49 CFR 1520 SSI

WARNING: This record contains SSI that is controlled under 49 CFR, Parts 15 and 1520. No part of this record may be disclosed to persons without a “need to know,” as defined in 49 CFR, Parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration or the Secretary of Transportation. Unauthorized release may result in civil penalty or other action. For U.S. government agencies, public disclosure is governed by 5 USC 552 and 49 CFR, Parts 15 and 1520.

SUBCHAPTER B—SECURITY RULES FOR ALL MODES OF TRANSPORTATION

PART 1520—PROTECTION OF SENSITIVE SECURITY INFORMATION

Sec.
1520.1 Scope.
1520.3 Terms used in this part.
1520.5 Sensitive security information.
1520.7 Covered persons.
1520.9 Restrictions on the disclosure of SSI.
1520.11 Persons with a need to know.
1520.13 Marking SSI.
1520.15 SSI disclosed by TSA or the Coast Guard.
1520.17 Consequences of unauthorized disclosure of SSI.
1520.19 Destruction of SSI.

AUTHORITY: 46 U.S.C. 70102–70106, 70117; 49 U.S.C. 114, 40113, 44901–44907, 44913–44914, 44916–44918, 44935–44936, 44942, 46105.

SOURCE: 69 FR 28082, May 18, 2004, unless otherwise noted.

§ 1520.1 Scope.

(a) *Applicability*. This part governs the maintenance, safeguarding, and disclosure of records and information that TSA has determined to be Sensitive Security Information, as defined in § 1520.5. This part does not apply to the maintenance, safeguarding, or disclosure of classified national security information, as defined by Executive Order 12968, or to other sensitive unclassified information that is not SSI, but that nonetheless may be exempt from public disclosure under the Freedom of Information Act. In addition, in the case of information that has been designated as critical infrastructure information under section 214 of the Homeland Security Act, the receipt, maintenance, or disclosure of such information by a Federal agency or employee is governed by section 214 and any implementing regulations, not by this part.

(b) *Delegation*. The authority of TSA and the Coast Guard under this part may be further delegated within TSA and the Coast Guard, respectively.

§ 1520.3 Terms used in this part.

In addition to the terms in § 1500.3 of this chapter, the following terms apply in this part:

Administrator means the Under Secretary of Transportation for Security referred to in 49 U.S.C. 114(b), or his or her designee.

Coast Guard means the United States Coast Guard.

Covered person means any organization, entity, individual, or other person described in § 1520.7. In the case of an individual, *covered person* includes any individual applying for employment in a position that would be a covered person, or in training for such a position, regardless of whether that individual is receiving a wage, salary, or other form of payment. *Covered person* includes a person applying for certification or other form of approval that, if granted, would make the person a covered person described in § 1520.7.

DHS means the Department of Homeland Security and any directorate, bureau, or other component within the Department of Homeland Security, including the United States Coast Guard.

DOT means the Department of Transportation and any operating administration, entity, or office within the Department of Transportation, including the Saint Lawrence Seaway Development Corporation and the Bureau of Transportation Statistics.

Federal Flight Deck Officer means a pilot participating in the Federal Flight Deck Officer Program under 49 U.S.C. 44921 and implementing regulations.

Maritime facility means any facility as defined in 33 CFR part 101.

Rail facility means ''rail facility'' as defined in 49 CFR 1580.3.

Rail hazardous materials receiver means ''rail hazardous materials receiver'' as defined in 49 CFR 1580.3.

Rail hazardous materials shipper means ''rail hazardous materials shipper'' as defined in 49 CFR 1580.3.

Rail secure area means ''rail secure area'' as defined in 49 CFR 1580.3.

Rail transit facility means ''rail transit facility'' as defined in 49 CFR 1580.3.

Rail transit system or *Rail Fixed Guideway System* means ''rail transit system'' or ''Rail Fixed Guideway System'' as defined in 49 CFR 1580.3.

Railroad means ''railroad'' as defined in 49 U.S.C. 20102(1).

Railroad carrier means ''railroad carrier'' as defined in 49 U.S.C. 20102(2).

Record includes any means by which information is preserved, irrespective of format, including a book, paper, drawing, map, recording, tape, film, photograph, machine-readable material, and any information stored in an electronic format. The term *record* also includes any draft, proposed, or recommended change to any record.

Security contingency plan means a plan detailing response procedures to address a transportation security incident, threat assessment, or specific threat against transportation, including details of preparation, response, mitigation, recovery, and reconstitution procedures, continuity of government, continuity of transportation operations, and crisis management.

Security screening means evaluating a person or property to determine whether either poses a threat to security.

SSI means sensitive security information, as described in §1520.5.

Threat image projection system means an evaluation tool that involves periodic presentation of fictional threat images to operators and is used in connection with x-ray or explosives detection systems equipment.

TSA means the Transportation Security Administration.

Vulnerability assessment means any review, audit, or other examination of the security of a transportation infrastructure asset; airport; maritime facility, port area, or vessel; aircraft; railroad; railroad carrier, rail facility; train; rail hazardous materials shipper or receiver facility; rail transit system; rail transit facility; commercial motor vehicle; or pipeline; or a transportation-related automated system or network to determine its vulnerability to unlawful interference, whether during the conception, planning, design, construction, operation, or decommissioning phase. A vulnerability assessment may include proposed, recommended, or directed actions or countermeasures to address security concerns.

[69 FR 28082, May 18, 2004, as amended at 70 FR 41599, July 19, 2005; 73 FR 72172, Nov. 26, 2008; 74 FR 47695, Sept. 16, 2009]

§1520.5 Sensitive security information.

(a) *In general.* In accordance with 49 U.S.C. 114(s), SSI is information obtained or developed in the conduct of security activities, including research and development, the disclosure of which TSA has determined would—

(1) Constitute an unwarranted invasion of privacy (including, but not limited to, information contained in any personnel, medical, or similar file);

(2) Reveal trade secrets or privileged or confidential information obtained from any person; or

(3) Be detrimental to the security of transportation.

(b) *Information constituting SSI.* Except as otherwise provided in writing by TSA in the interest of public safety or in furtherance of transportation security, the following information, and records containing such information, constitute SSI:

(1) *Security programs and contingency plans.* Any security program or security contingency plan issued, established, required, received, or approved by DOT or DHS, including any comments, instructions, or implementing guidance, including—

(i) Any aircraft operator, airport operator, fixed base operator, or air cargo security program, or security contingency plan under this chapter;

(ii) Any vessel, maritime facility, or port area security plan required or directed under Federal law;

(iii) Any national or area security plan prepared under 46 U.S.C. 70103; and

(iv) Any security incident response plan established under 46 U.S.C. 70104.

(2) *Security Directives.* Any Security Directive or order—

(i) Issued by TSA under 49 CFR 1542.303, 1544.305, 1548.19, or other authority;

(ii) Issued by the Coast Guard under the Maritime Transportation Security Act, 33 CFR part 6, or 33 U.S.C. 1221 *et seq.* related to maritime security; or

(iii) Any comments, instructions, and implementing guidance pertaining thereto.

(3) *Information Circulars.* Any notice issued by DHS or DOT regarding a threat to aviation or maritime transportation, including any—

(i) Information circular issued by TSA under 49 CFR 1542.303, 1544.305, 1548.19, or other authority; and

(ii) Navigation or Vessel Inspection Circular issued by the Coast Guard related to maritime security.

(4) *Performance specifications.* Any performance specification and any description of a test object or test procedure, for—

(i) Any device used by the Federal Government or any other person pursuant to any aviation or maritime transportation security requirements of Federal law for the detection of any person, and any weapon, explosive, incendiary, or destructive device, item, or substance; and

(ii) Any communications equipment used by the Federal government or any other person in carrying out or complying with any aviation or maritime transportation security requirements of Federal law.

(5) *Vulnerability assessments.* Any vulnerability assessment directed, created, held, funded, or approved by the DOT, DHS, or that will be provided to DOT or DHS in support of a Federal security program.

(6) *Security inspection or investigative information.* (i) Details of any security inspection or investigation of an alleged violation of aviation, maritime, or rail transportation security requirements of Federal law that could reveal a security vulnerability, including the identity of the Federal special agent or other Federal employee who conducted the inspection or audit.

(ii) In the case of inspections or investigations performed by TSA, this includes the following information as to events that occurred within 12 months of the date of release of the information: the name of the airport where a violation occurred, the airport identifier in the case number, a description of the violation, the regulation allegedly violated, and the identity of any aircraft operator in connection with specific locations or specific security procedures. Such information will be released after the relevant 12-month period, except that TSA will not release the specific gate or other location on an airport where an event occurred, regardless of the amount of time that has passed since its occurrence. During the period within 12 months of the date of release of the information, TSA may release summaries of an aircraft operator's, but not an airport operator's, total security violations in a specified time range without identifying specific violations or locations. Summaries may include total enforcement actions, total proposed civil penalty amounts, number of cases opened, number of cases referred to TSA or FAA counsel for legal enforcement action, and number of cases closed.

(7) *Threat information.* Any information held by the Federal government concerning threats against transportation or transportation systems and sources and methods used to gather or develop threat information, including threats against cyber infrastructure.

(8) *Security measures.* Specific details of aviation, maritime, or rail transportation security measures, both operational and technical, whether applied directly by the Federal government or another person, including—

(i) Security measures or protocols recommended by the Federal government;

(ii) Information concerning the deployments, numbers, and operations of Coast Guard personnel engaged in maritime security duties and Federal Air Marshals, to the extent it is not classified national security information; and

(iii) Information concerning the deployments and operations of Federal Flight Deck Officers, and numbers of Federal Flight Deck Officers aggregated by aircraft operator.

(iv) Any armed security officer procedures issued by TSA under 49 CFR part 1562.

(9) *Security screening information.* The following information regarding security screening under aviation or maritime transportation security requirements of Federal law:

(i) Any procedures, including selection criteria and any comments, instructions, and implementing guidance pertaining thereto, for screening of persons, accessible property, checked baggage, U.S. mail, stores, and cargo, that is conducted by the Federal government or any other authorized person.

(ii) Information and sources of information used by a passenger or property

screening program or system, including an automated screening system.

(iii) Detailed information about the locations at which particular screening methods or equipment are used, only if determined by TSA to be SSI.

(iv) Any security screener test and scores of such tests.

(v) Performance or testing data from security equipment or screening systems.

(vi) Any electronic image shown on any screening equipment monitor, including threat images and descriptions of threat images for threat image projection systems.

(10) *Security training materials.* Records created or obtained for the purpose of training persons employed by, contracted with, or acting for the Federal government or another person to carry out aviation, maritime, or rail transportation security measures required or recommended by DHS or DOT.

(11) *Identifying information of certain transportation security personnel.* (i) Lists of the names or other identifying information that identify persons as—

(A) Having unescorted access to a secure area of an airport, a rail secure area, or a secure or restricted area of a maritime facility, port area, or vessel;

(B) Holding a position as a security screener employed by or under contract with the Federal government pursuant to aviation or maritime transportation security requirements of Federal law, where such lists are aggregated by airport;

(C) Holding a position with the Coast Guard responsible for conducting vulnerability assessments, security boardings, or engaged in operations to enforce maritime security requirements or conduct force protection;

(D) Holding a position as a Federal Air Marshal; or

(ii) The name or other identifying information that identifies a person as a current, former, or applicant for Federal Flight Deck Officer.

(12) *Critical aviation, maritime, or rail infrastructure asset information.* Any list identifying systems or assets, whether physical or virtual, so vital to the aviation, maritime, or rail transportation system (including rail hazardous materials shippers and rail hazardous materials receivers) that the incapacity or destruction of such assets would have a debilitating impact on transportation security, if the list is—

(i) Prepared by DHS or DOT; or

(ii) Prepared by a State or local government agency and submitted by the agency to DHS or DOT.

(13) *Systems security information.* Any information involving the security of operational or administrative data systems operated by the Federal government that have been identified by the DOT or DHS as critical to aviation or maritime transportation safety or security, including automated information security procedures and systems, security inspections, and vulnerability information concerning those systems.

(14) *Confidential business information.* (i) Solicited or unsolicited proposals received by DHS or DOT, and negotiations arising therefrom, to perform work pursuant to a grant, contract, cooperative agreement, or other transaction, but only to the extent that the subject matter of the proposal relates to aviation or maritime transportation security measures;

(ii) Trade secret information, including information required or requested by regulation or Security Directive, obtained by DHS or DOT in carrying out aviation or maritime transportation security responsibilities; and

(iii) Commercial or financial information, including information required or requested by regulation or Security Directive, obtained by DHS or DOT in carrying out aviation or maritime transportation security responsibilities, but only if the source of the information does not customarily disclose it to the public.

(15) *Research and development.* Information obtained or developed in the conduct of research related to aviation, maritime, or rail transportation security activities, where such research is approved, accepted, funded, recommended, or directed by DHS or DOT, including research results.

(16) *Other information.* Any information not otherwise described in this section that TSA determines is SSI under 49 U.S.C. 114(s) or that the Secretary of DOT determines is SSI under

49 U.S.C. 40119. Upon the request of another Federal agency, TSA or the Secretary of DOT may designate as SSI information not otherwise described in this section.

(c) *Loss of SSI designation.* TSA or the Coast Guard may determine in writing that information or records described in paragraph (b) of this section do not constitute SSI because they no longer meet the criteria set forth in paragraph (a) of this section.

[69 FR 28082, May 18, 2004, as amended at 70 FR 41599, July 19, 2005; 71 FR 30507, May 26, 2006; 73 FR 72172, Nov. 26, 2008; 74 FR 47695, Sept. 16, 2009]

§ 1520.7 Covered persons.

Persons subject to the requirements of part 1520 are:

(a) Each airport operator, aircraft operator, and fixed base operator subject to the requirements of subchapter C of this chapter, and each armed security officer under subpart B of part 1562.

(b) Each indirect air carrier (IAC), as described in 49 CFR part 1548; and each certified cargo screening facility and its personnel, as described in 49 CFR part 1549.

(c) Each owner, charterer, or operator of a vessel, including foreign vessel owners, charterers, and operators, required to have a security plan under Federal or International law.

(d) Each owner or operator of a maritime facility required to have a security plan under the Maritime Transportation Security Act, (Pub.L. 107–295), 46 U.S.C. 70101 *et seq.*, 33 CFR part 6, or 33 U.S.C. 1221 *et seq.*

(e) Each person performing the function of a computer reservation system or global distribution system for airline passenger information.

(f) Each person participating in a national or area security committee established under 46 U.S.C. 70112, or a port security committee.

(g) Each industry trade association that represents covered persons and has entered into a non-disclosure agreement with the DHS or DOT.

(h) DHS and DOT.

(i) Each person conducting research and development activities that relate to aviation or maritime transportation security and are approved, accepted, funded, recommended, or directed by DHS or DOT.

(j) Each person who has access to SSI, as specified in § 1520.11.

(k) Each person employed by, contracted to, or acting for a covered person, including a grantee of DHS or DOT, and including a person formerly in such position.

(l) Each person for which a vulnerability assessment has been directed, created, held, funded, or approved by the DOT, DHS, or that has prepared a vulnerability assessment that will be provided to DOT or DHS in support of a Federal security program.

(m) Each person receiving SSI under § 1520.15(d) or (e).

(n) Each railroad carrier, rail hazardous materials shipper, rail hazardous materials receiver, and rail transit system subject to the requirements of part 1580 of this chapter.

[69 FR 28082, May 18, 2004, as amended at 70 FR 41600, July 19, 2005; 73 FR 72173, Nov. 26, 2008; 74 FR 47695, Sept. 16, 2009; 76 FR 51867, Aug. 18, 2011]

§ 1520.9 Restrictions on the disclosure of SSI.

(a) *Duty to protect information.* A covered person must—

(1) Take reasonable steps to safeguard SSI in that person's possession or control from unauthorized disclosure. When a person is not in physical possession of SSI, the person must store it a secure container, such as a locked desk or file cabinet or in a locked room.

(2) Disclose, or otherwise provide access to, SSI only to covered persons who have a need to know, unless otherwise authorized in writing by TSA, the Coast Guard, or the Secretary of DOT.

(3) Refer requests by other persons for SSI to TSA or the applicable component or agency within DOT or DHS.

(4) Mark SSI as specified in § 1520.13.

(5) Dispose of SSI as specified in § 1520.19.

(b) *Unmarked SSI.* If a covered person receives a record containing SSI that is not marked as specified in § 1520.13, the covered person must—

(1) Mark the record as specified in § 1520.13; and

(2) Inform the sender of the record that the record must be marked as specified in § 1520.13.

(c) *Duty to report unauthorized disclosure.* When a covered person becomes aware that SSI has been released to unauthorized persons, the covered person must promptly inform TSA or the applicable DOT or DHS component or agency.

(d) *Additional Requirements for Critical Infrastructure Information.* In the case of information that is both SSI and has been designated as critical infrastructure information under section 214 of the Homeland Security Act, any covered person who is a Federal employee in possession of such information must comply with the disclosure restrictions and other requirements applicable to such information under section 214 and any implementing regulations.

§ 1520.11 Persons with a need to know.

(a) *In general.* A person has a need to know SSI in each of the following circumstances:

(1) When the person requires access to specific SSI to carry out transportation security activities approved, accepted, funded, recommended, or directed by DHS or DOT.

(2) When the person is in training to carry out transportation security activities approved, accepted, funded, recommended, or directed by DHS or DOT.

(3) When the information is necessary for the person to supervise or otherwise manage individuals carrying out transportation security activities approved, accepted, funded, recommended, or directed by the DHS or DOT.

(4) When the person needs the information to provide technical or legal advice to a covered person regarding transportation security requirements of Federal law.

(5) When the person needs the information to represent a covered person in connection with any judicial or administrative proceeding regarding those requirements.

(b) *Federal, State, local, or tribal government employees, contractors, and grantees.* (1) A Federal, State, local, or tribal government employee has a need to know SSI if access to the information is necessary for performance of the employee's official duties, on behalf or in defense of the interests of the Federal, State, local, or tribal government.

(2) A person acting in the performance of a contract with or grant from a Federal, State, local, or tribal government agency has a need to know SSI if access to the information is necessary to performance of the contract or grant.

(c) *Background check.* TSA or Coast Guard may make an individual's access to the SSI contingent upon satisfactory completion of a security background check or other procedures and requirements for safeguarding SSI that are satisfactory to TSA or the Coast Guard.

(d) *Need to know further limited by the DHS or DOT.* For some specific SSI, DHS or DOT may make a finding that only specific persons or classes of persons have a need to know.

[69 FR 28082, May 18, 2004, as amended at 70 FR 1382, Jan. 7, 2005; 73 FR 72173, Nov. 26, 2008]

§ 1520.13 Marking SSI.

(a) *Marking of paper records.* In the case of paper records containing SSI, a covered person must mark the record by placing the protective marking conspicuously on the top, and the distribution limitation statement on the bottom, of—

(1) The outside of any front and back cover, including a binder cover or folder, if the document has a front and back cover;

(2) Any title page; and

(3) Each page of the document.

(b) *Protective marking.* The protective marking is: SENSITIVE SECURITY INFORMATION.

(c) *Distribution limitation statement.* The distribution limitation statement is:

WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520. No part of this record may be disclosed to persons without a ''need to know'', as defined in 49 CFR parts 15 and 1520, except with the written permission of the Administrator of the Transportation Security Administration or the Secretary of Transportation. Unauthorized release may result in civil penalty or other action. For U.S. government agencies,

public disclosure is governed by 5 U.S.C. 552 and 49 CFR parts 15 and 1520.

(d) *Other types of records.* In the case of non-paper records that contain SSI, including motion picture films, videotape recordings, audio recording, and electronic and magnetic records, a covered person must clearly and conspicuously mark the records with the protective marking and the distribution limitation statement such that the viewer or listener is reasonably likely to see or hear them when obtaining access to the contents of the record.

§ 1520.15 SSI disclosed by TSA or the Coast Guard.

(a) *In general.* Except as otherwise provided in this section, and notwithstanding the Freedom of Information Act (5 U.S.C. 552), the Privacy Act (5 U.S.C. 552a), and other laws, records containing SSI are not available for public inspection or copying, nor does TSA or the Coast Guard release such records to persons without a need to know.

(b) *Disclosure under the Freedom of Information Act and the Privacy Act.* If a record contains both SSI and information that is not SSI, TSA or the Coast Guard, on a proper Freedom of Information Act or Privacy Act request, may disclose the record with the SSI redacted, provided the record is not otherwise exempt from disclosure under the Freedom of Information Act or Privacy Act.

(c) *Disclosures to committees of Congress and the General Accounting Office.* Nothing in this part precludes TSA or the Coast Guard from disclosing SSI to a committee of Congress authorized to have the information or to the Comptroller General, or to any authorized representative of the Comptroller General.

(d) *Disclosure in enforcement proceedings*—(1) *In general.* TSA or the Coast Guard may provide SSI to a person in the context of an administrative enforcement proceeding when, in the sole discretion of TSA or the Coast Guard, as appropriate, access to the SSI is necessary for the person to prepare a response to allegations contained in a legal enforcement action document issued by TSA or the Coast Guard.

(2) *Security background check.* Prior to providing SSI to a person under paragraph (d)(1) of this section, TSA or the Coast Guard may require the individual or, in the case of an entity, the individuals representing the entity, and their counsel, to undergo and satisfy, in the judgment of TSA or the Coast Guard, a security background check.

(e) *Other conditional disclosure.* TSA may authorize a conditional disclosure of specific records or information that constitute SSI upon the written determination by TSA that disclosure of such records or information, subject to such limitations and restrictions as TSA may prescribe, would not be detrimental to transportation security.

(f) *Obligation to protect information.* When an individual receives SSI pursuant to paragraph (d) or (e) of this section that individual becomes a covered person under §1520.7 and is subject to the obligations of a covered person under this part.

(g) *No release under FOIA.* When TSA discloses SSI pursuant to paragraphs (b) through (e) of this section, TSA makes the disclosure for the sole purpose described in that paragraph. Such disclosure is not a public release of information under the Freedom of Information Act.

(h) *Disclosure of Critical Infrastructure Information.* Disclosure of information that is both SSI and has been designated as critical infrastructure information under section 214 of the Homeland Security Act is governed solely by the requirements of section 214 and any implementing regulations.

§ 1520.17 Consequences of unauthorized disclosure of SSI.

Violation of this part is grounds for a civil penalty and other enforcement or corrective action by DHS, and appropriate personnel actions for Federal employees. Corrective action may include issuance of an order requiring retrieval of SSI to remedy unauthorized disclosure or an order to cease future unauthorized disclosure.

§ 1520.19 Destruction of SSI.

(a) *DHS.* Subject to the requirements of the Federal Records Act (5 U.S.C. 105), including the duty to preserve

records containing documentation of a Federal agency's policies, decisions, and essential transactions, DHS destroys SSI when no longer needed to carry out the agency's function.

(b) *Other covered persons*—(1) *In general.* A covered person must destroy SSI completely to preclude recognition or reconstruction of the information when the covered person no longer needs the SSI to carry out transportation security measures.

(2) *Exception.* Paragraph (b)(1) of this section does not require a State or local government agency to destroy information that the agency is required to preserve under State or local law.

Vancouver Energy
Operations Site Security Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix B
Crime Cast Report (CAP)

CRIMECAST® basic

Site Information

Vancouver Terminal
2111 St. Francis Ln.
Vancouver, WA 98660

Coordinates Latitude: 45.638678, Longitude: -122.699294

Report Contents

About CAP Index, Inc. 2

CRIMECAST Map - 1:3 Methodology 3

CRIMECAST Scores - 1:3 Methodology 4

Appendices 5

About the CRIMECAST Map & Scores 5

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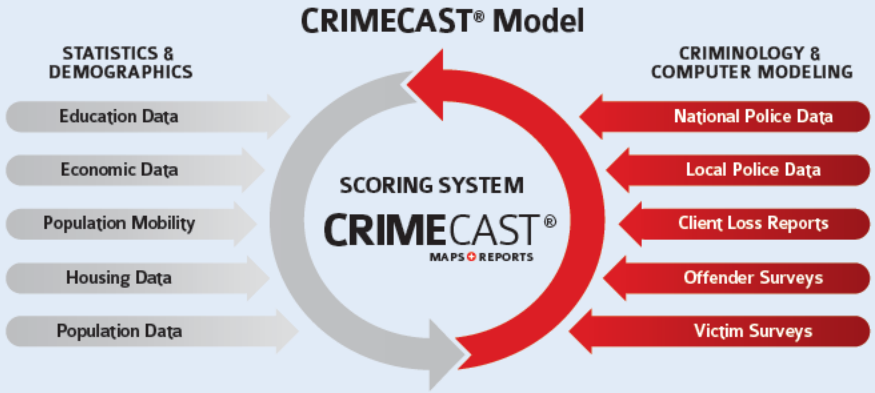
Address-Specific Crime and Loss Forecasting

The CAP Index® CRIMECAST Model is based upon the strong relationship that exists between a neighborhood's "social disorganization" and the amount of crime that is perpetrated there. Our advanced evaluation system identifies the risk of personal and property crimes at any location in the United States.

Objective, address-specific CRIMECAST Scores are calculated by correlating a broad array of demographic variables (excluding race, religion and gender) with historical crime data, survey information and other known indicators of crime.



The result? CRIMECAST Reports provide data-driven scores that place any location within the United States in context with national, state and county levels of crime risk.

About CAP Index, Inc.

As the world leader in crime and risk forecasting, CAP Index provides innovative solutions for companies and government agencies looking to minimize losses including shrink, general liability, fraud, lawsuits and crimes against persons and property. CAP Index is a trusted partner to 81 of the Fortune® 100 Companies.

CAP Index's CRIMECAST products are derived from an advanced evaluation system designed to identify the risk of personal and property crimes at any location in the United States, the United Kingdom and Canada. Address-specific CRIMECAST Reports assist clients in ranking and comparing multiple locations, site selection, security resource allocation, litigation and underwriting.

Going beyond CRIMECAST Scores, CAP Index's team of consultants can analyze external CAP Index information in tandem with internal company-specific data in order to create an objective, operationally feasible, cost-effective and fully customized risk identification model.

Corporate Headquarters
The Commons at Lincoln Center
150 John Robert Thomas Drive
Exton, PA 19341

U.S. and Canada
1-800-CAP-RISK
(1-800-227-7475)

Outside U.S. and Canada
+1 610-903-3000

info@capindex.com
www.capindex.com

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CRIMECAST Map - 1:3 Methodology

Tesoro Corporation

CRIMECAST® basic

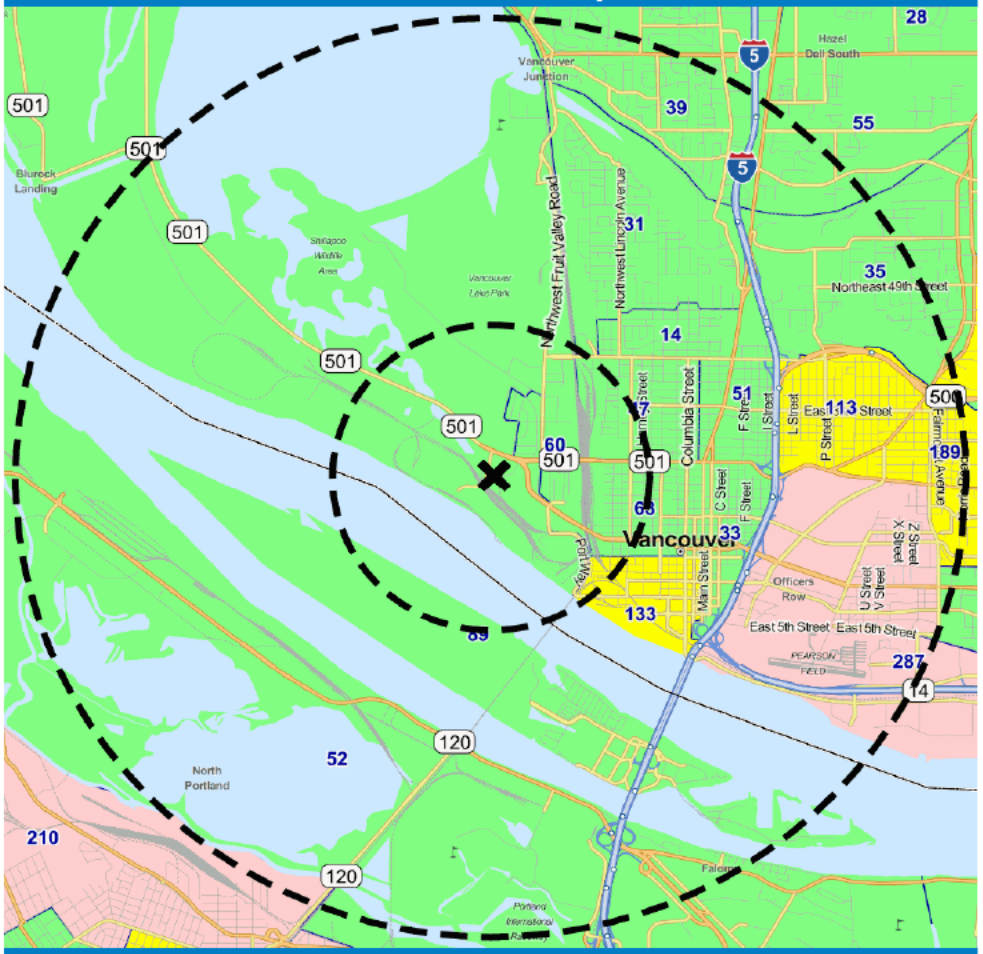
This site's Current 2014 National CAP Index Score is

134

Vancouver Terminal
2111 St. Francis Ln.
Vancouver, WA 98660

Lat: 45.638678, Long: -122.699294

CRIMECAST Map



Inner Radius: 1.0 mi • Outer Radius: 3.0 mi

Score Ranges: 0-99 | 100-199 | 200-399 | 400-799 | 800-2000

1.2 mi

CRIMECAST Scores are based on a scale of 0 to 2000, with 0 representing the lowest risk and 2000 the highest - 100 is average. A score of 600 is 6 times higher than average, and a score of 25 indicates that the risk is 1/4 the average.

National

This Site's Scores

CRIMECAST CATEGORY	CURRENT 2014
CAP Index	134
Homicide	84
Rape	187
Robbery	123
Aggravated Assault	151
Crimes Against Persons	**144**
Burglary	149
Larceny	248
Motor Vehicle Theft	207
Crimes Against Property	**239**

CAP INDEX SCORE	NATIONAL
Past – 2010	135
Current – 2014	134
Projected – 2019	123

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CRIMECAST Scores - 1:3 Methodology

Tesoro Corporation

CRIMECAST® basic

This site's Current 2014 National CAP Index Score is

134

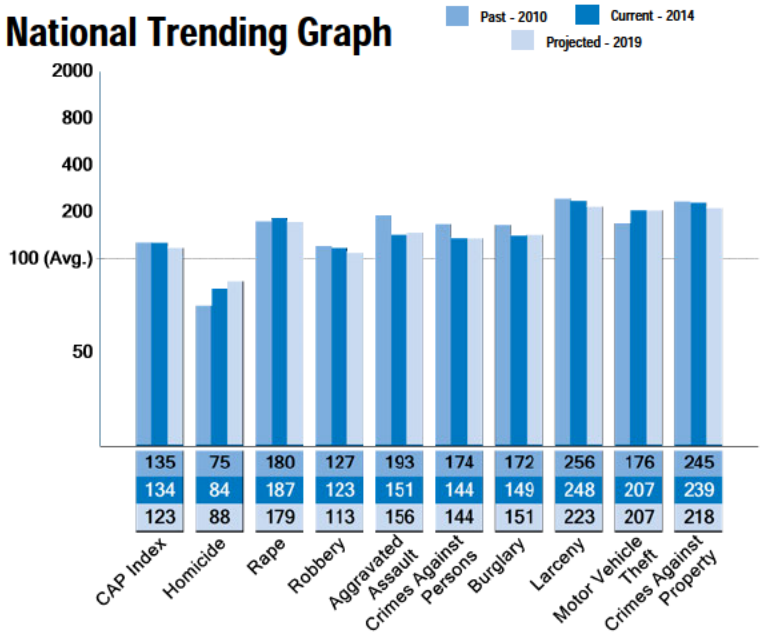
Vancouver Terminal
2111 St. Francis Ln.
Vancouver, WA 98660

Lat: 45.638678, Long: -122.699294

National

CRIMECAST CATEGORY	This Site's Scores PAST 2010	CURRENT 2014	PROJECTED 2019
CAP Index	135	134	123
Homicide	75	84	88
Rape	180	187	179
Robbery	127	123	113
Aggravated Assault	193	151	156
Crimes Against Persons	**174**	**144**	**144**
Burglary	172	149	151
Larceny	256	248	223
Motor Vehicle Theft	176	207	207
Crimes Against Property	**245**	**239**	**218**

National Trending Graph



State

CRIMECAST CATEGORY	This Site's Scores PAST 2010	CURRENT 2014	PROJECTED 2019
CAP Index	179	180	169
Homicide	172	200	208
Rape	175	188	183
Robbery	178	174	163
Aggravated Assault	248	202	212
Crimes Against Persons	**229**	**196**	**200**
Burglary	172	155	162
Larceny	210	210	191
Motor Vehicle Theft	140	158	159
Crimes Against Property	**205**	**206**	**191**

County*

CRIMECAST CATEGORY	This Site's Scores PAST 2010	CURRENT 2014	PROJECTED 2019
CAP Index	311	302	278
Homicide	310	341	348
Rape	326	311	297
Robbery	295	283	260
Aggravated Assault	391	306	310
Crimes Against Persons	**376**	**311**	**306**
Burglary	308	271	267
Larceny	557	535	462
Motor Vehicle Theft	301	317	311
Crimes Against Property	**531**	**512**	**453**

CRIMECAST Scores are based on a scale of 0 to 2000, with 0 representing the lowest risk and 2000 the highest - 100 is average. A score of 600 is 6 times higher than average, and a score of 25 indicates that the risk is 1/4 the average.

*Clark County, WA

Creation Date: January 05, 2015

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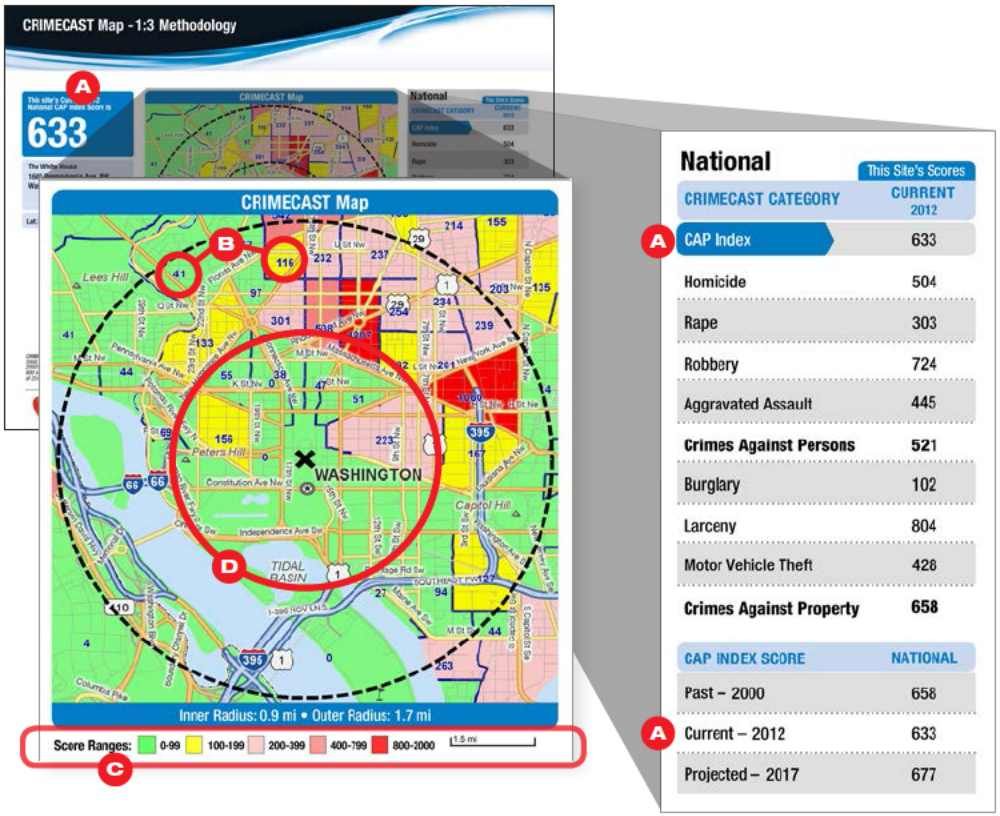
CAPIndex®

About the CRIMECAST Map & Scores

CRIMECAST® basic

CRIMECAST Reports

With a detailed, color-coded map and a spreadsheet of risk scores, users can identify potential asset protection concerns surrounding an address. A quick glance at the map shows the site in relation to its environment. The CRIMECAST Scores allow for an in-depth analysis of the overall crime risk.



CRIMECAST Scores

A The CAP Index Score represents the overall risk of crime at the address.

- CRIMECAST Scores are based on a scale of 0 to 2000, with 0 representing the lowest risk and 2000 the highest – 100 is average.
- A score of 600 is 6 times higher than average, and a score of 25 indicates that the risk is ¼ the average.
- Each CRIMECAST Report contains 90 risk scores provided for 3 geographic levels and 3 time periods:

1. **National** scores provide the site's risk in comparison to the entire U.S.
2. **State** scores compare the site to the average risk of the state in which it resides.
3. **County** scores compare the site to the average risk of the county in which it resides.
4. **Past, Current** and **Projected** risk scores are provided to allow for trending.

CRIMECAST Map

B Census tracts are outlined in blue. There are over 72,000 census tracts in the United States. Each tract contains several thousand residents with similar socioeconomic characteristics. Every census tract is assigned a numeric risk score and a coinciding risk shading.

C The site map is color-coded to depict the level of risk within each tract and identify the potential origin of criminal behavior. CAP Index Score ranges are used to assign risk shading similar to that of the green, yellow and red color scheme found on a traffic light.

D A radius threshold analysis is used to determine a site's overall risk. The inner radius represents 1 mile or a population of 25,000, equaling 2/3 of the overall score. The outer radius represents 3 miles or a population of 100,000, providing the remaining 1/3. In addition to the 1:3 methodology shown to the left, a 2:6 methodology is also available. This methodology applies an inner radius of 2 miles or a population of 100,000 and an outer radius of 6 miles or a population of 400,000.

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CRIMECAST Scores

This page contains 90 risk scores provided for 3 geographic levels and 3 time periods.

- **A** **National** scores provide the site's risk in comparison to the entire U.S. and are broken down by CRIMECAST Category. **Past, Current** and **Projected** risk scores are provided to allow for trending.
- **B** **State** scores compare the site to the average risk of the state in which it resides and are broken down by CRIMECAST Category. **Past, Current** and **Projected** risk scores are provided to allow for trending.
- **C** **County** scores compare the site to the average risk of the county in which it resides and are broken down by CRIMECAST Category. **Past, Current** and **Projected** risk scores are provided to allow for trending.
- **D** The **National Past**, **Current** and **Projected** risk scores for the CAP Index Score and each CRIMECAST Category are graphed in order to provide a visual representation of the site's risk pattern over an extended period of time.

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Vancouver Energy
Operations Site Security Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix C
Emergency Contacts

Appendix C
Emergency Contacts

IMPORTANT PHONE CONTACTS			
Affiliation	**Phone Number**	**Name of Person Contacted**	**Time Contacted**
Manager	XXX-XXX-XXXX (office) XXX-XXX-XXXX (cell)		
Company Security Officer Director Corporate Security Tesoro Companies Inc. LLC	XXX-XXX-XXXX (office) XXX-XXX-XXXX (cell)		
USCG National Response Center	(800) 424-8802		
USCG MSO, Portland	(503) 240-9301		
State of Washington Department of Emergency Management	(800) 258-5990		
Clark County Emergency Preparedness	(360) 737-1911		
Vancouver Police/Fire/Emergency Services	911		
NEIGHBORING AREA FACILITIES			
Port of Vancouver USA	(360) 693-3611		
OUTSIDE AGENCY PHONE CONTACTS			
FBI Portland	(503) 224-4181		
Washington State Highway Patrol	(360) 449-7900		
Washington State Fire Marshall	(360) 596-3900		

Vancouver Energy
Operations Site Security Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590

Appendix D
Bomb Threat

Appendix D
Bomb Threat Procedures

If You Receive a Telephone Bomb Threat

TIME _____ DATE _____

Be calm – listen carefully – pretend difficulty with hearing – write exact message.

_____

_____

_____

_____

SEX: MALE ☐ FEMALE ☐ ADULT ☐ JUVENILE ☐

VOICE CHARACTERISTICS

- ☐ LOUD
- ☐ HIGH PITCH
- ☐ RASPY
- ☐ INTOXICATED
- ☐ SOFT
- ☐ DEEP
- ☐ PLEASANT
- ☐ OTHER
- ☐ FAST
- ☐ DISTINCT
- ☐ STUTTER
- ☐ SLURRED

SPEECH

- ☐ SLOW
- ☐ DISTORTED
- ☐ NASAL
- ☐ LISP
- ☐ OTHER

LANGUAGE

- ☐ EXCELLENT
- ☐ FAIR
- ☐ FOUL
- ☐ GOOD
- ☐ POOR
- ☐ OTHER

ACCENT

- ☐ LOCAL
- ☐ FOREIGN
- ☐ Other
- ☐ NOT LOCAL
- ☐ REGION

MANNER

- ☐ CALM
- ☐ RATIONAL
- ☐ COHERENT
- ☐ DELIBERATE
- ☐ RIGHTEOUS
- ☐ ANGRY
- ☐ IRRATIONAL
- ☐ INCOHERENT
- ☐ EMOTIONAL
- ☐ LAUGHING

BACKGROUND NOISES

- ☐ FACTORY
- ☐ MACHINES
- ☐ BEDLAM
- ☐ MUSIC
- ☐ OFFICE
- ☐ MACHINES
- ☐ MIXED
- ☐ STREET TRAFFI
- ☐ TRAINS
- ☐ ANIMALS
- ☐ QUIET
- ☐ VOICES
- ☐ AIRPLANES
- ☐ PARTY
- ☐ ATMOSPHERE

Keep caller talking—if caller seems agreeable to further conversation, ask questions like:

When will it go off? Certain hour _____ Time remaining _____

Where is it located? Building _____ Area _____

What kind of bomb? _____ Where are you now? _____

How do you know so much about the bomb? _____

What is your name and address? _____

If the building is occupied, inform caller that detonation could cause injury or death.

Did caller appear familiar with plant or building by his description of the bomb location? _____

Distributed Power Training (Section 4.0)

Table of Contents

Section

1. Introduction to Distributed Power (DP) 3
2. DP System Operating Modes 3
3. Remote Operating Modes 4
4. Distributed Power Train Handling 6
5. Unlinking from Remote Consists (Ending Distributed Power Operation) 8
5.1 Unlinking IDP Lead Unit from Remote Consist(s) 8
5.2 Unlinking LIII Lead Unit from Remote Consist(s) 9
6. Preparing for Distributed Power Service 10
6.1 Locomotive Conditioning Sequence 10
7. Conditioning Remote LIII Unit (Harris Box) 11
8. Conditioning Lead IDP Unit 12
9. Conditioning a Lead LIII Unit (Harris Box) 12
10. Linking to Remote Consist(s) from Lead IDP Unit 13
11. Linking to Remote Consist(s) from Lead LIII Unit 14
12. Brake Pipe Continuity Test from IDP Unit 14
13. Brake Pipe Continuity Test from LIII Unit 15
14. Linking process 15
15. Special Operating Conditions 17
16. Penalty Brake Application 17
17. Emergency Brake Application 18
18. Charging Time Chart 18
19. Additional Information as to Group Requirements 18
19.1 Making Up a Locomotive Consist 18
19.2 Moving Locomotive 19
19.3 Locomotive Air Brake Equipment 20
19.4 Locomotive Air Brake Test 20

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1. Introduction to Distributed Power (DP)

This document presents general instructions and requirements for operating and conditioning locomotives equipped with multi-remote control systems. These systems are referred to as Distributed Power or DP. In most crude oil train applications, there will be only one remote consist.

There are two distinct distributed power remote control operating systems:

- Locotrol III system, which is referred to as LIII (Formerly referred to as DP). (Harris box controlled)
- Locotrol IFC, LEB and LSI systems, are referred to as Integrated Distributed Power (IDP). (Locomotive screen controlled)

Each system has a different operator interface, equipment setup steps and consist limitations. However, both systems provide the same control of air brakes, throttle and dynamic braking.

Distributed power systems provide synchronous (mimic) and independent (fenced) control of one to four remote consists (Li ii) or five remote consists (IDP). These consists within a train provide, in addition to the lead consist, power, dynamic braking and air braking as follows:

The system controls the remote units by radio signals transmitted from the lead unit.

During the initial setup and linking of the equipment and continuously during operation, a series of checks and comparisons detect equipment status, communication errors, or procedure sequence errors.

For safety, this equipment becomes operational only when it is properly conditioned, a brake pipe continuity test is confirmed, and the radio links the lead controlling unit and the remote controlled unit(s).

NOTE: An engineer controls each locomotive consist in the distributed power train from the "lead unit". The term "remote unit" applies to the controlling locomotive unit in a remote consist. Locomotives connected through the train lines for multiple unit service to the lead and remote unit(s) are called "trail locomotives.

2. DP System Operating Modes

After completing a brake pipe continuity test, change the system mode to RUN to enable the remote distributed power traction and dynamic brake functions.

NOTE: Brake pipe continuity tests are performed in the system IDLE mode.

Changing System Operating Modes on IDP Controlling Unit

To change the operating mode on an IDP controlling unit:

1. Select DP MAIN MENU
2. Select MODE
3. Select RUN or IDLE
4. Press EXECUTE

The RUN or IDLE status appears in the upper left-hand corner of the No. 2 or left ICE screen.

Changing System Operating Modes on LIII Controlling Unit (Harris Box)

To change the operating mode on a LIII controlling unit:

1. Select the MODE display
2. Select RUN or IDLE 3
3. Press EXECUTE

The RUN or IDLE status appears in the upper right-hand corner of the DP control console.

3. Remote Operating Modes

The system mode and the individual remote modes determine how each remote unit responds to the commands from the lead unit for throttle, air brake conditions, and other operator inputs.

Use the REMOTE display on the lead locomotive to select limiting modes for the individual remote units.

The remote modes are:

- NORMAL - All remote traction and dynamic braking functions are enabled for control. All remote air brake functions are enabled, and the brake valve may be cut in.
- IDLE - The remote throttle remains in IDLE. All remote air brake functions are enabled and the brake valve may be cut in.
- BV OUT - All remote traction and dynamic brake functions are enabled for control. The emergency and independent air brake functions are enabled for control. The remote automatic air brake functions are restricted by cutting out the brake valve.
- ISOLATE - The remote throttle does not respond to commands and remains in Idle. The remote's emergency brake application function and independent brake functions are enabled for control. All other brake functions are disabled, and the brake valve is cut out.
- SET OUT(S/O) - The remote throttle does not respond to commands and remains in Idle. The remote's emergency brake application is enabled for control. The independent brakes are fully applied (72 psi). All other brake functions are disabled, and the brake valve is cut out.

These modes may be selected from the REMOTE display.

Remote Mode NORMAL

When the distributed power system is linked and the brake pipe leakage test is complete, the remote consists are in NORMAL.

1. Returning a Remote Consist to NORMAL mode (Exception: see instructions for return to NORMAL from the SET OUT mode.) If a remote is in other than SET OUT or NORMAL modes, return it to NORMAL as follows:

   - Select NORMAL from the remote display.

   NOTE: Units in the STOP mode must be placed into the ISOLATE mode to be restarted and then may be returned to the NORMAL mode. Units must be manually restarted.

   - After changing the remote consist to NORMAL, you may cut in the automatic brake valve.

2. To Cut in Automatic Brake Valve on Remote: To cut in an automatic brake valve on a remote unit that has been returned to or is in NORMAL or IDLE:

   - Make at least a 10 psi brake pipe reduction with the automatic brake valve.
   - After the brake pipe exhaust has ceased, move the automatic brake valve handle to RELEASE.

   With the lead unit automatic brake valve in RELEASE, the remote brake valve will cut in when the brake pipe pressure increases at least 4 psi at the remote unit.

Remote Mode IDLE

The IDLE mode allows the remote consist to use all brake functions, but disables all power or dynamic braking.

NOTE: A change to this mode can be made while the train is moving or stopped.

If the mode is changed while moving, care must be exercised to assure that slack adjustment is not affected by loss of power or dynamic brakes.

Remote Mode BV OUT

The BRAKE VALVE (BV) OUT mode can be used when troubleshooting air brake problems and when making a brake pipe continuity check. If a consist is operated in the remote BV OUT mode, the consist will not continue to operate in power or dynamic brake (no override) following a communication interruption of 45 seconds or more.

To cut in an automatic brake valve on a remote unit that has been returned to or is in NORMAL or IDLE:

1. Make at least a 10 psi brake pipe reduction with the automatic brake valve.
2. After the brake pipe exhaust has ceased, move the automatic brake handle to RELEASE.

With the lead unit automatic brake valve in RELEASE, the remote brake valve will cut in when the brake pipe pressure increases at least 4 psi at the remote unit.

NOTE: A change to this mode can be made while the train is moving or stopped.

Remote Mode ISOLATE

The remote mode changes to ISOLATE when a communication loss idle down has occurred.

NOTE: A change can be made to this mode while the train is moving or stopped.

See Isolate on page 4.

Remote Mode SET OUT (510)

The SET OUT mode must be used to condition and help secure a remote consist left standing uncoupled from the front portion of a train operating in distributed power. A change to this mode must only be made when the train is stopped. This procedure also applies to an undesired separation (Break-in-two).

A. Separating from Remote Consist to Be Left Standing

To separate the remote consist from the train:

1. Stop the train.
2. Fully apply the independent brakes.
3. Make a 20 psi brake pipe reduction.
4. Apply Red Zone protection.
5. Tie sufficient hand brakes on engines and/or cars to be left standing.
6. From the REMOTE display.
   a. Use the cursor to select the remote consist to be left standing.
   b. Select S/O.
   c. Select EXECUTE.
   d. Wait for the status to change to S/O.
   e. Repeat steps "a" through "d" for each remote consist left standing.
7. Close the angle cock on the last car of the head portion of the train to be moved.
8. Separate the train when ready.
   a. Leave the angle cock OPEN on the detached portion of the train.
   b. Ensure that the detached portion of the train goes into emergency.

B. Returning Remotes to NORMAL after Re-coupling Train

To return the remotes to NORMAL after using the SET OUT mode to separate the train:

1. Re-couple and stretch the train.
2. Apply Red Zone with a full service brake pipe reduction.
3. Do not open the angle cock to recharge the rear portion of the train at this time.
4. From the remote display:
   a. Select the remote consist to be returned to NORMAL.
   b. Select NORMAL and then EXECUTE.
   c. Ensure that the remote consist status changes from S/O to NORMAL.
   d. Repeat steps "a" through "c" for each remote consist re-coupled.
5. Release the hand brakes.
6. Open the angle cock.
7. Place the automatic brake valve in release. NOTE: After a PSC open condition has occurred on a remote consist(s), the following conditions are required before tractive effort will be allowed to be produced by the remote consist(s).
   a. PCS on remote(s) has reset.
   b. Automatic brake valve on remote(s) has cut in.
   c. A minimum brake pipe pressure of 25 psi has been restored at the remote consist(s).

4. Distributed Power Train Handling

The following train handling rules can be applied to both types of equipment (IDP/Llll) and are intended to be generic. The train handling technique is the same for both types of equipment even though the exact steps and indications may vary.

A. Operating Remote Units in Front Group (synchronous mode/mimic)

After a distributed power train has been conditioned and the system has been placed in RUN mode, the system is configured with all remote units in the front group (synchronous mode/mimic) and controlled from the lead unit throttle.

If possible, operate all remote units in the front group when the train is operating on:

- Near-level or gentle undulating grades.
- Continuous descending or ascending grades without severe undulation.

When operating on severely undulating grades or when cresting a grade, use independent control for train handling.

B. Operating Remote Units in Independent Control (back group/fenced)

Caution: Remote unit(s) always have the generator field circuit energized regardless of the position of the generator field switch of the lead unit. The reverser on the lead unit must be centered while the train is standing, until the train is ready to move.

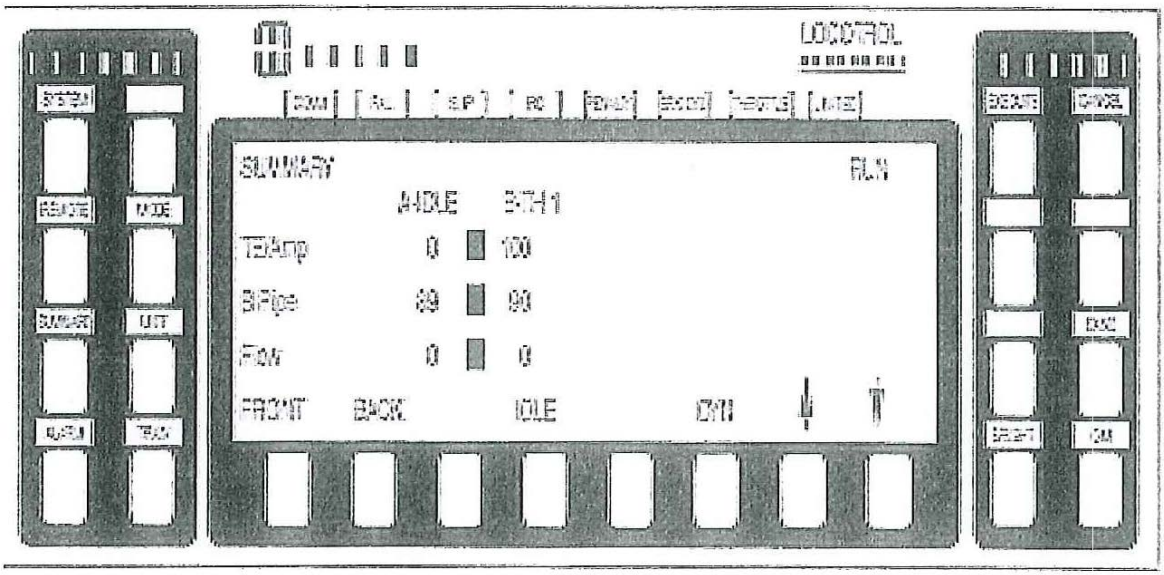
Use the independent control function only when the train is operating in the RUN mode. Control the independent operation for remote consist(s) using function keys displayed on the SUMMARY screen.

- Only the consist(s) displayed in the back group can respond to throttle and dynamic brake commands initiated from the Summary screen.
- Only the consist(s) operating in the front group can respond to throttle and dynamic brake commands made from the lead unit controller.

If a train is operating on undulating terrain, improve the train handling or slack action by operating the remote consist(s) at a power setting different form the front po1 ion of the train (called independent control).

Operate in independent control by moving the remote consist(s) into the back group and providing independent control of the throttle or dynamic braking by pressing the BACK soft key on the Summary screen.

NOTE: A fence (bar) separates the front and back consists. All consists to the right of the fence are in the back group and those on the left are in the front group.



If the consists were operating in power or dynamic braking(synchronous) when the rear remote consist was moved to the back group, the rear remote will remain at its present power setting until it is changed using the soft keys on the Summary screen.

If the consists were in IDLE when the rear remote consist was moved to the back group, it is necessary to select THROTTLE/TRACTION or DYN/BRAKE and to execute the command to take independent control of the back group. Once executed, the throttle or dynamic brake will move to Position 1.

Control the remote consist(s) in the back group as follows:

- From an IDP lead unit, press more or less TRACTION/BRAKING
- From a LIII lead unit, press the up or down arrows for more or less THL or DYN.

To control the throttle or braking of the units in the front group, use the lead unit throttle controller.

To reassign a remote consist from the front group to the back group, press the BACK soft key.

To reassign a remote unit from the back group to the front group, press the FRONT soft key.

NOTE: The Summary screen continues to display both the front and back throttle positions. A remote unit moved to a new group will immediately begin changing throttle or dynamic brake positions to match its new group assignment.

C. Reassigning Remote DP Units to Front Group When in a Different Mode.

When reassigning units between the front and back groups while the front group is in the DYNAMIC BRAKE mode, the back group is in THROTTLE mode, and the reverser is in the forward direction (as when cresting a grade):

1. Press the console's FRONT button to initiate the back-to-front transition. The following sequencing occurs:

   a. The selected remote steps down in throttle at 3 seconds per step. When it reaches IDLE, it pauses.

   b. The console's Summa1y screen indicates that the front group is in DYNAMIC BRAKE mode, the selected remote is in IDLE, and the back group is in the THROTTLE mode.

2. When additional braking in the front group is required as more of the train crests the grade, press the console's FRONT button again. The following sequencing occurs:

   a. The remote configures for dynamic braking and advances at 3 seconds per step to match the lead unit.

   b. The control console's Summary screen indicates that the selected remote is operating in the DYNAMIC BRAKING mode.

   NOTE: Having the front group in the THROTTLE mode and the back group in DYNAMIC BRAKE mode is an invalid condition, unless the front group's reverser switch is in the reverse setting. Then, the sequence in steps 1 and 2 above applies.

5. Unlinking from Remote Consists (Ending Distributed Power Operation)

Before ending LIII or IDP on remote consist(s), end distributed power on the lead consist. Stop and secure the train before ending distributed power, and follow one of the procedures below to unlink a LIII or IDP lead unit.

5.1 Unlinking IDP Lead Unit from Remote Consist(s)

To unlink an IDP lead unit:

1. Stop the train.
2. Fully apply the independent brake.
3. Place throttle in IDLE.
4. Make a 20 pound automatic brake pipe reduction.
5. From the RIGHT screen (or DP Main Menu):
   a. Select the system display key.
   b. Press the UNLINK key followed by the EXECUTE key.
   NOTE: A penalty brake application will reduce brake pipe pressure to 15 psi.
6. Wait to proceed until after the brake pipe exhaust ceases and the distributed power backup emergency valve drops the brake pipe pressure rapidly to zero.

   NOTE: Locotrol LEB IDP lead unit does not perform distributed power backup emergency valve test. On these IDP lead units, recover penalty application and end distributed power to return to conventional operation.

7. If the lead unit will not be re-linked, end distributed power operation as follows:
   a. Select the DP MAIN MENU key. On UPRR IDP locomotives END DIST POWER button should appear after back up emergency valve check without returning to DP menu again.
   b. Press the END DIST POWER key followed by the EXECUTE key.
   c. Turn the DATA RADIO circuit breaker OFF (or Distributed Power and TIM breakers.

   You may now operate the lead consist with normal operating procedures. Be sure to condition remote units for normal operation.

NOTE: Some foreign locomotives with DP equipment unlink with an immediate emergency application and no penalty application. End distributed power on these units after the emergency application upon unlinking.

5.2 Unlinking LIII Lead Unit from Remote Consist(s)

To unlink a LIII lead unit:

1. Stop the train.
2. Fully apply the independent brake.
3. Place throttle in IDLE.
4. Make a 20-pound automatic brake pipe reduction.
5. From the system display, select the UNLK and then EXECUTE.

NOTE: A penalty brake application will reduce brake pipe pressure to approximately 9 psi. UPRR LIII systems will initiate an emergency application.

6. Wait to proceed until after the brake pipe exhaust ceases and the distributed power backup emergency valve drops the brake pipe pressure rapidly to zero.
7. Turn OFF the distributed power breaker located on the engine control panel.
8. At the distributed power setup module in the nose of the unit:
   a. Set thumb wheels to 0000.
   b. Turn OFF the three circuit breakers on the distributed power switch panel labeled ELEC, RELAY, and RADIO.
9. Follow the instructions in the air brake message block to recover the locomotive brakes.

You may now operate the lead consist using normal operating procedures. Be sure to condition remote units for normal operation.

NOTE: Some foreign locomotives with DP equipment unlink with an immediate emergency application and no penalty application. End distributed power on these units after the emergency application upon unlinking.

Ending Distributed Power 011 Remote IDP Units

End distributed power on each remote IDP controlling unit only after it has been unlinked from the lead unit.

On the remote controlling unit:

1. Select the distributed power key.
2. Select END DISTRIBUTED POWER.
3. Turn the DATA RADIO circuit breaker OFF (or Distributed Power and TIM breakers).

Condition the locomotive brakes for normal operation.

Ending Distributed Powel on Remote LIII Units

End distributed power on each remote LIII controlling unit only after it has been unlinked from the lead unit.

On the controlling remote unit:

1. Turn OFF the distributed power breaker located on the engine control panel.
2. At the distributed power setup module located in the nose of the unit, set the thumb wheels to 0000.
3. Turn OFF the three circuit breakers on the distributed power switch panel labeled ELEC, RELAY, and RADIO.

NOTE: You may need to save and confirm LEAD CUT-OUT before changing the air brake system to the desired operation.

6. Preparing for Distributed Power Service

1. Secure consist(s) to prevent movement during conditioning.

All BNSF locomotive s are now equipped with "Brake Pipe Test on Demand" which provides the ability to perform the DP Brake Pipe Test whenever required. This feature eliminates the need to unlink and again perform the initial conditioning procedures. This test is on the locomotive DP set-up display.

NOTE: When automatic brake valve is at a 10 psi reduction or greater, the same button for DP Brake Pipe Test is replaced with "Train Check" (see page 15).

6.1 Locomotive Conditioning Sequence

Condition locomotive for distributed power in the following order:

1. Set up the remote units.
2. Set up the lead unit.
3. Link to remote(s) from the lead unit.
4. Perform a brake pipe test.

Follow this sequence for both IDP and LIII systems. Complete the applicable procedure for the system equipped on each locomotive.

Conditioning Remote IDP Unit

Condition the controlling remote IDP unit in each consist as follows:

A. Switch and Handle Positions

1. "Data radio" circuit breaker - ON

NOTE: On GE IDP locomotive, the Distributed Power/TIM or MTB breakers must be turned on in lieu of "Data Radio"

2. Isolation Switch - RUN
3. Dynamic brake circuit breaker - ON
4. Control and fuel pump switch - ON
5. Engine run switch - ON (some EMD units require switch OFF, follow prompts from screen)
6. Generator field switch - OFF
7. Reverser - Centered (handle removed)
8. Throttle handle - IDLE
9. Automatic brake handle - Continuous Service/Handle Off
10. Independent brake handle - Fully applied (at this time)
11. Air brake setup - Lead (freight) CUT IN

NOTE: Ensure that the PCS and all air brake faults are reset before starting the setup procedure.

B. IDP Setup Procedure

On the right-hand (No. 1) ICE screen or either screen on GE Locotrol IFC, perform the following:

1. Select the MORE menu.
2. Select the DIST POWER key from the menu options.
3. From the Distributed Power Main Menu, choose the REMOTE SETUP key.
4. Enter the LEAD IDP (or DP) unit number.
5. Designate the direction of the remote unit as either SAME as or OPPOSITE of the lead unit.
6. Press ACCEPT.
7. Verify LEAD CUT IN and DP ENABLED (or DP REMOTE).
8. Place the independent brake valve handle in RELEASE.
9. Do not attempt to reset the PCS.

This unit is now set up as a remote unit.

NOTE: If the locomotive is equipped with outer locking hasp and lock, lock remote IDP unit(s) and any trailing units in remote consist(s) after conditioning for service.

7. Conditioning Remote LIII Unit (Harris Box)

Condition the controlling remote Li ii unit in each consist as follows:

A. Switch and Handle Positions

1. Distributed power circuit breaker - OFF (at this time)
2. Isolation switch - RUN
3. Dynamic brake circuit breaker - ON
4. Control and fuel pump switch - ON
5. Engine run switch - ON
6. Generator field switch - OFF
7. Reverser - Centered (handle removed)
8. Throttle handle - IDLE
9. Air brake setup - LEAD (freight)
10. Automatic brake handle - Continuous Service/Handle Off (UPRR LIII with air brake button control console, place ABV in RELEASE position)
11. Independent brake handle - Fully Applied (at this time)

NOTE: Ensure that the PCS and all air brake faults are reset before starting the setup procedure.

B. LIII Setup Procedure

At the LIII setup module in the nose compartment of the unit:

ALL LIII

1. Set the thumb wheels to the lead unit LIII unit number.
2. Set the LEAD/REMOTE switch to REMOTE.
3. Using the SAME/OPPOSITE switch, designate the direction of the remote unit as either SAME as or OPPOSITE of the lead unit.

UPRR LIII ONLY

4. Dual port air brake valve set to CUT IN (on units so equipped).
5. Locotrol/Conventional switch set to Locotrol (on units so equipped).

ALL LIII

6. Turn ON the three circuit breakers labeled ELEC, RELAY, and RADIO.

At the engine control panel:

7. Turn the distributed power circuit breaker ON.

At the control stand:

8. Place the independent brake handle in RELEASE.
9. Verify that the air brake message block reads DIST PWR REMOTE (if IFC screen equipped).
10. Do not attempt to reset the PCS.

This unit is now set up as a remote unit.

NOTE: If the incorrect lead DP unit is identified or the SAME/OPPOSITE switch is in the wrong position at the setup module, turn OFF the distributed power breaker on the engine control panel. After making the correct settings, turn ON the distributed power breaker.

NOTE: If the locomotive is equipped with outer door locking hasp and lock, loci< remote IDP unit(s) and any trailing unit(s) in remote consist(s) after conditioning for service.

8. Conditioning Lead IDP Unit

Before starting the setup procedure, ensure that: PCS and all air brake faults are reset.

Condition the controlling IDP unit as follows:

A. Switch and Handle Positions

1. "Data Radio" circuit breaker - ON

NOTE: On GE Locotrol IFC locomotives, the Distributed Power/TIM or MTB breakers must be turned on in lieu of "Data Radio".

2. Isolation switch - RUN
3. Dynamic brake circuit breaker - ON
4. Control and fuel pump switch - ON
5. Engine run switch - ON
6. Generator field switch - OFF (until ready to move)
7. Reverser - Centered (handle removed)
8. Throttle handle - IDLE
9. Automatic brake handle - Continuous Service/Handle Off
10. Independent brake handle - Fully applied
11. Air brake setup - Lead (freight) CUT IN

B. IDP Setup Procedure

On the right-hand (No. 1) ICE screen or either screen on GE Locotrol IFC, perform the following:

1. Select the MORE menu.
2. Select the DIST POWER key from the menu options.
3. At the Distributed Power Main Menu, select the LEAD SETUP key.

This unit is now conditioned and is ready to begin the linking process (see page 13).

9. Conditioning a Lead LIII Unit (Harris Box)

Before starting the setup procedures, ensure that:

- Equalizing reservoir is adjusted to the required pressure.
- PCS and all air brake faults are reset.

Condition the controlling LIII unit as follows:

A. Switch and Handle Positions

1. Distributed power circuit breaker - OFF (at this time)
2. Isolation switch - RUN
3. Dynamic brake circuit breaker - ON
4. Control and fuel pump switch - ON
5. Engine run switch - ON
6. Generator field switch - OFF (until ready to move)
7. Reverser - Centered (handle removed)
8. Throttle handle - IDLE
9. Air brake setup - LEAD (freight)
10. Automatic brake handle - Continuous Service/Handle Off
11. Independent brake handle - Fully Applied (at this time)

B. LIII Setup Procedure

At the LIII setup module in the nose of the unit:

ALL

1. Set the thumb wheels to the lead unit LIII unit number.
2. Set the LEAD/REMOTE switch to LEAD.
3. Set the SAME/OPPOSITE switch to LEAD.

UPRR LIII ONLY

4. Dual port air brake valve set to CUT IN (on units so equipped).
5. Locotrol/Conventional switch set to Locotrol (on units so equipped).

ALL

6. Turn ON the three circuit breakers labeled ELEC, RELAY, and RADIO.

At the engine control panel:

7. Turn the distributed power circuit breaker ON.

At the control stand:

8. On units so equipped, verify that the IFC displays an air brake message block indicating "DPC Penalty, Place Handle in Supp".

NOTE: The system LIII console should now begin cycling through a self-diagnostic mode. Verify that all lights are working before proceeding to the linking operation. Press any button on the LIII console to stop the diagnostic cycling.

This unit is now set conditioned and is ready to begin the linking process.

10. Linking to Remote Consist(s) from Lead IDP Unit

After completing step 3 of the lead IDP conditioning, the linking process is started by entering the controlling unit number of the remote consist(s). If there is more than one remote consist enter the locomotive remote nearest the lead consist first.

Perform the following:

1. Enter the number of the remote DP unit to be linked and select LINK.

The system will perform a short test.

- Check the System display for LINK OK, which means this step was successful.
- If the System display responds with LINK FAIL, check and re-enter the number of the controlling remote unit. If this step fails again, check the setup of the remote unit.

NOTE: If a "Radio Fail A or B" message is received, unlink and then re-link with remote. If a "Radio Fail A or B" message is received again, continue with linking process. Report the radio defect.

2. Repeat step 1 for each remote consist. Verify that each remote(s) are linked OK and then press the ACCEPT key.

NOTE: Once the consists are accepted, the Distributed Power Main Menu will appear on the right screen and the Distributed Power Main Menu will appear on the left screen. (On GE Locotrol IFC Locomotives, the DP Main Menu may be displayed on either screen, and the DP Operation can then be displayed on the opposite screen)

3. Perform the brake pipe continuity test (see page 14).

11. Linking to Remote Consist(s) from Lead LIII Unit

If the LIII console indicator lights are cycling, press any soft key to reset and display the prompt to enter the controlling unit number of the remote consist nearest the lead consist.

Perform the following:

1. Use the arrow keys to select the number and move the cursor.
2. After the proper unit number is displayed, press the LINK soft key.

NOTE: The status of the linking process will be displayed to the right of the unit number, i.e., TESTING, LINK OK, RADIO, FAIL A or B, LINK FAIL

Ensure that LINK OK is displayed to the right of the remote before proceeding to the next step. If LINK FAIL is displayed, re-enter the unit number and press the LINK soft key. If LINK FAIL is displayed again, check for the proper setup on the remote unit.

NOTE: If a "Radio Fail A or B" message is received, unlink and then re-link with remote. If a "Radio Fail A or B" message is received again, continue with linking process. Report the radio defect.

3. If the train has more than one remote consist, repeat steps 1 and 2 for each consist.
4. After entering all controlling remote engine numbers, press the DONE soft key.
5. Ensure that the automatic brake valve is in SUPPRESSION and wait until the penalty clears (about 2 minutes).
6. When the PCS and air brake message clears (on IFC equipped units), you may move the automatic brake valve handle to RELEASE to charge the brake system.
7. Perform the Brake Pipe Continuity Test.

12. Brake Pipe Continuity Test from IDP Unit

Perform the brake pipe continuity test (BP test) after linking the consists and before moving the locomotive or train. Ensure that the IDP system is in IDLE.

After the correct locomotive(s) have been accepted in the linking process, perform the following.

1. When the message CHARGE TRAIN BEFORE RUNNING BRAKE PIPE TEST appears, place automatic brake valve handle in RELEASE.

NOTE: After linking to remote(s) the left-hand screen on EMO IDP locomotives will automatically display the DP control screen. GE IDP units must be manually set up at this time, on some units, to display DP control screen to left.

Upon releasing brakes on lead unit, observe automatic brake valves on remote(s) cut in and a flow indication for all DP units on the DP control screen. Wait until flow values drop to 20 CFM on the lead and remote unit(s) before proceeding with step 2. This may take several minutes to reach desired rate.

2. Press the BRK PIPE TEST key, followed by the EXECUTE key.
3. When prompted (this is an automated test), move the automatic brake valve handle to MINIMUM REDUCTION.

NOTE: Moving beyond MINIMUM REDUCTION will void the test.

4. Check the system screen for BP TEST OK, which means the test was satisfactorily completed.
5. If the test fails (BP TEST FAIL), RELEASE THE TRAIN BRAKES AND RECHARGE. Return to step 1, wait until the flow has stabilized, and repeat test.
6. See page 3 for step to change the system operating mode to RUN.

EXCEPTION: In extreme cold temperatures, the DP Brake Pipe Test may be initiated when brake pipe charging has stabilized. If the air flow rate does not reduce to 20 CFM and if there is no further decrease in flow rate for a period of at least 90 seconds, then the flow rate is considered to be stabilized and the DP Brake Pipe Test may be initiated as long as the CFM is no higher than 30 CFM on any DP controlling

unit. DP Brake Pipe Leakage test (no more than 5 psi/minute) must be successfully completed before departing.

13. Brake Pipe Continuity Test from LIII Unit

Perform the brake pipe continuity test to properly condition and enable the LIII equipment.

Perform the following:

1. Press the BP TEST soft key.
2. When the BP TEST key begins to flash (this is usually a prompt to press the EXECUTE or CANCEL soft key):

   a. Do not press EXECUTE or CANCEL at this time.
   b. Check the flow valves for the lead and remote consists displayed on the LIII console screen and wait until these values are below 20 CFM.

NOTE: The flow may take several minutes to reach the desired rate.

3. Once the air flow indicated on the lead and remote consists is below 20 CFM, press the EXECUTE soft key to initiate the BP test. (some LIII systems automatically reduce to MINIMUM REDUCTION at this time)
4. When prompted on the LIII console, move the automatic brake valve handle to MINIMUM REDUCTION. Moving beyond MINIMUM REDUCTION will void the test.
5. Check the LIII control console for BP TEST OK, which means the test was satisfactorily completed.
6. If the test fails, release the train brakes and recharge. Wait until the flow has stabilized to a lower flow value than previous attempt, return to step 1, and repeat the test.
7. See page 3 for steps to change system operating mode to RUN.

EXCEPTION: In extreme cold temperatures, the DP Brake Pipe Test may be initiated when brake pipe charging has stabilized. If the air flow rate does not reduce to 20 CFM and if there is no further decrease in flow rate for a period of at least 90 seconds, then the flow rate is considered to be stabilized and the DP Brake Pipe Test may be initiated as long as the CFM is no higher than 30 CFM on any DP controlling unit. DP Brake Pipe Leakage test (no more than 5 psi/minute) must be successfully completed before departing.

14. Linking process

The train check operating feature verifies that the brake pipe is open and unrestricted between the lead consist and the remote consist(s).

Perform the train check in the following instance:

- Just before movement any time the train has been stopped or the train's brake pipe may have been compromised (cars set-out).

Train Check is NOT required when:

- Required to stop very briefly for lining switches such as entering or departing a track or siding followed by an immediate movement.

Performing Train Check from IDP or·LIII Unit

The conditions and procedure for this brake pipe system check are identical for both types of distributed power equipment.

Perform the check as follows:

1. Ensure that the train is standing.
2. Apply the train air brakes (make at least a 10 pound reduction).
3. Wait until the brake pipe exhaust has ceased before initiating the train check.

NOTE: During extremely cold temperatures, do not initiate the train check until just before departure.

4. From the system display, select TRAIN CHECK.
5. Select EXECUTE.
6. Verify that the brake valves cut out on the remote consist(s) by checking the status of the remotes or by seeing the prompt appear to release the brakes.
7. Move the automatic brake handle to RELEASE when ready to depart.

The results of the train check will appear on the display as PASS or FAIL.

The check may take up to 2 minutes. During this time, the Locotrol system is expecting brake pipe pressure to increase on the remote consist(s). If it does not detect this increase, if the increase comes too slowly, or if communication is interrupted, the result will be a FAIL indication.

NOTE: Train may be started while waiting for the train check results. The results of the train check must yield a PASS indication before:

- Train speed exceed 10 mph, AND
- Train movement exceeds the train's length. Unless the entire train is visually inspected, or the charging brake pipe pressure readings from the remote(s) or ETD (FRED) indicate that the brake pipe is not obstructed.

Responding to Train Check FAIL

If the train check results in a FAIL indication, three chimes will sound and the System screen will indicate the failure. A brake pipe blockage, excess brake pipe leakage, or an interruption in communications between the lead and remote(s) could cause the failure.

A. Second Attempt of Train Check

If the train was started and is moving when the train check FAIL is received, stop the train and retry the train check (see previous page).

1. If a TRAIN CHECK PASS or OK indication is given on the second attempt, proceed as normal.
2. If another TRAIN CHECK FAIL occurs, walk the train and inspect air hose connections and angle cocks.

B. Alternative Method for Determining Brake Pipe Continuity

If there are no indications of communication interruptions between the remote(s) and/or the ETD (FRED) and the lead unit, perform the alternative method as follows:

1. Make a 10 psi brake pipe reduction with the automatic brake valve.
2. Cut out the brake valves on all remote(s) by placing each in BV OUT mode.
3. After determining that all remote brake valves are cut out, return the remotes to NORMAL mode.
4. Move the automatic brake valve handle to RELEASE.
5. Using the remote DP at the rear of the train or an ETD (FRED), verify a rise of at least 5 psi of brake pipe pressure at the rear of the train.
6. If any remote brake valves do not cut in with a rise in brake pipe pressure of at least 4 psi at that remote as indicated by the control console, report that the remote DP unit is defective to the mechanical help desk.
7. If the brake pipe is unrestricted between the lead unit and the rear of the train, proceed at maximum authorized speed.

If the brake pipe pressure does not increase or decrease in a normal amount of time, visually inspect the train. Correct and report any defect(s) found.

C. Communication Interruption during Train Check or Alternate Method

During the train check or alternate method, if there are indications of a communication interruption between the remote(s) and or ETD (FRED) and the lead unit, perform the following:

1. If needed and if move can be made safely, proceed one train length at no more than 10 MPH to try to improve radio reception.
2. Successfully complete the train check or the alternate method before allowing the train to proceed at maximum authorized speed.

15. Special Operating Conditions

This section describes special operating conditions and procedures for adding or removing units while linked.

Adding or Removing Unit(s) in Lead or Remote Consist while Linked

Locomotives may be added or removed from the lead or remote consist while linked except the controlling locomotive of each consist. If it is necessary to change out the controlling locomotive or lead consist:

1. Unlink the distributed power.
2. Properly condition the new controlling locomotive and link it to the other consists in the train.

Adding or Removing Trail Locomotives

Trail locomotives may be added or removed while the train is stopped and linked. When adding or removing locomotives, except when removing the rear locomotive(s) of the consist, perform locomotive air brake test.

NOTE: The air brake test may be performed on the remote consist by the engineer operating from the lead consist. Crew members or mechanical forces must observe from the ground that the locomotive brakes apply and release on the consist that has been changed.

Do not operate (MOVE) a remote consist from the lead consist unless the brake pipe is connected and open between the lead and remote consist to be moved.

Alarm Warning from a Remote Unit

The alarm indication is triggered by a train line alarm from that remote consist. The defect may be on any unit in that consist.

When the lead DP unit display indicates a wheel slip from a DP remote consist that is continuous (active alarms remain highlighted on alarm display screen and audible alarm is continuous), train must be stopped immediately and cause for alarm determined. A rolling inspection of remote consist(s) involved is required before proceeding.

All other alarms must be investigated at first opportunity.

16. Penalty Brake Application

If a penalty brake application occurs during distributed power operation:

1. Control the lead locomotive consist brake cylinder pressure to prevent excessive buff and draft forces.

NOTE: The remote consist(s) locomotive brake cylinder pressure is automatically regulated to maintain 45 psi of brake cylinder pressure during a penalty brake application and cannot be controlled by the lead unit.

2. Move the automatic brake valve handle to SUPPRESS ION.
3. Place the lead and remote(s) throttle in IDLE.
4. All penalty brake applications require stopping before releasing when involving DP equipment. After the PCS has reset on the lead unit and remote unit(s) (approximately 2 minutes), move the automatic brake valve handle to RELEASE.

NOTE: The remote brake valve will cut in and begin charging the brake pipe after sensing a brake pipe pressure increase.

17. Emergency Brake Application

If an emergency exists or an emergency brake application occurs during distributed power operation:

1. Move the automatic brake valve handle to EMERGENCY.
2. Control the lead locomotive consist brake cylinder pressure to prevent excessive buff and draft forces.

NOTE: The remote consist(s) locomotive brake cylinder pressure is automatically regulated to maintain 45 psi of brake cylinder pressure during an emergency brake application and cannot be controlled by the lead unit.

3. Place the lead and remote(s) throttle in IDLE.
4. After the train has stopped and the PCS has reset on the lead unit (approximately 1 minute), move the automatic brake valve handle to RELEASE.

NOTE: The remote brake valve will cut in and begin charging the brake pipe after sensing a brake pipe pressure increase.

18. Charging Time Chart

When the brake system is uncharged and not equipped with an air flow meter, use the following chart to determine the minimum and maximum charging times.

Minimum and Maximum Charging Times When a Brake System Is Empty		
Brake Pipe Length (ft)	**Minimum Charging Time (minutes)**	**Maximum Charging Time (minutes)**
2,500	8	25
3,000	10	30
4,000	15	35
5,000	20	40
6,000	26	55
7,000	35	65
8,000	45	75
9,000	57	100
10,000	71	125
11,000	80	160

19. Additional Information as to Group Requirements

19.1 Making Up a Locomotive Consist

Each set of units will be conditioned as if to power a conventional train. Lead consist and rear consist will be the same until placed in the train.

A. Couple desired units together and stretch the train.

B. Fully apply the independent brake. Center and pull reverser. Generator field switch to OFF position.

C. Tie the hand brakes on all the units.

D. Couple the train line and open the angle cocks on both units.

E. Couple the MU air and open the angle cocks on both units.

F. Install the MU electrical cables.

G. On the trailing unit or units:

Condition the air brakes to trail.

Move the auto brake handle to HO (handle off)

Move the independent brake to release.

H. On the controlling unit (lead):

Condition the air brakes to lead - cut in.

Move auto brake handle to release.

Fully apply independent brake.

Move isolation switch to ON.

Do a locomotive air brake test on each consist after set up is complete.

19.2 Moving Locomotive

A. Initial Movement of a Locomotive Consist Not Coupled to Other Equipment

1. Follow these steps prior to making the initial movement of a locomotive consist outside designated mechanical department limits:

   a. Ensure locomotive air brakes are applied on each locomotive during visual inspection.
   b. Determine that sufficient main reservoir pressure is present.
   c. Verify that hand brakes are released on all locomotives.
   d. Ensure air hoses are coupled between all locomotives in consist including brake pipe, main reservoir, actuation, and application and release.
   e. Position cutout cocks and valves for MU operation.

2. Perform these steps as soon as operating conditions permit when changing operating ends of a locomotive consist previously tested as during the initial movement of a locomotive consist.

   a. At a speed of 1 to 3 mph, allow the locomotive to drift with the throttle in IDLE.
   b. Check that brakes or other defects do not restrict the locomotive's movement.
   c. Increase speed to approximately 10 mph, make a service brake pipe application sufficient to develop brake cylinder pressure.
   d. When speed decreases to approximately 5 mph, actuate to make sure the brakes release.

B. Initial Movement of a Locomotive Consist Coupled to Other Equipment

When making the initial movement of a locomotive consist that is coupled to a train or other equipment, before speed exceeds 10 mph, actuate for 5 seconds per locomotive in the consist to determine if brakes apply on trailing locomotive(s) in the consist.

If actuating results in brakes applying on trailing locomotives or a sudden change in slack is noted, stop and check MU hose connections (lines may be crossed between Act and App/Rel).

If MU hoses are not properly connected, correct the problem and then perform locomotive air brake test.

NOTE: Instructions regarding coupling MU air hoses between locomotives are intended to mean only one coupling for Main Reservoir, Actuation and Application & Release hoses is required. Duplicating the coupling of any of these hoses on both sides of the locomotive is not required.

19.3 Locomotive Air Brake Equipment

Place air brake valves in the proper position on freight and helper locomotives. Position brake valves and cut out cocks as indicated in the following table.

CCB Brake Equipment Positions			
	Lead	Trail	Helper
Automatic Brake Valve	Release	Handle Off Continuous Service	Release
Independent Brake Valve	Applied Full	Release	Release
Air Brake Setup	Lead/Cut In	Trail	Lead/Cut Out

19.4 Locomotive Air Brake Test

Locomotive Air Brake Test on Multiple-Unit Consists Required When:

- Making up a locomotive consist.
- Adding locomotive(s) to a consist.
- Removing locomotive(s) from a consist, other than when the rear locomotive is removed.
- Locomotives are rearranged in consist.

Locomotive Air Brake Test Procedures:

NOTE: If necessary, apply hand brake(s) to secure consist before beginning brake test. If a locomotive in the consist has a hand brake applied, observe only the pistons at the opposite end from the hand brake on that locomotive to determine if brakes apply and release.

Observe one side of the multiple-unit consist, from a ground position, to determine all locomotive brakes apply and release as specified in each step below.

- With the independent and automatic brake valve handles in RELEASE position, apply the independent brake.
- After observing brakes apply on each locomotive, release the independent brakes.
- When brakes are released on all locomotives, make a 10 psi brake pipe reduction using the automatic brake valve.
- After brakes apply on all locomotives, actuate and observe independent brakes release on all locomotives.
- Reduce brake pipe pressure an additional 10 psi with the automatic brake valve and determine all locomotive brakes apply.
- Cut out the automatic brake valve.
- Observe gauges to verify that the equalizing reservoir indicates no leakage and that brake pipe leakage does not exceed 5 psi per minute.
- Move the automatic brake valve handle to RELEASE position and cut the brake valve in.
- Determine that all brakes release.
- Fully apply independent brakes upon successful completion of this test.

Addendum to Air Brake Test

To insure that all the units in a locomotive consist make power, on the controlling unit, move switch to ON, insert the reverser handle and move throttle to position FORWARD and move throttle to POSITION ONE. Walk through the units to observe that they are all making effort. Lack of effort may be the result of unattached or damaged MU electrical cables, isolation switch not in RUN position, or PCS not properly reset. Correct any faults before linking for DP operation.

DAILY LOCOMOTIVE INSPECTION

Locomotive: _____ **Name:** _____

Time: _____ **Date:** _____

BEFORE Starting Engine						AFTER Starting Engine		
Check Brake Rigging and Shoes, c/o shoes as required		How many? _____				Check Cooling Water Level		
Inspect for Loose or Dragging Equipment						(Water added)	Y	N
Check Fuel Level	1/4	1/2	3/4	Full		Quantity of Water Added (inches)		
Drain Environmental Tank						Check Engine Oil Level (ensure engine is warm)		
Inspect for Signs of Fuel, Oil, or Water Leaks						(Oil added)	Y	N
Check Compressor Oil Level (added)		Y	N			Quantity of Oil Added		
Check Governor Oil Level (added)		Y	N			Check for Leaks		
Engine Protection Device Buttons In						Check Lube Oil Pressure (at least 15 lbs)		
Engine Overspeed Lever Latched (11 o'clock position)						Check Rotating Equipment		
Open Test Cocks and Blow Engine						Check Horn/Belt		
Verify Airbrake Setup (lead or trail)						Check Brake Piston Travel		
Turn on Required Breakers/Switches						(Adjust travel 2 to 4 inches)	Y	N
Check Isolation Switch in Start Position						Functional Airbrake Test		
Inspect Fire Extinguishers						Check Lights		
Verify Handbrake Operation						Check Sanders		

Defects (including any corrective actions taken): _____

_____

_____

_____

_____

ABNORMAL CONDITIONS

Cooling Water Low:	Check for leaks and add to the full mark (either running or stopped).
Engine Oil Low:	Check for leaks and add to the full mark on the dipstick (normal operation between add and full).
Engine Oil High:	Check dipstick, if engine oil smells of diesel fuel, shut down engine and consult mechanic.
Engine Oil High:	Check dipstick, if engine oil appears gray or tan color, shut down engine and consult mechanic.
Governor Oil Low:	Add to 1/2 sight glass with engine at operating temperature and running.
Governor Oil High:	Overfilled and black color; drain to 1/2 sight glass; okay to run for shift and consult mechanic.
Other Problems:	See Field Troubleshooting Guide.

FIELD TROUBLESHOOTING GUIDE

Problem	Cause	Corrective Action
Not Loading	Battery field fuse blown or circuit breaker tripped	Change out 80 AMP battery field fuse or reset breaker
	No auxiliary generator power (alarm bell will ring)	Change out 250 (may be 150 Amp) aux gen main fuse or reset breaker. Change out 15 Amp voltage regulator fuse (if equipped).
	Ground relay (alarm bell will ring)	Reset ground relay and try. If trips again, try cutting out traction motors.
	If one locomotive in consist does not load – bad MU cable	Change out MU cable (may also be any of the above).
	Bad electrical interlock or contact	Try cutting out one traction motor or truck at a time.
	Severe wheel slip	Cut out one traction motor or truck at a time (ensure all wheels turn freely).
	PC	Recover PC (throttle must be in idle position).
Underloading	Excessive wheel slip	Out of sand Flat spots or sheels on wheels (to be addressed by mechanical staff) Poor track condition (rain, snow, track condition)
	Mechanical problem	Plugged engine air or fuel filters (to be addressed by mechanical staff)
	Governor oil	Governor sight glass should be ½ full at idle (normal operating temperature)
Unable to start engine	Low oil button tripped	Reset low oil button on the governor.
	Engine protection device low water or crankcase pressure button tripped	Check water level. If okay, reset low water button (low oil button on governor will also be tripped; reset also) and restart. If crankcase button (and low oil button on governor) trip, do not start until mechanical staff has inspected.
	Engine overspeed tripped	Level on diesel engine beside governor. Normal operation 11 o'clock position. If tripped (2 o'clock position), pull back to reset.
Hot engine	Low water or shutter problem	Check cooling water; add if necessary. Check front and top shutters (if top blade of front shutters is open, then top shutters are open). Can be blocked open with a flag stick, broom handle, etc. until repairs are completed.
PC unable to recover	Mechanical or electrical problem	If air connected to cars, turn off air at locomotive and try to recover. Cycle speedometer breaker off for 10 seconds, turn on and try to recover. Make sure throttle is in idle before trying to recover; will not recover otherwise.
Low oil alarm	Engine or governor oil	Governor sight glass should be ½ full at idle (normal operating temperature). Engine oil low, add to full mark. If the low oil button on the governor trips when throttle returned to idle after heavy pull, check engine oil level. If the oil level is high and smells of raw diesel fuel, contact mechanical staff.

SITE SPECIFIC PROCEDURES
Road Power Locomotive
Daily Inspection and Air Brake Test

PURPOSE: This procedure outlines and defines the basic necessary steps needed to safely inspect locomotives and perform an Air Brake Test.

SCOPE: This procedure is to be followed by terminal employees when inspecting locomotives and performing air brake tests.

RESPONSIBILITY: The respective Quality Supervisor and Logistics Director shall ensure that this procedure is followed by terminal personnel when performing locomotive inspections and air brake tests and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task. This procedure is to be reviewed on an annual basis.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat		Miscellaneous Safety Equipment	
	Vancouver Energy Approved Uniform (FRCs)			
	Safety Toed Boots - 6" laced above ankle with a defined heel (ASNI Z41.1 Certified)			
	Side Shield Safety Glasses (ANSI Z87.1 Certified)			
	Leather Gloves			

NOTE: All Employees helping with any part of this procedure must don all PPE (Personal Protection Equipment)

Tools & Transfer Equipment			Environmental Equipment	

LOCOMOTIVE DAILY INSPECTION

Inspection Requirements

1.1 The Engineer is responsible for ensuring that each locomotive in his/her charge including locomotives picked up enroute is inspected each day the locomotive is in service.

1.2 The Employee will need to determine if the locomotive needs to be inspected by checking the locomotive cab card in each locomotive. This card will indicate the date and time of the last inspection.

1.3 In service includes locomotives moving in through freight service that are isolated or shut down for fuel conservation or other non-complying defects.

1.4 On a multiple locomotive consist the Engineer may assume that all locomotives in the consist and any distributed power in the train were inspected on the same day as the cab card on the controlling locomotive.

1.5 An inspection is not required on a locomotive that is left standing (idling or shut down) and will not be used as a working locomotive.

NOTE: UP locomotives have an entry in the "REMARKS" section at the bottom of the blue card which reads "Do Not Use After: mm/dd/yy". You will need to verify that the locomotive has not passed this date.

NOTE: BNSF locomotive daily inspection reports will be filed electronically, whenever possible. Defects to locomotives, whether discovered during locomotive daily inspection or otherwise, non-complying or not, will be verbally reported to the BNSF mechanical desk, NOC unless local instructions provide otherwise.

Inspected Previous Calendar Day

1.6 The Employee will check the locomotive cab card to see when the locomotive was last inspected. If the locomotive was inspected the previous calendar day, you will need to complete the current daily inspection before 2359 hours.

1.7 If your tour of duty will go beyond the 2359 hours you will need to conduct the inspection before the 2359 hours.

Not Inspected the Previous Day

1.8 If the locomotive cab card indicates that the locomotive was not inspected the previous calendar day or if there is no record in the locomotive, the Employee must inspect the locomotive before it is placed in service.

1.9 No locomotive in a consist may have a date older than the lead, controlling locomotive.

Locomotive Set Out On Line

1.10 When setting out a locomotive on line that was inspected on the previous calendar day you must inspect the locomotive, unless notified that the locomotive will be inspected by the Mechanical Department or be picked up by another train before 2359 hours.

CONDUCTING A LOCOMOTIVE DAILY INSPECTION

2.1 Not all defects are considered non-complying conditions.

2.2 The following items are considered non-complying conditions if they do not function properly during the inspection. You need to inspect each of these three general areas on the locomotives.

Control Compartment/Locomotive

2.3 The Employee will verify that the FRA Form F 6108-49A (blue card) is displayed under a transparent cover in the cab of each locomotive.

2.4 The Employee will operate the sanders to deposit sand in front of each locomotive's lead wheels when the reverser position determines the direction.

2.5 During the inspection the Employee need to ensure that each air gauge registers correctly and is within 3 psi of the required pressure. Follow the following steps when accomplishing this:

2.5.1 Employee charges the air brake system to ensure it functions as needed.

2.5.2 Employee will need to ensure he/she does not charge the train's air brake system more than one automatic brake valve cut in unless you are utilizing distributed power locomotives.

2.5.3 The Employee needs to ensure he/she does not increase diesel engine RPM to maintain main reservoir pressure unless the pressure fails to stay 10 psi above the regulating valve setting.

2.5.4 Should the engine RPM need to be increased, do not exceed throttle position 4.

NOTE: Locomotive consists with a single locomotive equipped with an electric air compressor (GE C40-8 or C44-9 for example) may only require advancing throttle to Run 1position to increase charging speed. Some EMD locomotives (like SD70MAC) automatically increase engine speed as needed to maintain main reservoir pressure. In yards where trains are made up, unattended locomotives may be used to charge the brake system when ambient temperatures requires additional charging time.

2.6 The Employee needs to verify that at least one headlight bulb is operational on each end of the locomotive consist.

2.7 The Employee needs to verify that two ditch light, if equipped, are operational in the direct ion of travel.

NOTE: If not equipped with ditch lights or when operated as a remote control locomotive, the locomotive may be used as the leading locomotive if it is operated at 20 MPH over all road crossings. Inspection of ditch lights is not required when performing daily inspection on locomotives being used as remote control locomotive.

2.8 The Employee needs to verify that the horn and bell operate properly.

2.9 The Employee needs to verify that the gauge lights and the engineer's overhead cab light illuminate. If burned out or other lighting is sufficient to allow visibility form the crews normal position you will report this as a defect but not a non-complying condition.

2.10 The Employee needs to verify that the speed indicator, if equipped, functions accurately.

NOTE: If after a daily inspection, the speed indicator failure is identified on the lead locomotive as soon as it begins moving, the failure is a non-complying condition discovered during the daily inspection.

Exception: Locomotives that are not equipped with speed indicators or when operated as a remote control locomotive are not considered to have a non-complying defect and may be used as controlling locomotive only if operated at speeds not exceeding 20 MPH.

Inspection of speed indicator is not required if the locomotive is being used as a remote control locomotive.

2.11 The Employee needs to verify that the locomotive cab is free of slip or trip hazards.

2.12 The Employee needs to ensure that the windows provide a clear view. Small cracks that do not obscure view must be reported as a defect but not as a non-complying condition.

2.13 The Employee needs to ensure that no traction motors have been cut out.

Exception: On GE AC, GE-8 DC, GE-9 DC & EMD AC locomotives, one or more traction motors/trucks may be cut out and not considered a non-complying condition.

2.14 The Employee needs to ensure that the locomotive cab seats are properly secured.

NOTE: Locomotives with defect items of ditch lights, horn, bell, gauge lights/engineer's overhead cab light, speed indicator, or windows with small cracks may be used in power as trailing units. You must report these defects but they are considered non-complying only when positioned in locomotive consist as the lead, controlling locomotive.

2.15 The Employee needs to verify that the Sanitary Toilet Facility is clean and working properly.

NOTE: Toilet facilities are not required on locomotives used in switching or transfer service on which employees have railroad-provided sanitation facilities outside the locomotive that meet sanitation standards at frequent intervals during the course of their work shift. However, toilet facilities on any locomotives must be part of the daily locomotive inspection and defect reporting. Also, unoccupied locomotives in trail position on through freight trains are not required to have operative or sanitary toilets. However, any locomotive toilet found defective or unsanitary, whether required or not, are to be reported as defective.

2.16 Locomotives with defective or unsanitary toilet may not be used as lead unit unless:

- No other suitable locomotives are available for use
- It is not possible to switch another locomotive into lead position.
- Location is not equipped to clean the sanitation compartment, if unsanitary, or repair the toilet facility if defective.

Walkway and Engine Compartment

2.17 The Employee needs to inspect both sides of each locomotive.

2.18 When inspecting the walkways and walk-in compartments the Employee needs to ensure they are clear of debris, tools and accumulated grease and oil that may present a trip or slip hazard.

2.19 The Employee inspects the handrails, hand holds, steps, ladders, safety chains and guards to ensure they are secure and ready for service. Make sure there are no bent, broken, damaged or loose equipment and that safety chains are connected high enough for safe passage.

2.20 The Employee needs to verify that all electrical and rotating equipment guards are in place.

2.21 The Employee needs to ensure the diesel engine has no apparent exhaust, water, oil, or fuel leaks.

2.22 The Employee needs to inspect the hand brake to ensure it is operational.

Ground Level

2.23 The Employee needs to inspect the exposed areas for apparent defects.

WARNING: DO NOT crawl under or between locomotives to make the visual inspection.

2.24 The Employee sets the hand brakes, if necessary, and walks around both sides of the locomotive for the inspection.

2.25 The Employee needs to verify that the sand is deposited on the rail in front of the lead wheels on each locomotive in the consist.

2.26 The Employee needs to ensure the fuel tank is not leaking.

2.27 The Employee verifies there are no cracks, missing or broken parts on the locomotive trucks, wheels, gear cases or draft gears.

2.28 The Employee needs to verify that the brake cylinder piston travel is: a) At a minimum: Sufficient to provide brake shoe clearance when the brakes are released; and b) At maximum: 1 1/2 inches less than the travel entered on the blue card in the locomotive cab.

2.29 The Employee verifies that the foundation brake rigging is secured and all components other than wheels and sand hoses are at least 2 1/2 inches above the top of the rail.

2.30 The Employee verifies that the snowplow, pilot or endplate is properly secured and is between 3-6 inches above the top of the rail.

2.31 The Employee verifies that the brake shoes are secured and approximately in line with the tread of the wheel. Ensure the shoe has no obvious lips or overhangs.

2.32 The Employee ensures that no part of the electrical cable is lying on the coupler.

2.33 All unused electrical cables need to be stowed or the disconnected ends placed into a dummy receptacle or a multiple-unit cable holder.

2.34 The Employee needs to manually drain oil and water from the main reservoirs that are not equipped with automatic drains. If equipped with automatic drains the Employee ensures that the valve handles are then turned fully clockwise to the automatic position with the stem extending beyond the valve handle.

COMPLETE REQUIRED DAILY INSPECTION FORMS

Locomotive Inspection Report

3.1 The Employee must complete a Locomotive Inspection Report for each locomotive inspected.

3.21 The Employee must complete the daily inspection form and a FRA Rule 229.21 Daily & Mid-trip Inspection Form (cab card) with the following inspection information:

- Date
- Location
- Time
- Signature

3.3 The Employee will write "NC" for Non-complying in the "time" column if the locomotive with a non-complying defect is found during the inspection of that locomotive.

3.4 A copy of the locomotive daily inspection should be left at location designated by other local.

LOCOMOTIVE WITH NON-COMPLYING CONDITION DEEMED SAFE TO MOVE

4.1 If during the locomotive daily inspection the Employee finds one or more non-complying conditions he/she will determine if the locomotive is safe to move.

4.2 If the locomotive is deemed safe to move, it may move only under the following circumstances:

- As a single locomotive under power not attached to cars
- In a locomotive consist not attached to cars
- Isolated or shut down when attached to cars

4.3 Exceptions to 4.2 are as follows:

4.3.1 Controlling locomotive found with a defective speed indicator during the daily inspection may be operated under power attached to cars not exceeding 20 MPH.

4.3.2 Locomotives found with the following defects during the daily inspection may be operated under power attached to cars as a trailing locomotive:

- Inoperative headlights
- Inoperative horn
- Inoperative bell
- Defective speed indicator
- Window cracks that obscure view
- Cab seats not properly secured
- Both ditch lights inoperative
- Inoperative Safety Devices
  - To the extent possible, make sure these locomotive safety devices are cut in and operating at all times:
    - Over speed
    - Alerters (consider defective if device fails to provide visual and audible warnings)
    - Automatic cab signals
    - Automatic train stop equipment
    - Automatic train control equipment

NOTE: However, safety devices do not have to be operating on non-controlling locomotives, distributed power remote controlling locomotives, or:

- **When a safety device becomes defective enroute, or**
- **During drag loading/unloading operations under 5 mph.**

4.4 Prior to moving a non-complying locomotive the Employee must perform the following:

4.4.1 The Employee must complete a non-complying locomotive tag and attach it to the isolation switch of the non-complying locomotive with the following information:

- The words "Non-complying locomotive" written on the tag.
- The locomotive initials and number
- The Name of the inspecting railroad.
- The Nature of the defect.
- The Movement restrictions, if any.
- The Destination
- Employee signature performing the inspection.

4.5 The Employee will secure a copy of the non-complying tag on the control stand of the controlling locomotive.

4.6 The Employee needs to ensure that the engineer in charge of the locomotive movement receives written notification of the non-complying locomotive. A copy of the non-complying locomotive tag will meet this requirement.

4.7 The Engineer must inform all other crew members of the non-complying unit and of any restrictions.

4.8 The Employee needs to notify the train dispatcher/mechanical desk, yardmaster, or other proper authority.

NOTE: A locomotive may be moved without complying with steps 4.4.1 through 4.7 as a single locomotive or dead within a yard solely for repairs and at no more than 10 MPH.

Locomotive With Non-complying Condition Not Deemed Safe to Move

5.1 If during the locomotive inspection the Employee finds one or more non-complying conditions and determines that the locomotive is not safe to move he/she must do the following.

5.1.1 The Employee must notify the BNSF Train Master, Operations Manager, Logistics Manager, or other proper authority.

5.1.2 The Employee must complete a non-complying tag and attach the tag to the isolation switch of the non- complying locomotive. The following information must be on the tag:

- The words "Non-complying locomotive" written on the tag.
- The locomotive initials and number
- The Name of the inspecting railroad.
- Inspection location and Date
- Signature of Employee performing the inspection

Defects Other Than Non-complying Conditions

6.1 If a defect or problem is found and is not a non-complying condition the Employee will do the following:

6.1.1 The Employee completes a Locomotive Daily Inspection Report for each locomotive in the consist with a defect or problem.

6.1.2 The Employee reports any locomotive not producing power to the Mechanical Desk.

6.2 The following are examples of a defect or problem that s not a non-complying condition:

- Weather stripping is defective
- Windshield wipers not working
- One headlight bulb is burned out
- Ground relay is tripped
- Safety valve on the air compressor or main reservoir is popping off.

NOTE: When a locomotive is discovered with a single operative headlight bulb, immediately contact the mechanical desk and follow the manager's instructions.

LOCOMOTIVE AIR BRAKE TEST

7.1 The Employee must conduct a locomotive air brake test when any of the following occur:

- Making up a locomotive consist
- Adding a locomotive to a consist
- Other than rear locomotive(s) is removed from the consist
- Locomotive consist is rearranged, or
- Changing operating ends

Air Brake Test Procedure

7.2 From the ground the Employee observes the locomotive brakes to ensure they apply and release during this entire procedure.

7.3 With the independent and automatic brake valve handles in the RELEASE position the Employee applies the Independent Brake.

7.4 After observing that the brakes apply on each locomotive the Employee releases the Independent brake.

7.5 Once the brakes are released on all locomotives, the Employee applies the automatic brakes by making a 10 psi pipe reduction.

7.6 After the brakes apply on all locomotives, actuate and observe that the brakes release.

7.7 The Employee then reduces the brake pipe pressure an additional10 psi to reapply the brakes.

7.8 The Employee verifies that all brakes apply on all locomotives.

7.9 Employee cuts out the automatic brake.

7.10 The Employee observes the gauges and verifies that the equalizing reservoir indicates there is no leakage and that the brake pipe leakage does not exceed 5 psi per minute.

7.11 The Employee moves the automatic brake valve handle to the RELEASE position.

7.12 The Employee cuts in the automatic brake valve.

7.13 Employee verifies that all brakes release.

7.14 Upon successful completion of the test, the Employee reapplies the Independent brakes.

End of this procedure

SITE SPECIFIC PROCEDURES
Road Power Locomotive
Daily Inspection and Air Brake Test

This permit to be kept at job site. Return job site copy to Safety Officer following job completion.

Date & Time Issued: _____ Date & Time Expires: _____
Job Site/Space ID.: _____ Job Supervisor: _____
Equipment to be worked on: _____ Work to be performed: _____
Stand-by personnel: _____ _____ _____

1. Atmospheric Checks: Time _____
   Oxygen_____%
   Explosive_____% LEL
   H_2S_____%

2. Tester's Signature_____

3. Source Isolation (No Entry):

	NA	Yes	No
Pumps or lines blinded,	( )	( )	( )
disconnected or blocked	( )	( )	( )

4. Ventilation Modification:

	NA	Yes	No
Mechanical	( )	( )	( )
Natural Ventilation only	( )	( )	( )

5. Atmospheric check after Isolation and Ventilation:
   Oxygen _____% > 19.5%
   Explosive_____% LEL< 10%
   H2S_____%< 15%
   Tester's Signature

6. Communication procedures:_____
   _____

7. Rescue procedures: _____
   _____

8. Entry, standby and back up persons:

	Yes	No
Successfully completed required training?	( )	( )
Is it current?	( )	( )

9. Equipment:

	NA	Yes	No
Direct reading gas monitor tested	( )	( )	( )
Safety harness and lifelines for entry and standby persons	( )	( )	( )
Hoisting Equipment	( )	( )	( )
Powered Communications	( )	( )	( )
SCBA's for entry and standby persons	( )	( )	( )
Protective Clothing	( )	( )	( )
All electric equipment listed Class I, Division I, Group D and non-sparking tools	( )	( )	( )

10. Periodic atmospheric tests:

Oxygen_____% Time_____	Oxygen_____% Time_____
Oxygen_____% Time_____	Oxygen_____% Time_____
Oxygen_____% Time_____	Oxygen_____% Time_____
Explosive_____% Time_____	Explosive_____% Time_____
Explosive_____% Time_____	Explosive_____% Time_____
Explosive_____% Time_____	Explosive_____% Time_____
H_2S_____% Time_____	H_2S_____% Time_____
H_2S_____% Time_____	H_2S_____% Time_____
H_2S_____% Time_____	H_2S_____% Time_____

We have reviewed the work authorized by this permit and the information contained herein. Written instructions wand safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Permit Prepared By: (Supervisor) _____ _____
Approved By: (Unit Supervisor) _____ _____
Reviewed By: (Cs Operational Personnel) _____ _____
(Printed name) (Signature)

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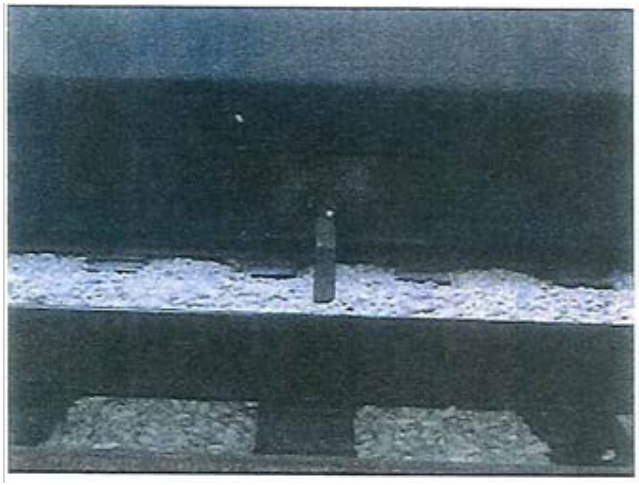
5.2 Locomotive Daily Inspections
Proper Inspection Techniques

Drain condensation from main reservoirs.

- With locomotive running, open drain valve so that handle is in line with piping.
- When all water is drained from tank, close drain handle to where handle 90 degrees from piping.
- Handles are located under the fuel tanks.
- Note: As this is water vapor that condenses from ambient air, for this drain condensation only, no collection pans or containment is required.

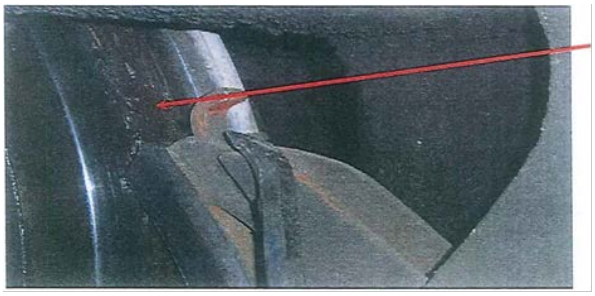


Inspect condition of the following.

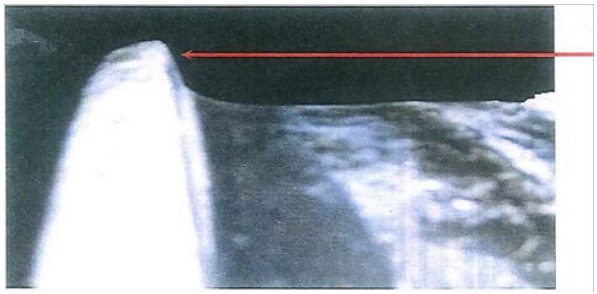
- Wheels
- Trucks
- Draft Gears
- Coupler
- Hand Brake
- Safety Appliances above and below running board

Inspect condition of wheels.

- Check wheels for flat spots, thermal cracks, or chips on flanges and wheel tread.



- Inspect flanges to ensure they aren't chipped, thin, or pointed.



Inspect condition of trucks.

- Inspect truck assembly for any broken springs or components.
- Inspect for missing hardware or bolts.
- Report any unusual appearances of truck assembly to manager.

Inspect condition of draft gears and couplers.

- Inspect coupler for cracks, wear, broken pins or any unusual appearance
- Inspect coupler carrier for cracks or unusual wear

Inspect condition of hand brake.

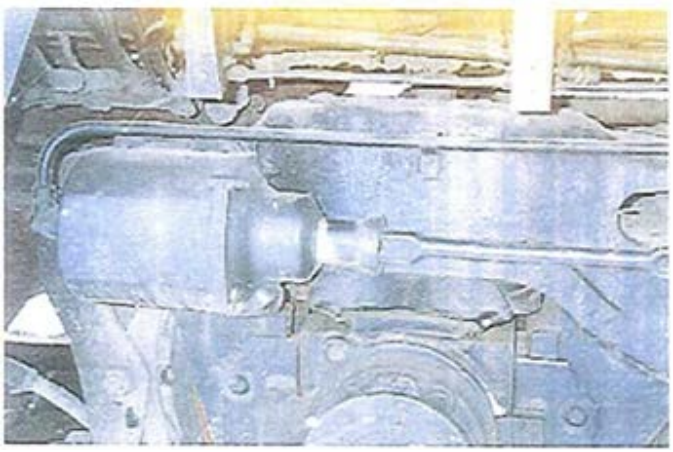
- Inspect hand brake for proper operation.
- Apply hand brake to ensure that it holds equipment in place while all brakes are off.
- Check for proper release and that brake cylinders do not stay out.
- Report any defects to manager and document on inspection form.

Inspect condition of safety appliances above and below running board.

- Inspect for cracked, broken or missing steps.
- Inspect crossover step to ensure it is up and secured if not being used and safety chain properly secured on handrails, or step is completely down and chains properly secured to adjacent locomotive if MU'd.
- Inspect to ensure hand rails are straight and secured.
- Ensure all lights are functioning properly.

Check condition of brake shoes, change any if required. Adjust brake travel (4 to 6 inches of travel). Perform operation air brake test.

- Visually inspect shoes. If shoe needs to be replaced, refer to locomotive brake shoe replacement procedures.
- Inspect piston travel. If adjustment is necessary, refer to locomotive brake shoe replacement procedures.
- Perform operational air brake test per instruction.



Visually check fuel tank gauges and fueling equipment, report any defect.

- Inspect fuel filler cap for cracks or breaks.
- Ensure safety line is attached properly.
- Inspect fuel sight glass for any cracks, breaks, or fuel leaks.
- Report any defects to manager and document on inspection report.

Inspect firefighting equipment.

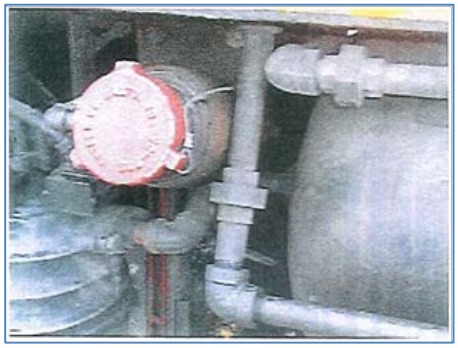
- Check to ensure fire extinguishers are securely mounted in cab and engine room
- Ensure there is no obstructions to firefighting equipment
- Inspect firefighting equipment to ensure it has proper inspection tags or stickers
- Report any defects to manager and document on inspection sheet
- There should be 1 fire extinguisher in the cab and l in the engine room

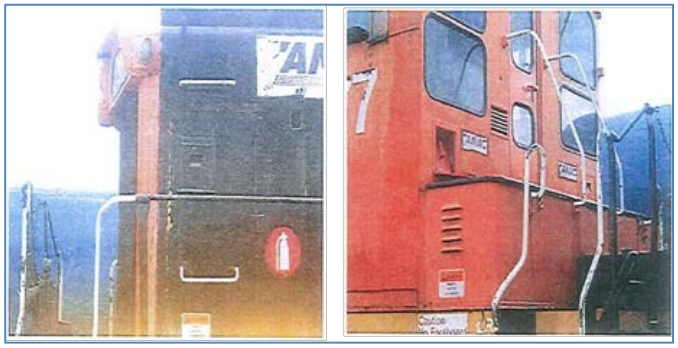
Check unit for fire and accident hazards.

- Inspect electric cabinet for cans, garbage, paper, etc.
- Inspect engine room for trash, oily rags, fuel leaks, etc.
- Remove all potential fire hazards from unit.
- If any fuel leaks exist, shut off locomotive and contact manager immediately.

Supply fuel and sand.

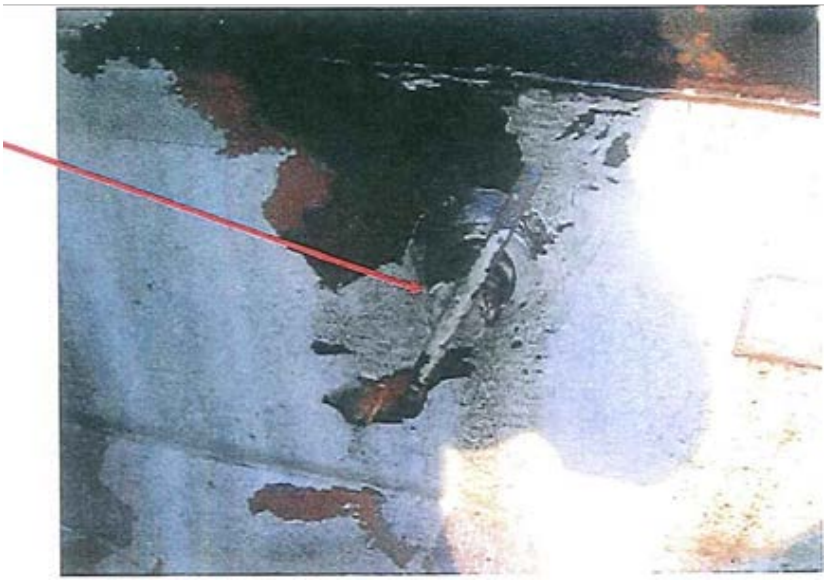
- Fuel locomotive per Facility safety rules and regulations. Mobile fuel supplier shall use containment at all hose connections and be equipped with spill cleanup kit at all times while on terminal.
- Fill sand traps as needed.
- Fuel filler necks are located on each side of unit.
- Rear sand traps are above the battery compartments.
- The front sand traps are located on the sides by the air compressor.





Blowing down engine.

- If locomotive has been shut down for more than 4 consecutive hours or after a heavy rain, open cylinder test valves located on side of engine block
- Tum engine over by turning the start button for a couple revolutions
- Once the blow down is complete, close all test valves and start engine



With engine idling, check engine, radiator, shutters, air compressor, and all other rotating equipment; report any defects.

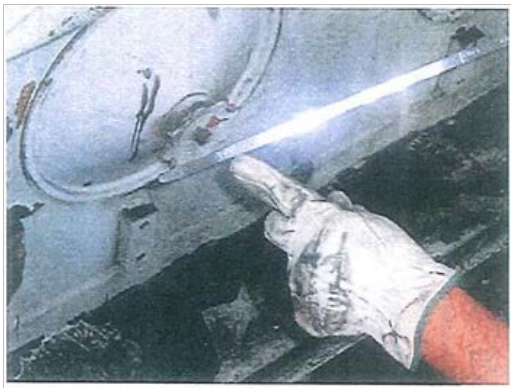
- Ensure all guards are in place.
- Report any abnormal noise from engine room to manager or mechanical manager immediately. Shut locomotive down until released by a qualified mechanic.

With engine idling, check all fluids.

- Engine Oil
- Air Compressor Oil
- Engine Water
- Fuel
- Governor Oil
- Journal Lube Oil

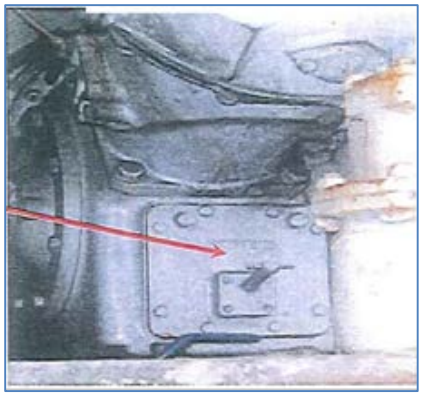
Engine Oil

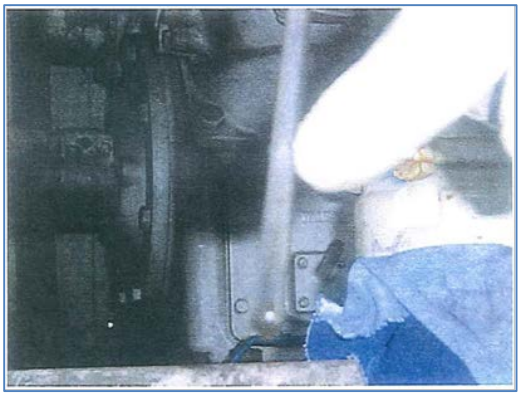
- With engine running, pull dipstick out of crankcase and wipe off excessive oil.
- Insert dipstick into engine and pull back out and record reading.
- If oil is on "Low" mark or not on dipstick, ADD OIL IMMEDIATELY! Use a containment drip pan. If any fluid is collected, it should be emptied into an appropriate waste containment tank for temporary onsite storage, prior to disposal at an approved offsite location by a third party service provider.
- Use only an approved "Zinc Free" oil.



Air Compressor Oil

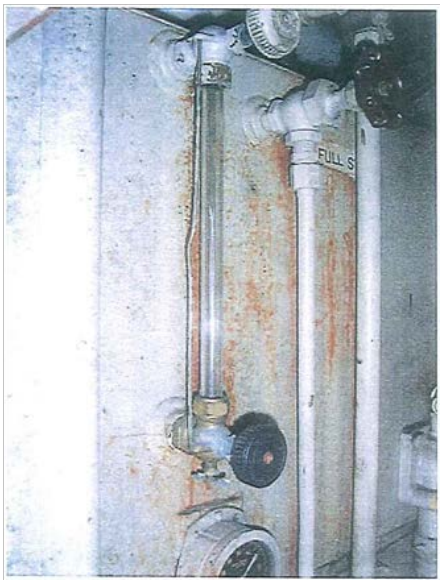
- Remove Air Compressor dipstick
- Wipe off excessive oil and re-insert dipstick into crankcase and record reading
- If oil is low, add oil immediately. Use a containment drip pan. If any fluid is collected, it should be emptied into an appropriate waste containment tank for temporary onsite storage, prior to disposal at an approved offsite location by a third party service provider.
- Use only approved air compressor oil or a turbine oil as a substitute. (DO NOT use Air Tool Oil)





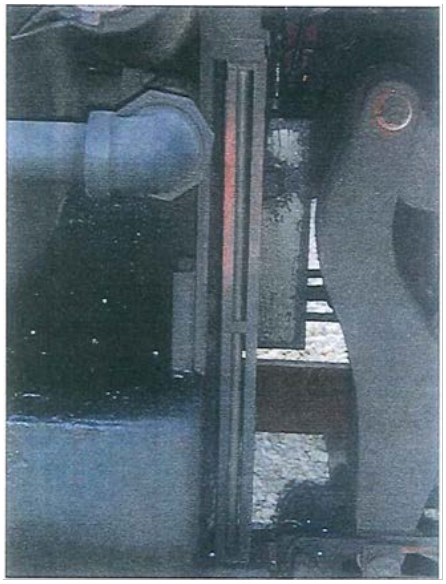
Engine Water Level.

- Check water level before starting engine.
- If no water is in the sight glass, DO NOT START ENGINE.
- Check water level again once engine is running.
- If you are adding water excessively or find water in the retention tank, report it immediately to your manager or the mechanical manager.



Fuel.

- Check fuel level on sight glass
- If it is at an unacceptable level, add fuel or contact manager. Mobile fuel supplier shall use containment at all hose connections and be equipped with spill cleanup kit at all times while on terminal.

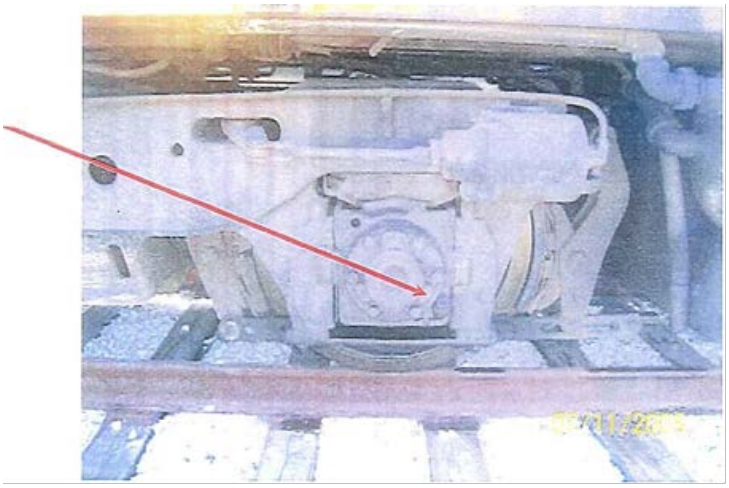


Governor Oil.

- Check Governor Oil on sight glass
- Governor Oil should only be filled up to line in the MIDDLE of the sight glass, indicating it is FULL.
- Only use approved Governor Oil to replenish. If unavailable, you may substitute with a 10W-30 weight oil. Use a containment drip pan. If any fluid is collected, it should be emptied into an appropriate waste containment tank for temporary onsite storage, prior to disposal at an approved offsite location by a third party service provider.

Journal Lube Oil.

- Check to ensure that Journal Lube Oil is present on the dipstick.
- If no oil is present, do not run locomotive.
- Contact mechanic immediately to have oil replenished.
- If you need to add Journal Oil, use only Journal Oil. Do not use engine oil or bearing oil.

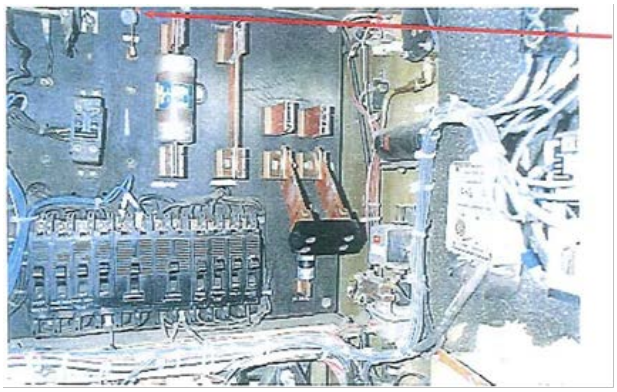


Cross contamination.

- Never use the same bucket or spout to add oil to different components.
- Never use your drain bucket for the retention tank to add oil to the locomotive.
  New Oil = New Buckets. Used Oil = Used Buckets.
- Never cross or substitute oils unless authorized by the manager of mechanical services.
- Certain oils, such as engine oil, cannot be used in the air compressor or governor and vice versa.

Ensure that seals are applied to ground relay, transition, and load cut-out switches.

- Make sure seals are not broken or removed on switches.
- If seals are missing or broken, contact manager and document on inspection sheet.



Drain the pollution tank.

- Drain Oil and Water out of retention tank daily.
- Retention Tank Drain is located on the Engineer's side of locomotive next to fuel tank.
- Drain waste into an approved container, which then should be emptied into an appropriate waste containment tank for temporary onsite storage, prior to disposal at an approved offsite location by a third party service provider.

Ensure the cab card is up to date.

- Sign Daily Inspection Report and submit it to your Supervisor.
- Fill out Discrepancy Report and submit to your Supervisor if there are any necessary repairs to be made to locomotive.

Reporting.

- Sign Daily Inspection Report and submit it to your Supervisor.
- Fill out Discrepancy Report and submit to your Supervisor if there are any necessary repairs to be made to the locomotive(s).

Locomotive Inspection Form

Attached.

DAILY LOCOMOTIVE INSPECTION

Locomotive: _____ **Name:** _____

Time: _____ **Date:** _____

BEFORE Starting Engine						AFTER Starting Engine		
Check Brake Rigging and Shoes, c/o shoes as required		How many? _____				Check Cooling Water Level		
Inspect for Loose or Dragging Equipment						(Water added)	Y	N
Check Fuel Level	1/4	1/2	3/4	Full		Quantity of Water Added (inches)		
Drain Environmental Tank						Check Engine Oil Level (ensure engine is warm)		
Inspect for Signs of Fuel, Oil, or Water Leaks						(Oil added)	Y	N
Check Compressor Oil Level (added)		Y	N			Quantity of Oil Added		
Check Governor Oil Level (added)		Y	N			Check for Leaks		
Engine Protection Device Buttons In						Check Lube Oil Pressure (at least 15 lbs)		
Engine Overspeed Lever Latched (11 o'clock position)						Check Rotating Equipment		
Open Test Cocks and Blow Engine						Check Horn/Belt		
Verify Airbrake Setup (lead or trail)						Check Brake Piston Travel		
Turn on Required Breakers/Switches						(Adjust travel 2 to 4 inches)	Y	N
Check Isolation Switch in Start Position						Functional Airbrake Test		
Inspect Fire Extinguishers						Check Lights		
Verify Handbrake Operation						Check Sanders		

Defects (including any corrective actions taken): _____

_____

_____

_____

_____

ABNORMAL CONDITIONS

Cooling Water Low:	Check for leaks and add to the full mark (either running or stopped).
Engine Oil Low:	Check for leaks and add to the full mark on the dipstick (normal operation between add and full).
Engine Oil High:	Check dipstick, if engine oil smells of diesel fuel, shut down engine and consult mechanic.
Engine Oil High:	Check dipstick, if engine oil appears gray or tan color, shut down engine and consult mechanic.
Governor Oil Low:	Add to 1/2 sight glass with engine at operating temperature and running.
Governor Oil High:	Overfilled and black color; drain to 1/2 sight glass; okay to run for shift and consult mechanic.
Other Problems:	See Field Troubleshooting Guide.

FIELD TROUBLESHOOTING GUIDE

Problem	Cause	Corrective Action
Not Loading	Battery field fuse blown or circuit breaker tripped	Change out 80 AMP battery field fuse or reset breaker
	No auxiliary generator power (alarm bell will ring)	Change out 250 (may be 150 Amp) aux gen main fuse or reset breaker. Change out 15 Amp voltage regulator fuse (if equipped).
	Ground relay (alarm bell will ring)	Reset ground relay and try. If trips again, try cutting out traction motors.
	If one locomotive in consist does not load – bad MU cable	Change out MU cable (may also be any of the above).
	Bad electrical interlock or contact	Try cutting out one traction motor or truck at a time.
	Severe wheel slip	Cut out one traction motor or truck at a time (ensure all wheels turn freely).
	PC	Recover PC (throttle must be in idle position).
Underloading	Excessive wheel slip	Out of sand Flat spots or sheels on wheels (to be addressed by mechanical staff) Poor track condition (rain, snow, track condition)
	Mechanical problem	Plugged engine air or fuel filters (to be addressed by mechanical staff)
	Governor oil	Governor sight glass should be ½ full at idle (normal operating temperature)
Unable to start engine	Low oil button tripped	Reset low oil button on the governor.
	Engine protection device low water or crankcase pressure button tripped	Check water level. If okay, reset low water button (low oil button on governor will also be tripped; reset also) and restart. If crankcase button (and low oil button on governor) trip, do not start until mechanical staff has inspected.
	Engine overspeed tripped	Level on diesel engine beside governor. Normal operation 11 o'clock position. If tripped (2 o'clock position), pull back to reset.
Hot engine	Low water or shutter problem	Check cooling water; add if necessary. Check front and top shutters (if top blade of front shutters is open, then top shutters are open). Can be blocked open with a flag stick, broom handle, etc. until repairs are completed.
PC unable to recover	Mechanical or electrical problem	If air connected to cars, turn off air at locomotive and try to recover. Cycle speedometer breaker off for 10 seconds, turn on and try to recover. Make sure throttle is in idle before trying to recover; will not recover otherwise.
Low oil alarm	Engine or governor oil	Governor sight glass should be ½ full at idle (normal operating temperature). Engine oil low, add to full mark. If the low oil button on the governor trips when throttle returned to idle after heavy pull, check engine oil level. If the oil level is high and smells of raw diesel fuel, contact mechanical staff.

PURPOSE: This procedure outlines and defines the basic necessary steps needed to safely inspect Trains and perform an Air Brake Test.

SCOPE: This procedure is to be followed by terminal employees when inspecting trains and performing air brake tests in accordance with FRA regulations.

RESPONSIBILITY: The respective Quality Supervisor and Logistics Director shall ensure that this procedure is followed by terminal personnel when performing train inspections and air brake tests and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task. This procedure is to be reviewed on an annual basis.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat		Miscellaneous Safety Equipment	
	Vancouver Energy Approved Uniform (FRCs)			
	Safety Toed Boots - 6" laced above ankle with a defined heel (ASNI Z41.1 Certified)			
	Side Shield Safety Glasses (ANSI Z77.1 Certified)			
	Leather Gloves			

NOTE: All Employees helping with any part of this procedure must don all PPE (Personal Protection Equipment)

Tools & Transfer Equipment			Environmental Equipment	

SAFETY INSPECTIONS OF FREIGHT CARS

1.1 The Employee will inspect and test the brake equipment on locomotives and cars in accordance with FRA regulations.

1.2 The Employee will perform a safety inspection on all cars at the initial terminal or that are added enroute.

1.3 Inspections and air brake tests may be performed by either a "Qualified Person" (Trainman who has been given fundamental training on freight car inspections and air brake tests. In this procedure all trainmen are “Qualified Persons”) or a "Qualified Mechanical Inspector" (A person who has received more extensive training that provides for a more detailed inspection. Inspections and air brake tests by Qualified Mechanical Inspectors provide for a greater distance that a train may travel before additional inspections are required.)

1.4 The Employee must inspect equipment on both sides during an inspection and air brake test to verify that all moving parts of the brake system is functioning properly on each car.

NOTE: Roll-by inspections may only be used to determine that all brakes have released and may not be used to perform all other inspection requirements for either side of the train.

COUPLING AND SECURING HOSES

2.1 Before coupling air hoses between locomotives and/or cars the Employee must shake out the debris out of the hoses.

2.2 The Employee must also blow all condensation from the locomotive brake pipe or yard airline before coupling air hoses between locomotives and /or cars.

2.3 Whenever possible the Employee should secure the air hoses on locomotives and cars during all movements in order to prevent the hoses and glad-hands from dragging and becoming damaged.

OPERATIVE BRAKES

3.1 Unless the brakes fail enroute, air brakes on all cars must be operative unless they are being moved for repairs and properly tagged.

3.2 A Qualified Mechanical Inspector is to provide three (3) tags on cars given to train crews to be moved to repair facilities.

3.3 Cars with defective air brake equipment are to be tagged on each side and the third tag is to be kept on the locomotive.

3.4 Tags will only be required on one (1) side of the car and on the locomotive when no crossover platform is available to crossover between cars or when adjacent tracks are involved which could present a risk of injury.

Exception: Scale test cars are not required to be equipped with air brakes. If however, they are equipped with air brakes the brakes must be operable.

3.5 Cars discovered with brakes that fail enroute have to be tagged on both sides of the car and also noted on the space provided on the train documentation. This must be left in the controlling locomotive cab form holder for the relieving crew.

3.6 The Employee must include the following information on the tags:

- Reporting Mark and Number of the defective locomotive or car (i.e., BNSF 601234)
- Name of the inspecting or discovering Railroad (i.e., SBG Railroad)
- Name and Job Title of the Inspector Inspection Location and Date (i.e., Trenton, ND 07/30/12)
- Type of Defect (i.e. Brake was cut out because it would not release)
- Movement Restrictions (i.e., None)
- Repair Destination (Mechanical Desk will advise on location)
- Employee Signature

3.7 The Train documentation may also reflect such cars by electronic means to subsequent crews after defective brakes are initially discovered and reported.

3.8 At least 85% of the cars in a train must have operative brakes under all circumstances.

3.9 The Engineer must allow his/her train to be inspected when departing terminals, where required.

PERSON IN CHARGE OF AIR BRAKE TEST

4.1 The Employee performing the air brake test is in charge of the train while the test is being conducted.

4.2 It is the responsibility of the Employee in charge to ensure that all other employees are safely positioned prior to giving permission to apply or release the brakes.

4.3 The Engineer at the controls of the locomotive may not apply or release train brakes without receiving permission from the Employee performing the air brake test.

STANDARD BRAKE PIPE PRESSURE

5.1 The regulating valve must be set at 90 psi for freight service or yard.

CHARGING THE AIR BRAKE SYSTEM

6.1 The Employee will need to charge the air brake system to ensure that the system is functioning properly.

6.2 The Employee should not charge the train's air brake system with more than one automatic brake valve cut in unless using distributed power locomotives.

6.3 The Employee should not increase diesel engine RPM to maintain main reservoir pressure unless the pressure fails to stay 10 psi above the regulating valve setting.

6.4 Should the Employee need to increase the diesel engine RPM he/she must not exceed throttle 4 position.

NOTE: Locomotive* consists *with a single locomotive equipped with an electric air compressor (GE C40-8 or C44-9, for example) may only require advancing the throttle to Run 1position in order to increase charging speed. Some EMD locomotives (such* as *SD70MAC) will automatically increase the engine speed as needed to maintain main reservoir pressure.

6.5 In yards where trains are made up unattended locomotives may be used to charge the brake system when the ambient temperature requires additional charging time.

AIR BRAKE TESTS USING AN END-OF- TRAIN TELEMETRY DEVICE (ETD)

7.1 When an air brake test requires determining that the brake pipe pressure is restored or the air brake system is to be charged to a specified pressure at the rear end of the train any of the following may be used:

- An accurate gauge
- an ETD
- A DP locomotive consist

7.2 When an air brake test requires an inspection to determine that the brakes apply and release on the rear car of the train, the requirement is considered to be fulfilled when either an ETD or a distributed power unit attached to the rear of the train indicates the following:

- A brake pipe pressure decrease of at least 5 psi, the brakes are applied
- A brake pipe pressure increase of at least 5 psi, the brake are released.

AIR BRAKE* TESTS *USING HANDHELD GAUGES

8.1 The Employee must verify that the handheld gauges used for performing an air brake test has been determined to be accurate within the last 92 days.

To Check the Accuracy of Handheld Gauges

8.2 Using a locomotive brake pipe gauge the Employee will have the engineer release the automatic brake valve and charge the brake pipe to 90 psi.

8.3 The Employee will attach the handheld gauge to the brake pipe of the controlling locomotive.

8.4 The Employee will compare the pressure indicated by the handheld gauge to the locomotive brake pipe gauge.

8.5 If the pressure indicated by the handheld gauge is within 3 psi of the locomotive brake pipe gauge reading, the handheld gauge may be used to conduct the air brake tests. If the gauge reading is not within 3 psi of the locomotive reading the gauge must not be used to conduct the air brake test and must be turned into the mechanical department for repair or recalibration.

8.6 The Employee must note on a sticker the date of the most recent pressure comparison and apply the sticker to the gauge or on a document in the possession of the user.

INITIAL TERMINAL AND ROAD AIR BRAKE* TEST *(CLASS I AIR BRAKE TEST)

9.1 A Qualified Employee must conduct an initial terminal air brake test to inspect the air brake and safety appliances and to test the brake pipe integrity.

9.2 The Employee will perform the test when any of the following occur:

- Where the train is originally assembled (the initial terminal)
- Where the train consist is changed, other than by adding or removing a car or a solid block of cars, or by removing cars that are determined to be defective
- Where a unit or cycle train has traveled 3,000 miles since it's last Class I Air Brake Test, or where the train is received in interchange and the train consist is changed. However, an inspection and test are not needed if the train consist is changed by any one or a combination of the following:
  - Removing a solid block of cars from the train
  - Changing motive power
  - Removing or changing the caboose, if used
- On a portion of the train as specified below:
  - On one or more cars added that have not been pre-tested by the initial terminal air brake test.
  - On a portion of train that has not been kept charged (off air for over 4 hours)
  - On a solid block of cars being added to the train that is comprised of cars from more than one previous train
  - On each solid block of cars that is comprised of cars from only one previous train but the cars have not remained continuously and consecutively coupled together with the train line remaining connected, other than for removing defective equipment , since being removed from its previous train.

NOTE: Cars are still considered a "solid block" if from only one previous train and divided into smaller segments to accommodate space or trackage constraints as long as placed back in the same relative order as when removed from the previous train.

PROCEDURE FOR INITIAL TERMINAL AND ROAD AIR BRAKE TEST AND INSPECTION

***Note: The Employee will inspect each of the following both before and during the air brake* test.**

10.1 The Employee will inspect the angle cocks and verify that they are properly positioned.

10.2 The Employee will inspect the air hoses to verify that they are in good condition for service and are properly coupled.

10.3 The Employee will inspect the system for leakage. If leakage occurs the Employee will make the necessary repairs to reduce the leakage to a minimum.

10.4 The Employee will inspect the retaining valves and verify that they are in EXHAUST.

AIR BRAKE TEST PROCEDURE

11.1 The Employee charges the air brake system to within 15 pounds of the locomotive regulating valve setting as indicated by a gauge or device at the rear of the train.

11.2 The Employee performs a leakage test as specified in the Brake Pipe Leakage Test.

11.3 The Employee in charge gives the Engineer permission to apply the brakes. The Engineer will then make a 20 pound brake pipe reduction.

11.4 The Employee inspects the entire train or cars added not pre-tested to ensure that the brakes are applied and remain applied on each car until he/she gives the signal to release the brakes.

NOTE: Any car whose brakes release prior to the signal to release the brakes is given may be re-tested once. The brakes must remain applied until a release is initiated for a period of not less than 3 minutes.

11.5 The Employee also verifies that the piston travel meets the requirements listed below:

- As outlined on the stenciling or badge plate or
- On Truck Mounted Brake Cylinders the piston travel must:
  - Provide brake shoe clearance when brakes are released
  - Not exceed 4" where the piston acts directly on the brake beam
- On Body Mounted Brake Cylinders the piston travel must be adjusted to between 6 and 9" at the initial terminal.
- On Body Mounted Brake Cylinders the piston travel must not exceed 10 1/2' at Intermediate Inspection Points

11.6 The Employee needs to make sure 100% of the train brakes are operative before departing.

11.7 The Employee verifies that the brake rigging does not bind or foul.

11.8 The Employee verifies that all parts of the brake equipment are properly secured.

11.9 When the test and inspection of the air brake application is complete the Employee will notify the Engineer and have him/her release the brakes.

11.10 After receiving permission to release the brakes, the Engineer will place the automatic brake valve handle in the RELEASE position.

11.11 The Engineer will notify the Employee in charge of the brake test that the brakes have been released.

11.12 The Employee will inspect each brake to verify that all brakes have released. This inspection may be made as the train departs at a speed not to exceed 10 MPH.

NOTE: An ETD pressure drop and rise of 5 psi during the air brake test may be used to determine application and release of cars within the train that have been previously tested.

ENGINEER NOTIFICATION

12.1 A written record of Class I inspections that are performed at the train's origin and at any 1500 mile Extended Haul inspection location (either at origin or enroute) must be retained on the locomotive to the train's destination.

12.2 Cars that are picked up, inspected and air tested enroute by the train crew do not require written documentation of the Class I inspections.

NOTE: Since which trains are designated as "Extended Haul" trains may not be communicated to train crews assume all car man inspections re for "Extended Haul", unless notified otherwise. Retain all Form 15287 inspection forms provided by a car man to the destination.

12.3 When a written record is required a Qualified person or Qualified Mechanical Inspector who participated in the test and inspection or anyone who knows the test was completed must notify the Engineer in writing that the initial terminal air brake test has been completed satisfactorily including the name, date, time, location and number of cars inspected. Class I inspections and tests may also be communicated to the Engineer so that it may be entered on the space provided on train documentation.

Engineers Responsibilities

12.4 Engineers receiving written notification of the air brake test must accept the notification as authority that the initial terminal air brake test has been completed satisfactorily.

12.5 The Engineer must maintain the written record of all Class I inspections and brake test in the cab of the locomotive in the form holder provided until the train reaches its final destination.

12.6 The written notification of the initial terminal inspection and air brake test may be provided the locomotive engineer by any one of the following methods:

- On Form 15287 at the initial terminal
- By written record on space provided on TRAIN PROFILE. NOTE: Any written record is acceptable if profile is unavailable.
- By electronic means on the space provided on the TRAIN PROFILE.

NOTE: Electronic records of Class I inspections on TRAIN PROFILE are only to be used in the absence of the originals and should a discrepancy occur, the original will be used as the official record. All other brake tests other than Initial Terminal Tests (Class I) do not require any written documentation to be maintained in the train. The number of cars indicated on your Class I test record(s) may not correspond to the number of cars on your train due to pick-ups and set outs enroute.

12.7 In addition to maintaining written documentation on locomotive as outlined above, the conductor must use the Voice Train Reporting (VTR) method to report all Class I inspections performed by the train crew at the train's origin (where the train is initially made up) and at all locations where the train crew performs an Intermediate Brake Test and Inspection (Class IA Brake Test) enroute.

BRAKE PIPE LEAKAGE TEST

13.1 The brake system leakage can be tested by using either the Air Flow Method (AFM) or the Brake Pipe Leakage Method.

13.2 The Air Flow Method is the preferred method when required equipment is available.

13.3 A brake pipe leakage test is required when:

- Conducting an Initial Terminal and Road Air Brake Test
- Conducting an Initial Terminal Air Brake Test From Yard Test Plant
- Conducting an Intermediate Brake Test
- Adding cars to a train that have not been pre-tested
- An Air Turbine ETD is used to replace an existing end-of-train device on a train.

AIR FLOW METHOD

14.1 To qualify a train's air brake system using AFM, the train must be equipped as follows:
- The controlling locomotive has a maintaining-type automatic brake valve
- The train has a gauge or device at the rear of the train
- The locomotive has an air flow indicator with a direct reading of air flow in increments no greater than 10 cubic feet per minute (CFM).

NOTE: Some locomotives without digital displays of air flow have air flow meters with a scale that does not correspond to a specific CFM and may not be used for conducting an air flow method brake pipe leakage test. These are identified by their lack of any reference to CFM on the gauge.

AFM Test Procedure

14.2 The Engineer charges the brake system to within 15 psi of the regulating valve setting as indicated by a gauge or device at the rear of the train.

14.3 When the air flow does not exceed 60 CFM the test is complete. If air flow exceeds 60 CFM the train must be inspected for leakage.

Brake Pipe Leakage Method

15.1 If the train does not meet AFM test conditions the Employee conducts a brake pipe leakage test.

15.2 The Engineer charges the brake system to within 15 psi of the regulating valve setting as indicated by a gauge or device at the rear of the train.

15.3 The Engineer waits for the signal to apply the brakes.

15.4 When the Engineer receives the signal to apply the brakes he/she reduces the brake pipe pressure by 20 psi.

15.5 The Engineer allows the brake pipe exhaust to stop.

15.6 The Engineer will wait 1 minute and cut out the automatic brake valve.

15.7 The Employee waits 1 additional minute to allow the brake pipe pressure to equalize.

15.8 The Employee will time the brake pipe leakage for 1 minute, if the leakage does not exceed 5 psi the test is complete.

15.9 If the leakage exceeds 5 psi the Employee must inspect the train for leakage and re-test.

15.10 When the Engineer is given the signal to release the brakes, he/she moves the automatic brake valve handle to RELEASE position and cuts the automatic brake valve in.

NOTE: Use the Distributed Power Systems automated brake pipe leakage mode when checking leakage on DP trains.

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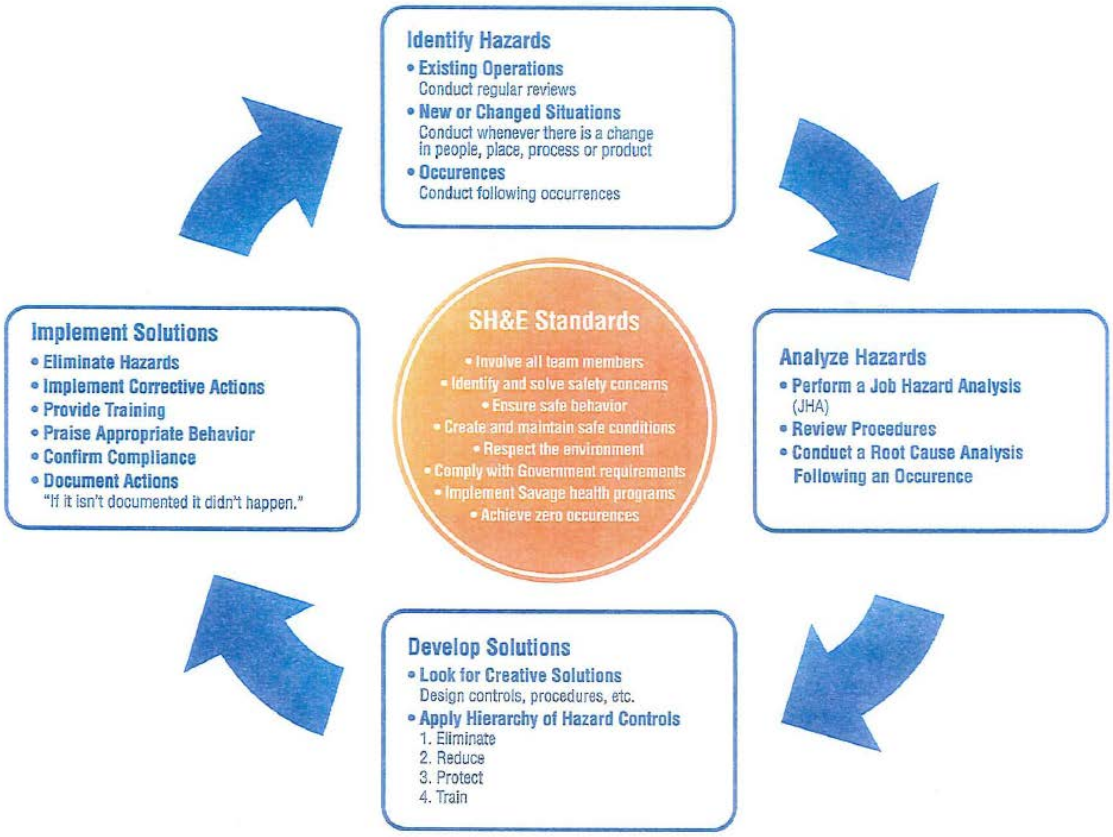
6.0 Cardinal Rule Training

Industrial Rail Services

Cardinal Rules for Zero Occurrences

Training for Revised Cardinal Rules

SHAPS
Vancouver Energy Hazards Analysis & Prevention System



Cardinal Rules

It is estimated that if the Cardinal Rules are followed 100% of the time, we can reduce occurrences by approximately 90%.

Red Zone Protection

Always ask for and receive verbal confirmation before fouling any area between working ends of railcars or locomotives.

Exceptions:

- Riding a tank car outside the gauge
- Operating a cut lever

Point Protection

Always protect the leading movement by having the ability and being in position to visually confirm clear track. Always be in a position to stop short of

- An improperly aligned switch
- Closed derail
- Equipment in the foul
- Compromised rail condition
- Shoving into a stubbed track
- Shoving into a track with a bumping mechanism

Fouling Tracks

Do not leave equipment in the foul. If equipment cannot be left clear of the converging track's foul point, then the equipment must always be pulled to switch points and placed in a position that will:

- Foul the entire track: and prohibit any equipment movement on the converging track
- Vehicles or Equipment within 4 feet of any active rail or track are to be considered in the foul

Secured Equipment

Apply a sufficient number of hand brakes as required by Minimum Hand Brake Application Chart or Site Specific Requirements to hold standing railcars in place. While applying hand brakes, always perform a push/pull test on ALL railcars.

Red Zone Protection

What is the Red Zone?

The IRO Operating Manual describes it as:

Any area between working ends of railcars or locomotives is designated as the Red Zone.

How do you establish Red Zone?

The IRO Operating Manual describes it as:

Rule 7.6, How to provide Red Zone Protection

- When a task requires an employee to work inside the Red Zone area, that employee requests Red Zone Protection from the locomotive operator.
- If more than one member of the crew intends to work under Red Zone Protection, the crew leader will request the protection and such protection will remain in effect until the crew leader determines that all members of his/her crew understand the intention to remove the protection and all are in the clear.

The Cardinal Rule states:

Always ask for and receive verbal confirmation (RED ZONE) before fouling any area between working ends of railcars or locomotives.

Exceptions: Riding a tank car outside the gauge Operating cut lever.

Point Protection

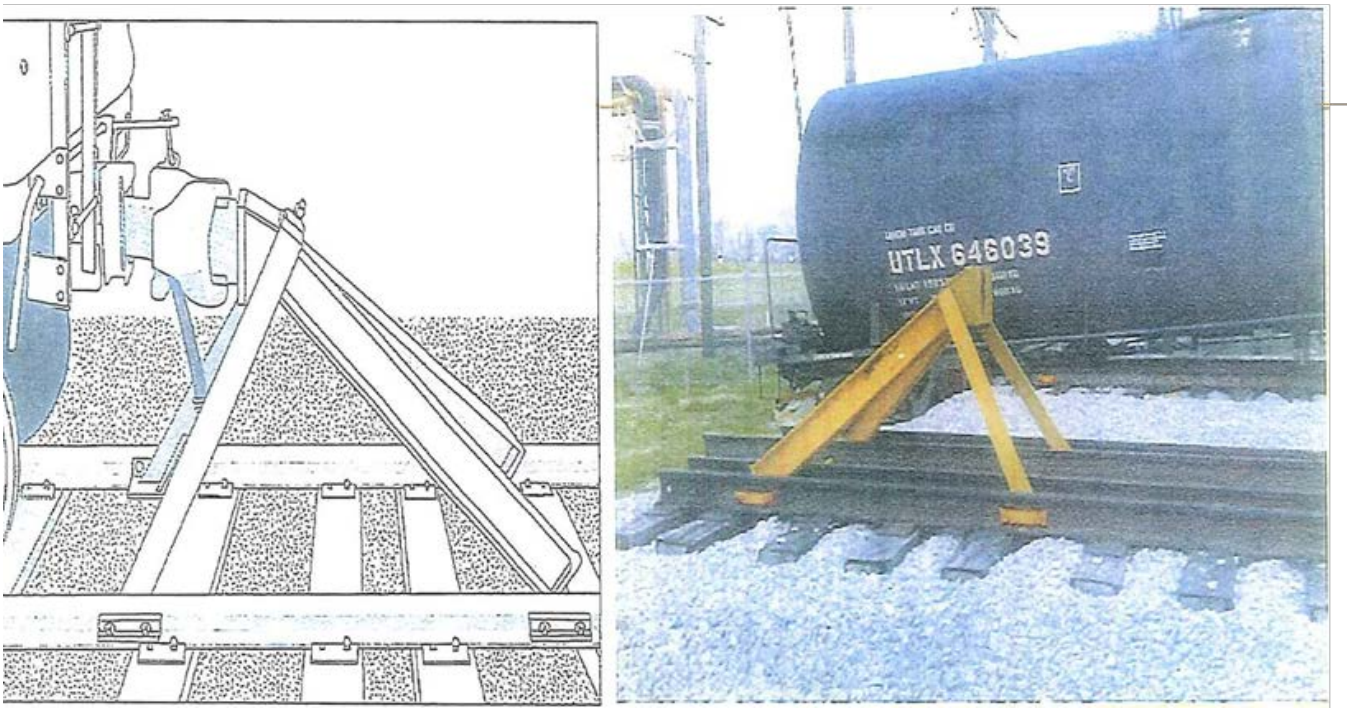
What is Point Protection?

The IRO Operating Manual states in Rule 22: Shoving Equipment.

When cars or engines are shoved and the way cannot be seen and ensured clear, employees must take an easily seen position on the leading car or engine, or be ahead of the movement, to provide protection. Cars or engines must not be shoved over switches, derails, or crossings without protection. Upon request and prior to opening the throttle to shove, the locomotive operator must establish that the crew member directing the shove is in position to protect the point. Equipment must not be shoved to block other tracks unless it is known that the adjacent tracks are clear and the switches are properly lined for the movement.

The IRO Operating Manual also states in Rule 23: Shoving into Stub Tracks.

When shoving into tracks that are stubbed, equipped with wheel stops or bumping posts, a SAFETY STOP must be made between 50 and 100 feet from the end of the track, wheel stops or bumping post. The movement must not exceed 2 miles per hour for the remaining distance.



Bumper post – at the end of a spur, stub end, or branch line track to keep cars from running over the end.

The Cardinal Rules states:

Always protect the leading movement by having the ability and being in position to visually confirm clear track.

Always be in a position to stop short of

- An improperly aligned switch
- Closed derail
- Equipment in the foul
- Compromised rail condition
- Shoving into a stubbed track
- Shoving into a track with a bumping mechanism

Fouling Tracks

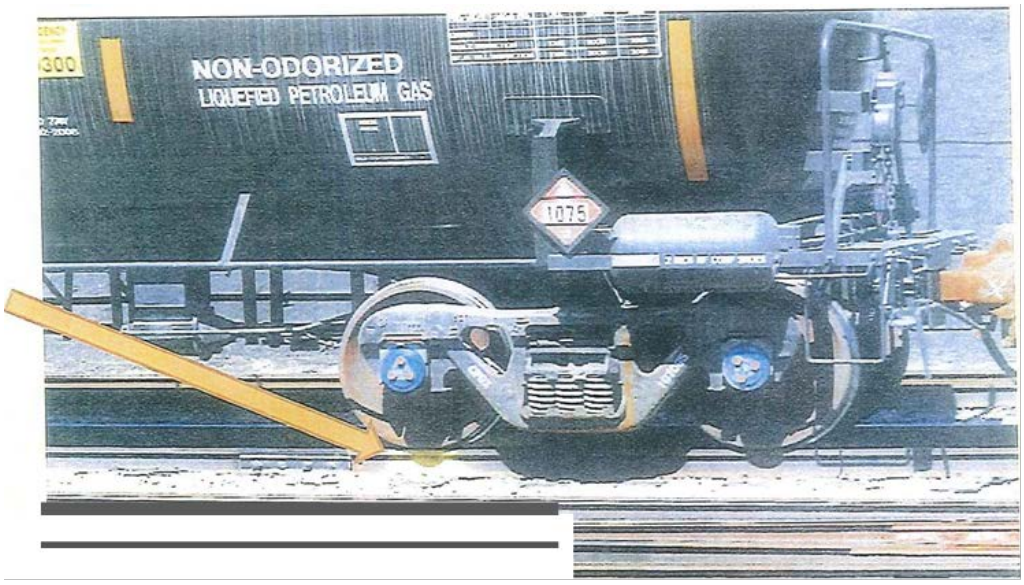
What is Fouling Tracks?

Rule 11.0, Stopped Clear of Fouling Point.

An engine or rail movement required to stop for another rail movement must be stopped clear of the route to be used by the other engine or rail movement.

Rule 21.0, Fouling Other Tracks.

- Equipment must not be moved foul of another track unless the movement is properly protected. Switches must be lined for the route and it must be visually seen that the portion of the track to be used is clear.
- Equipment must not be left foul of a connecting track unless the switch being fouled is covered by the equipment.



The Cardinal Rule states:

Fouling tracks

Do not leave equipment in the foul. If equipment cannot be left clear of the converging track's foul point, then the equipment must always be pulled to switch points and placed in a position that will

- Foul the entire track
- Prohibit any equipment movement on the converging track

Vehicles or equipment within 4 feet of any active rail or track are to be considered in the foul.

What is Securement?

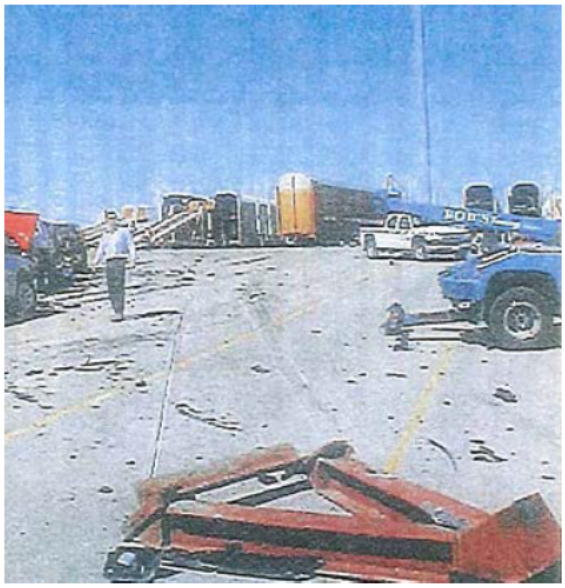
The IRO Operating Manual states: Rule 17.0, Hand Brakes and Securing Devices.

A sufficient number of hand brakes are applied on cars prior to uncoupling.

The IRO Operating Manual states:

Minimum Hand Brake Application Chart	
1 car	1 hand brake
2 to 19 cars	2 hand brakes
20 to 29 cars	3 hand brakes
30 to 39 cars	4 hand brakes
40 to 49 cars	5 hand brakes
50 to 59 cars	6 hand brakes
60 to 69 cars	7 hand brakes
70 to 79 cars	8 hand brakes

Note: at locations where a specific number of hand brakes are required, such locations are identified in Operating Bulletins and Notices or Site-Specific Procedures and equipment left unattended is checked as provided by Rule 17.0, Hand Brakes and Securing Devices, specifically the Push/Pull Test.



The Cardinal Rule states:

Apply a sufficient number of hand brakes as required by Minimum Hand Brake Application Chart of Site-Specific Requirements to hold standing railcars in place. After applying hand brakes, always perform a push/pull test on all railcars.

In Review

What are the four Cardinal Rules?

Why do we have them?

Will they reduce or eliminate ALL occurrences/incidents?

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7.0 Managing Fatigue

Points to Consider

- Fatigue is a physiological problem that cannot be overcome by motivation, training, or willpower.
- People cannot reliably judge their own level of fatigue-related impairment.
- There are wide individual differences that make people susceptible to fatigue.
- There is no one magic solution (other than proper sleep) that can counter fatigue for every person in every situation.
- There are strategies that can help counter fatigue.

Did you know?

Fatigued people are less able to respond to unusual or emergency conditions effectively? They are also more likely to take risks.

A fatigued person could be a danger to themselves and others.

Definitions

1. The state of feeling very tired, weary, or sleepy resulting from insufficient sleep, prolonged mental or physical work, and extended periods of stress or anxiety.
2. A result of prolonged mental or physical exertion; it can affect people's performance and impair their mental alertness, which leads to dangerous errors.

Factors Contributing to Fatigue

Adjustable Factors: Work Schedule and Social Schedule

Fixed Factors: Individual Circadian Tolerance and Age

Behavioral Signs of Fatigue

- Difficulty keeping eyes open/trouble focusing/frequent blinking/rubbing eyes
- Head nodding/drooping
- Irritability
- Poor coordination
- Poor response times
- Repeated yawning
- Lack of alertness/daydreaming/wandering/disconnected
- Erratic shifting/restless
- Stiff/sore muscles, neck

Physical Symptoms of Prolonged Fatigue

- Depression/moodiness
- Loss of appetite
- Digestive problems
- Increase susceptibility to illness
- Lack of energy
- Difficulty concentrating

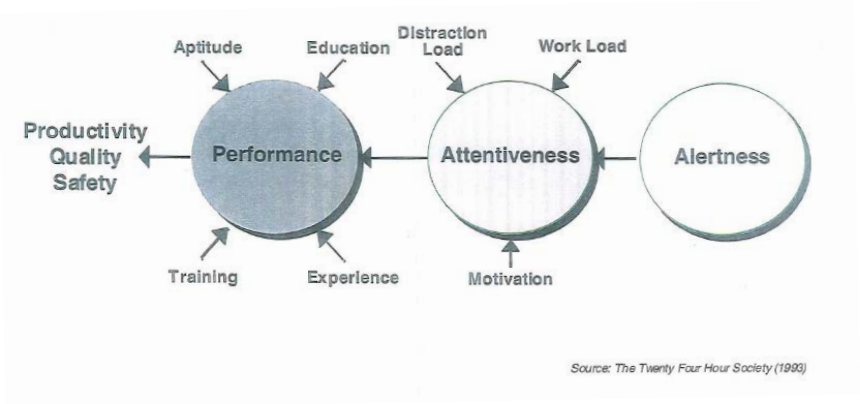
How Fatigue Hinders Your Performance at Work
Fatigue reduces:

- Decision-making ability
- Ability to do complex planning/problem solving
- Communication skills
- Productivity/performance; work slower; check more; rely more on workers
- Attention and vigilance (alertness and watchfulness)
- Ability to handle stress on the job
- Reflexes/reaction time (both speed and thought)

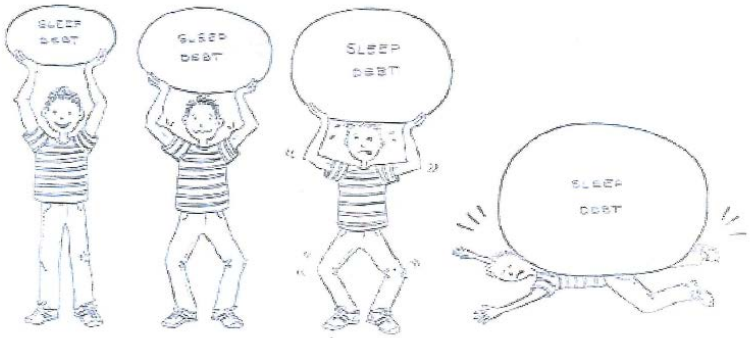
Fatigue increases:

- Loss of memory or the ability to recall details
- Failure to respond to changes in surroundings or information provided
- Ability to stay awake or microsleeps
- Automatic behavior
- Tendency for risk taking
- Forgetfulness
- Errors in judgment
- Sick time, absenteeism, rate of turnover
- Medical costs
- Accident rates

Performance/Attentiveness/Alertness



Ever Feel this Way?



How many hours of sleep do you need?
Most healthy adults need between 7.5 to 9 hours of sleep per night to function at their best.

Did you know…?
If you are logging enough hours, you'll feel energetic and alert all day long, from the moment you wake up until your regular bedtime.

Could this be you?
If you are getting less than 8 hours of sleep per night, chances are you are sleep deprived. What's more, you probably have no idea just how much lack of sleep is affecting you.

Strategies to Promote Alertness

- Work scheduling
- Limit the time on task
- Take your scheduled breaks
- Don't underestimate the power of a nap
- Maintain an upright posture or stand up
- Develop healthier eating habits
- Practice any physical activity
- Keep your mind active
- Practice good sleep hygiene

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PROCEDURAL/POLICY
Review Record

NOTE: Use this document for your annual procedural/policy review process. A completed copy of this form is required to be retained for each terminal-specific procedure/policy.

General Information				
	Terminal:		Procedure/Policy:	
	Written By:	Issue Date:	Revised By:	Revision Date:

Procedural/Policy Review Section	Review Date	Review Conducted By	Revision Required (Y/N)	Misc. Comments

Revision History Section	Revision No.	Reason/Purpose for Revising Procedure	Revision Date

NOTE: By completing the below approval section of this form, you are consenting to the following statement: I have reviewed the aforementioned procedure/policy and I'm in agreement with its current content.

Approval Section				
	Operations Manager	Print Name (First, MI, Last)	Signature	Date
	SHE&Q Director	Print Name (First, MI, Last)	Signature	Date
	SHE&Q Manager	Print Name (First, MI, Last)	Signature	Date

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TRANSFER PROCEDURE
Crude Oil Transfer Railcar to Manifold

PURPOSE: This procedure outlines and defines the necessary steps needed to safely conduct a railcar-to-manifold transfer of crude oil.

SCOPE: This procedure is for the transfer of crude oil from railcar to manifold.

RESPONSIBLITY: The Manager shall ensure that this procedure is followed by Facility personnel when conducting crude oil transfers, and that personnel are adequately trained and are provided with the necessary personal protective equipment (PPE), tools and equipment to accomplish this task. Personnel performing any tasks shall be trained and qualified to do so.

The below listings are the equipment, tools and PPE required to successfully accomplish this task.

Personal Protective Equipment (PPE)	Hard Hat (ANSI Z89.1 Certified)	H_2S Gas Alert Clip 2 Extreme Detector	***Miscellaneous Safety Equipment***	Bi-directional Derail (Engaged & locked-out)
	Vancouver Energy Approved Uniform (FRC)			Blue Flag w/Blue Light (Raised, light illuminated, & locked)
	Safety Toed Boots (ANSI Z41.1 Certified)			Rail Car Handbrake (Set & restricting movement)
	Safety Glasses (ANSI Z87.1 Certified)			Rail Car Wheel Chocks (In place & restricting movement)
	Neoprene/Leather Gloves			Ice Melt
	Hearing Protection			Safety Eye Wash Operational & Available within 50'

Tools & Transfer Equipment	Spark Proof Pipe Wrench 14", 24"and 48"	Spark Proof 1-5/8",1-7/16" Combination Wrenches	***Environmental Equipment***	Containment Pans (also called Drip Pans or Spill Pans) (Containing residual spillage by outlets)
	Assorted Pipe/Hose Fittings	12.5' Wood Gauge Stick		Absorbent Wipes
	Dedicated Product Hose	Dedicated Vapor Hose		Oil Dry Absorbent (granular)
	Orange Cam Lock Clips/ Velcro straps/ Tie Down Straps (Hose Hoist)	Mobile Platform and or Man-Lift with (2) 14'ropes		Emergency Spill Kit
	Check Valve Vacuum Breaker with Fitting	Radio with full battery		

HAZARDS

Hazards associated with performing a transfer of heavy fuel oil include the following:

- **Operating within the confines of a rail yard.** All safety rules and regulations must be followed 100% of the time - NO EXCEPTIONS. It is also vitally important to be aware of your surroundings and those activities which are transpiring around your particular work area. This may include other transfers nearby, moving equipment and passing vehicles, railcar movement on adjacent tracks, etc. Follow the included procedures pertaining to the setting of brakes and use of chocks in order to eliminate the hazards of railcar movement.

- **Working surfaces.** Always ensure that the particular work area is free of any items which represent a slip/tripping hazard and/or obstruction. Prior to commencing any type of work, it is vitally important to inspect the area for ice, snow, slippery surfaces, loose ballast, tools and/or other materials and product lying around. If detected, these items are to be removed whenever possible and/or the individual is to proceed with caution.

- **Climbing ladders and working on elevated surfaces (e.g. tank car).** It is vitally important to maintain proper 4-point contact while ascending and/or descending ladders, as well as restricting your movement to only on grated surfaces such as running boards, sills, platforms, etc.
- **Body positioning.** Working on, around, and under tank cars sometimes makes for awkward positions. Always ensure that your body is in a safe position. Use caution when lifting or maneuvering transfer hoses and fittings; these items may be extremely heavy, and proper lifting techniques must be used to avoid back strain. Try at all times to maintain ergonomically safe body position in order to minimize strain and loss of balance. Always position your body out of the "line of fire" and upwind when opening man ways, valves, and other access points; always assume that every cap, plug, valve, and cover is under some degree of pressure and may eject itself and/or product upon you when you remove it or open it.

- **Environmental exposure.** Avoid detrimental environmental exposure to land and water resources and drains by avoiding spillage of any product onto the ground. This can be accomplished by ensuring the following established procedures, especially pertaining to pre-transfer hose & gasket inspections, use of containment pans, securing hose connections using Velcro straps/ Orange Cam Lock Clips, applying caps/plugs to hoses, fittings, and connection points after use, and properly securing all openings to the tank car to prevent any spillage during switching activities or transport.

- **Chemical exposure.** Crude oil is a DOT-placarded Class 3 flammable product. It can be very thick and can be very difficult to clean up. Crude oil vapors can build up to toxic levels within railcars; the skin may absorb certain components present in the material in toxic quantities. Always wear the required PPE, and avoid getting your face close to the man way of a loaded tank car to minimize vapor exposure. Review the MSDS for further information, warnings, and recommendations.

- **Flammability of the product.** Do not handle or store crude oil near an open flame or other sources of heat or ignition. Utilize non-sparking urethane railcar chocks, and avoid using metal chocks. Immediately discontinue the transfer in the event of lightning in the area. While the track is bonded and grounded and designed to handle the day to day level difference in potential energy. A lightning storm has a greater potential and thus operations will be ceased.

- **Confined spaces.** The interior of tank cars are among the confined spaces within the rail yard. Operators shall not break the plane of the entry point (e.g. man way) of a confined space with any part of the body without formal training/certification, permit, and proper safety equipment and PPE. Confined space entry will not be necessary and must be avoided during operations of this procedure. Notify the manager of any instance whereby an item has fallen into the railcar and before attempting any retrieval. You may attempt retrieval only with the use of a tool that prevents any part of your body from breaking the plane of the entry point.

- **Machine guards/moving parts.** Prior to utilizing the transfer pump, it is vitally important that the Operator ensures that all of the appropriate machine guards are properly in place. Additionally, the Operator is required to keep all body parts, tools, and/or other items away from the pump's moving parts. Under no circumstances is an employee permitted to make any unauthorized modifications to the equipment (e.g. removal of machine guards, parts, or sections) without obtaining the collective approval of the Operations Manager, Maintenance Manager, and SHE&Q Manager. Pinch points and vibrating or moving parts may exist throughout the work area, which present exposed skin, muscle, or body parts to crushing, caught-between, struck-by, struck-against, cutting, tearing, shearing, or nerve damage. The pump basin area is not to be entered without authorization

- **Electronic Devices.** No electronic devices are allowed beyond gate **(With the exception of the area rated radios for commination and Supervisor's work phone).** All electronic devices are to be left in the office and can be picked up when guest is departing. This includes cameras.

- **Static Electric Discharge.** A release of static electricity in the form of a spark that might be capable of causing ignition of a flammable atmosphere under appropriate circumstances. Utilize grounding system to tank cars to mitigate static electric hazard.

1.0 RAIL CAR SPOTTING & BOTTOM HOOK-UP

NOTE: Always ensure the railcar's BOV is in the CLOSED position and BOV seal is in place. In event seal is missing notify supervisor prior to hook-up

WARNING: Hydrogen Sulfide Gas is EXTREMELY dangerous. The Immediately Dangerous to Life and Health (IDLH) level is 100 ppm. At low concentrations H_2S smells like rotten eggs. At higher concentrations the ability to smell H_2S is lost. Therefore, one cannot rely on odor to detect the presence of H_2S. If your H_2S alarm goes off or it is detected at any time contact your Supervisor and or Manager. Leave the area and report. The unloading area has the h2s detection alarms along the building and they will also give you an audible and visual indication if an alarm were to sound.

WARNING: H_2S can accumulate in confined spaces. Take care not to place your face in or near an open manways, valve or opening on the railcar tank.

WARNING: Do not approach anyone who has fallen. Move away quickly perpendicular (sideways) to wind and get upwind. Then, contact your Supervisor and Operations Manager in accordance with the ERP (Emergency Response Procedure) on file.

1.1 The Transload Operator ensures that the is protected by a portable bi-directional derail device and/or rail switch which is aligned away from the particular transfer track, thus restricting entry. A lock is subsequently placed on the derail and/or rail switch. The Operator also ensures that the blue flag which reads "Stop – Tank Car Connected" or "Stop – Men at Work" is in the raised/erect position and locked.

1.2 The Transload Operators ensures that they have the necessary tools/equipment to accomplish this task (refer to above listing). They work in teams of two on the ground and one on the platform/gangway.

1.3 The Transload Operator dons the required personal protective equipment (refer to above listing).

1.4 Prior to starting the transfer, the Transload Operator initiates radio communication with team or other authorized personnel to perform a radio check and to inform the control room where the personnel are starting the work.

1.5 Warning: Cars must be grounded before any connection is made to the railcar. Grounding cable shall be first connection made and the last connection disconnected.

1.6 Verify railcar is grounded via indication at grounding station

1.7 The Transload Operator ensures that an operational eye wash unit is positioned within 50' feet of the transfer area.

1.8 When a train is released from the BN to Vancouver Energy; the Vancouver Energy train crew will move the train to the selected loop track and the loading positions. They will then index the set of cars until all the cars have been unloaded. Once unloaded the train will be moved to the departure tracks where it will be handed back to the BN crews. Note: trains with product in them will be manned 24 hrs a day until the product empty from the cars.

1.9 Switchman will align switches to go to the desired loop track

1.10 The cars will be spotted/ positioned in a predetermined number of railcar spots at a time.

1.11 When unloading is complete the red zone will be removed and the cars will be allowed to move forward when the all clear is sounded. The next set of cars will be placed and the process repeated until the unloading is complete.

1.12 The Switchman/ Transload Operator sets the railcar's handbrake by turning the wheel in a clockwise motion; the brake is fully applied when you can no longer turn it. Air brakes are set and the power lever is removed to prevent movement. A locomotive operator will remain in the engine until the unloading is complete. The front 2 and rear 2 railcars will have handbrakes set. The handbrake is located on the railcar's B-end

1.13 The Transload Operator utilizes the set of railcar chocks, by resting each individual chock on top of the rail on opposite sides of the railcar's wheel; a wheel chock will be placed on the front and rear railcar between the string of up to a predetermined number of cars. This process is undertaken to prevent any accidental movement during the transfer process.

1.14 A Transload Operator performs a general inspection of the railcar *(see Section 7.2 Tank Car Inbound Inspections)* ensuring that it is in good operating condition and provides for a safe work environment.

1.15 The Transload Operator checks the surrounding area for slip or trip hazards. Remove any such items where possible and/or be wary that a hazard exists and be cautious when working in that specific area.

1.16 A Transload Operator will work within the containment area and install the dry disconnect fittings on the rail car. Transload Operators required to hook up bottom of railcars will stay at least one car or behind Transload Operator hooking up top of railcars (to eliminate potential risk from falling objects from above).

WARNING: Never assume the bottom operated valve is closed. **Before** removing the bell cap**,** ***ALWAYS*** **double check** that the BOV (bottom outlet valve) is in the **closed position** and the locking pin is in place.

1.17 The Transload Operator ensures that the containment pan is not damaged and the elbow fitting and a thread adapter (should it be needed) is positioned in the pan under the railcar's BOV,

NOTE: A containment pan should *always* be placed under any product hose connection even when in stored position.

1.18 The Transload Operator utilizes the specified pipe wrench to remove the cap/plug from the railcar's BOV.

WARNING: Carefully test the weight and force of the cap as you are in the process of removing it. If it seems unusual, stop and tighten the closure, and make sure that the valve is in the closed position. If the handle is indeed closed, any unusual weight or signs of product seepage around the threads is indicative of a failure of the bottom operated valve. If you suspect or see indications of BOV failure, stop and tighten the bell cap, and do not proceed to unload the car. Immediately notify the Manager or designee, and red-tag the car.

1.19 The Transload Operator attaches and secures the railcar's appropriate fitting to the railcar adapter.

1.20 The Transload Operator connects and secures the product hose to the recently installed elbow fitting and apply orange cam lock on dog ears.

1.21 At this time the hose may need raised and tied off with a rope or strap to insure the dry disconnect valve and the 90 degree fitting are not sagging which may create leakage of product.

1.22 At this time the Transload Operator will grasp the handle on the hose valve and push it down into the locked open and allow the valves flow when seated properly. The Operator will then inspect the connections to verify there are no leaks.

NOTE: Inspect all product hoses prior to each use. Look for holes or cracks, check the hose's hardware connections for signs of wear, make sure the hardware is not cracked or broken and operates correctly, and ensure all gaskets are in good operating condition.

1.23 Remove BOV seal (this step is to ensure BOV is not opened before adapters, Elbow, and API head is installed.)

1.24 Once fitting and hose are properly hooked up and secured, the BOV on the railcar can be opened.

NOTE: BEFORE Opening BOV, verify all equipment and cam safety locks are attached properly. Always have eyes on the BOV while opening the handle and verify that no leaks are present before proceeding.

1.25 At this point the Transload Operator verifies the product hose is charging to the site glass does and does not see any leaking.

NOTE: <u>DO NOT</u> OPEN THE STATIONS MAIN UNLOADING VALVE AT THIS TIME

2.0 PLATFORM/GANGWAY OPERATION AND TOP HOOK UP

2.1 The Operator utilizes 4-point contact to access the top of the railcar.

CAUTION: *Always utilize 4-point Contact when climbing and descending stairs, ladders and other equipment, ensuring good grip with your hands and good traction with your feet and looking before you move.* Transload Operators required to hook up bottom of railcars will stay at least one car or behind Transload Operator hooking up top of railcars (to eliminate potential risk from falling objects from above).

CAUTION: *Do not stand directly over the valve when attempting to open, as pressure inside the tank car might force the product and or pressure up the air induction pipe and may result in injury.*

2.3 The Operator inspects the man way bolts using a wrench to tap each bolt. All bolts must be tool tight, any bolt that moves is not tool tight and will be tightened before moving on.

2.4 The Operator opens the dome cover lid to inspect for loose bolts on the flanges.

2.5 The Operator ensures the vapor and liquid valves are closed, capped and tool tight and there is no leakage or product loss.

2.6 The unloading stations which are not equipped with a vent hose will need the appropriate fitting attached to the railcar's vent/vapor valve which is typically 2-3" in diameter. Tighten this with the appropriate tool.

2.7 The Operator inspects the pressure relief device for visible damage, leakage or product loss. (Do not press VRP as this can damage O-ring and create leakage during transport.)

2.8 The Operator lowers the rope to the ground Operator to retrieve vapor hose and pulls hose up.

2.9 The Operator removes the cap from the vapor valve on the tank car and attaches the vapor hose/vacuum breaker to the tank using a cam lock fitting

2.10 The Operator then opens the ball valve on the vapor hose (if hose is allocated) by moving the handle to the inline position. CAUTION should be used.

2.11 The Operator then opens the ball valve on the tank car vapor valve by moving the handle to the inline position, CAUTION should be used thus allowing the railcar's internal pressure to be relieved.

2.2 Before leaving the tank car platform the Operator gathers tools and visually inspects that both vapor valve on the tank car and the vapor recovery hose valve are open by physically touching valve handles. Then verbally acknowledging this by saying, "**Open, Open**" to one of the operators on the ground which will open the main product and vapor valve for that station while checking for leaks.

2.12 The Operator will repeat steps 2.1 to 2.12 until hookup is complete.

END OF PROCEDURE

Note: Every team works together to insure that Operator on top is accommodated and the Main Product and Vapor valves to that Station are open and charged prior to the Mobile Platform moving on to the next Station.

3.0 STARTING THE TRANSFER and TRANSFER IN PROGRESS

3.1 Once railcars have been hooked up for unloading, the containment pans are in place, the vent fittings and or vent hoses are hooked up, the railcar BOV's have been opened, and all personnel are clear at both the top and bottom of the railcars**, the Facility appropriate Operator is called to insure he/she is ready and all valves are opened.**

3.2 After cars are hooked up and ready, the Supervisor makes a call for permission to start the pumps. Once the pumps are started, conformation of the pumps being started is given by either the Supervisor or the Transload Operator at the Facility. The operators check for leaks and any abnormalities.

3.3 At this time steps 1.20 to 1.27 and 2.1 to 2.13 can be repeated for the remaining cars.

3.4 The Transload Operator observes the system to ensure that there are no leaks detected while the product starts to flow. If leaks are detected, immediately shut-off the BOV and take appropriate steps to stop the leak then open the BOV to resume offloading. Inform the Supervisor to alert him of the situation and repair of both before and after the leak.

WARNING: Never leave a transfer in progress. Always be sure that you are monitoring the unloading and staying in the vicinity of all the railcars being unloaded. It is vitally important that the Operator maintain control over the transfer process, thus preventing an incident from escalating into a catastrophic scenario.

3.5 The Transload Operator continually monitors the product flowing into the manifold by observing the sight glass in the VISI FLOW fitting. In addition, the Transload Operator continues to check for leaks and any abnormalities on the entire facility at a minimum of every 30 minutes.

END OF PROCEDURE

4.0 SHUTDOWN PROCESS and RAILCAR BOTTOM BREAKDOWN

Transload Operators required to hook up bottom of railcars will stay at least one car or behind Transload Operator hooking up top of railcars (to eliminate potential risk from falling objects from above).

4.1 Supervisor notifies other crew members that pumps are down and teardown can begin.

Note: The tear down process can begin prior to pump(s) shutting down once there is reasonable information available to prove that transfer is very near to completion. This is usually confirmed by the number of pumps still running, the flow indicated on screen, the gauging of the railcar and the time lapsed.

4.2 Once the product quits flowing through the VISI FLOW sight glass the Operator closes the bottom outlet valve (BOV) on the railcar and allows and residual product to finish draining from the hose.

4.3 The Transload Operator then closes the main (API) valve on the product hose.

NOTE: Ensure containment is under the 90 degree fitting on the railcar.

4.4 Once both valves are closed the hose is disconnected from the 90 degree fitting and placed in the containment pan after the end of the valve is wiped off with an absorbent wipe. (Note that this is done by disconnecting the 90 degree fitting from the railcar insert the 4" plug in the female end push cam lock levers down in the locked position and place in containment pan, then wipe off the end of the 90 degree fitting that the valve once hooked to with an absorbent wipe).

4.5 Transload Operator replaces the bottom cap after the inspection of the gasket.

4.6 The Transload Operator crawls out from under the railcar picks up end of product hose with API valve on it and returns valve back to its holder by snapping it into the holder and closes the main product valve and main vapor recovery valve. Then pulls the containment pan out from under the railcar and places it beside the main product valves at that station.

NOTE: <u>Do not</u> push down on handle to secure valve to holder

5.0 SHUTDOWN PROCESS and RAILCAR TOP BREAKDOWN

Transload Operators required to hook up bottom of railcars will stay at least one car or behind Transload Operator hooking up top of railcars (to eliminate potential risk from falling objects from above).

5.1 Supervisor notifies other crew members that pumps are down and teardown can begin.

Note: The tear down process can begin prior to pump(s) shutting down once there is reasonable information available to prove that transfer is very near to completion. This is usually confirmed by the number of pumps still running, the flow indicated on screen, the gauging of the railcar and the time lapsed.

5.2 Depending on the personnel utilization plan, one Operator starts on the one end of the train.

5.3 Depending on the personnel utilization plan, another Operator starts on the other end of the train.

5.4 The Transload Operator utilizes 4-point contact to climb the steps on the mobile platform to access the top of the railcar. Once the mobile platform is aligned the walkway (ramp) is lowered with safety rail completely encompassing the platform area approximately 6" above the height of the railing of the railcars platform.

5.5 If the Transload Operator uses the man-lift, the lift is positioned with the man lift basket parallel to the top of the tank car then he/she proceeds onto the tank car platform while staying harnessed to the man lift.

5.6 The Transload Operator on the mobile platform works from side to side moving to the South, (HARNESS NOT REQUIRED ON MOBILE RACK.)

5.7 The Transload Operator inspects all man way bolts using a pipe wrench to tap each bolt. All man way bolts must be too tight. Any bolt that moves is not tool tight and all bolts are tightened using the star pattern and torqued via gasket manufacturer's recommended specifications.

5.8 The Operator closes the vapor valve on the railcar and then closes the ball valve on the vapor hose (the valve on the vapor hose maybe left open if there is negative pressure on the line). This is usually confirmed when the pump(s) are still running and there is suction on the end of the vapor hose.

5.9 The Operator disconnects the cam lock fitting to remove the vapor hose and sets hose aside or the vacuum breaker (whatever used on that railcar).

5.10 The Operator cracks the vapor valve on the railcar slowly to check for pressure in railcar. If no pressure, Operator will turn the valve to the open position and gauges the railcar with the wooden gauge stick. (Record gauge results). If still loaded refer to steps 1.20 to 1.27 and steps 2.1 to 2.14 until product is unloaded. ***CAUTION:*** *Do not stand directly over the valve when attempting to open as pressure inside the tank car might force the product up the air induction pipe and possibly strike you.*

5.11 Once the Transload Operator verifies that the railcar has been un-loaded the product valve and vapor valve are closed, capped and tool tight and the railcar is then re-gauged and the figure is then recorded. The rope is attached to the vapor hose and the hose is lowered to the ground in which the operator on the ground un-hooks the hose and places it in its appropriate location.

5.12 The Operator closes and pins the dome lid removes all tools and fittings back to the mobile platform or the man-lift in preparation to move to the next railcar. If the mobile platform is used, both walkways are then raised up and locked in the raised position.

5.13 The Operator will repeat steps 5.2 to 5.14 to complete rail string.

5.14 Each Operator on the pad/track completes steps 5.2 to 5.14 on rail string assigned. Once completed they will move over to assist other operators in completion on their pad/track of railcar duties.

6.0 TRAIN AIR BRAKE TESTING and INSPECTION

See Section 8.8 Train Air Brake Test & Inspection

7.0 TANK CAR OUTBOUND INSPECTION

See Section 8.2 Tank Car Outbound Inspections

NOTE: When coupling a unit train back together road crossings cannot be blocked for extended periods, if ever relevant to rail operations at this specific location.

END OF PROCEDURE

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PURPOSE: This procedure outlines and defines the necessary steps needed to safely conduct an inbound tank car inspection in accordance with 49 CFR § 174.300, 174.900 and applicable Association of American Railroads (AAR) Rules.

SCOPE: This procedure applies to this Vancouver Energy terminal that receives inbound tank cars.

RESPONSIBILITY: The Operations Manager shall ensure that this procedure is followed by their respective Operating Personnel (i.e., Operators, Lead Operator, Ops Supervisor, etc.) who are responsible for inspecting inbound tank cars, and that those employees are trained and provided with the necessary personnel protective equipment (PPE) and tools to execute this procedure.

TANK CAR INBOUND INSPECTION

NOTE: Terminal Personnel is required to conduct an inbound rail car inspection within 24 hours of a car's arrival (e.g., the rail car being switched & spotted onto the terminal's transfer tracks); corresponding documentation is required to be retained for a period of three years.

1.1 Administrative Personnel (i.e., Coordinator/CSR, Administrative Supervisor, Ops Manager, etc.) provides a yard list to Operating Personnel (i.e., Operators, Lead Operator, Ops Supervisor, etc.) which has all the newly arrived railcars highlighted.

1.2 Operating Personnel (i.e., Operator, Lead Operator, Ops Supervisor, etc.) obtains a blank tank car inspection form for each of the newly arrived rail cars. Ops Personnel begins to complete the general information section of the form (e.g., date, terminal, rail car number, shipper, product & grade).

1.3 Operating Personnel (i.e., Operator, Lead Operator, Ops Supervisor, etc.) obtains & dons the appropriate PPE based on the associated product hazards; refer to minimum product specific PPE listing. In addition, Ops Personnel obtain the necessary tools (e.g., adjustable pipe wrench) to accomplish this task.

1.4 Operating Personnel (i.e., Operator, Lead Operator, Ops Supervisor, etc.) proceeds to the location of the first rail car which is highlighted on the yard list.

NOTE: The most effective way to inspect a tank car is to begin on one end. On tank cars these ends are identified as the "A" or "B" ends. The "B" end or brake end is pictured in figure 1. The left and right-hand positions on a tank car are determined while facing the "B" or brake end. This method is utilized throughout the industry as the standard way in which to identify where defective components are located and to properly report them on an inspection form; refer to figure 2.

Figure 1. Illustrates the B end of tank car CATX 70500.

Figure 2. Illustrates the quadrants of a tank car.

1.5 Prior to working on any rail car, Operating Personnel (i.e., Operator, Lead Operator, Ops Supervisor, etc.) are required to ensure that the rail siding is protected by a bi-directional derail and/or a switch lock and the blue flag which reads "Stop – Tank Car Connected" or "Stop - Men at Work" is in the raised position.

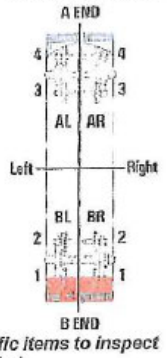
1.6 Prior to working on any rail car, Operating Personnel (i.e., Operator, Lead Operator, Ops Supervisor, etc.) are required to set the rail car's handbrake by turning the wheel in a clockwise motion; the break is fully applied when you can no longer turn it.

1.7 Operating Personnel utilizes the set of rail car wheel chocks, by resting each individual chock on top of the rail on opposite sides of the respective Tank car's wheel; only one wheel per rail car is required to be chocked and/or blocked. This process is undertaken to prevent any incidental movement.

1.8 Operating Personnel (i.e., Operator, Lead Operator, Ops Supervisor, etc.) conducts a comprehensive visual inspection of the tank car by walking around and inspecting each of the below quadrants. The individual who conducts the inspection, shall determine if the specific item is classified as acceptable (i.e., safe & in good repair) or defective/unacceptable and documents their findings on the corresponding tank car inspection form.

NOTE: The below diagrams highlight the tank car's quadrant and corresponding items to inspect.

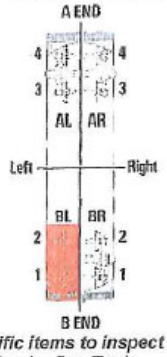
Quadrant: B-End



Specific items to inspect

1. Tank
   a. Tank Car Identification
   b. Other Markings
   c. Stenciling
   d. Paint
   e. Tank Condition
   f. Head Shield
2. Tank Ladder (where present)
   a. Step Treads
   b. Ladder Stiles
   c. Ladder Supports
3. End Sill
   a. Grating
   b. Hand Rail
   c. Grab Irons
   d. Sill Steps
4. Placarding
   a. Placard Holder
   b. Placard
   c. Hazard Class
   d. UNID Number
5. Handbrake Assembly
   a. Wheel and Lever
   b. Brake Chain
   c. Bell Crank
6. Coupler & Other Components
   a. Knuckle
   b. Air Brake Hose
   c. Uncoupling Rod
   d. Uncoupling Bracket

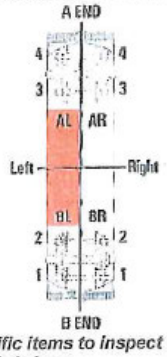
Quadrant: B-Left



Specific items to inspect

1. Running Gear/Truck
   a. Truck Side Frame
   b. Car Axle
   c. Car Wheels
   d. Truck Springs
   e. Roller Bearings
2. Placarding
   a. Placard Holder
   b. Placard
   c. Hazard Class
   d. UNID Number
3. Defect Card & Holder

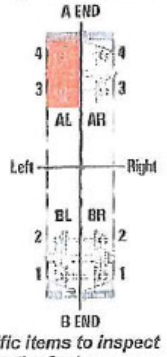
Quadrant: Left Side



Specific items to inspect

1. Underframe
   a. Stub Sill
   b. Full Sill
   c. Underframe Components
2. Tank Condition
   a. Paint
3. Tank Car Stenciling
   a. Class & Specifications
   b. Test Dates
   c. Sill & Side Frame
   d. Consolidated
   e. Chemtrec
   f. Water Capacity & Plate C
   g. Initials & Number
   h. Load Limit
   i. Light Weight
   j. Brake Shoe Stencil
4. Miscellaneous Stenciling
   a. Exemptions
   b. Commodity (Product)
   c. Inhalation Hazard
   d. Linings
   e. Insulation
   f. Leased To
   g. Ownership
5. Side Safety Railings
6. Tank Ladder
   a. Step Treads
   b. Ladder Stiles
   c. Ladder Supports

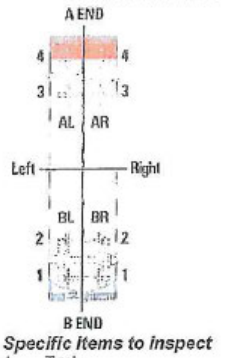
Quadrant: A-Left



Specific items to inspect

1. Routing Card
2. Running Gear/Truck
   a. Truck Side Frame
   b. Car Axle
   c. Car Wheels
   d. Truck Springs
   e. Roller Bearings

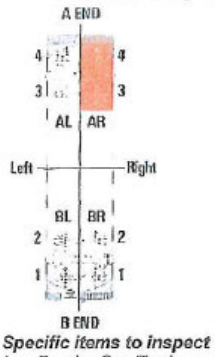
Quadrant: A-End



Specific items to inspect

1. Tank
   a. Initials & Number
   b. Other Markings
   c. Stenciling
   d. Paint
   e. Tank Condition
   f. Head Shield
2. Tank Ladder (where present)
   a. Step Treads
   b. Ladder Stiles
   c. Ladder Supports
3. End Sill
   a. Grating
   b. Hand Rail
   c. Grab Irons
   d. Sill Steps
4. Placarding
   a. Placard Holder
   b. Placard
   c. Hazard Class
   d. UNID Number
5. Handbrake Assembly
   a. Wheel and Lever
   b. Brake Chain
   c. Bell Crank
6. Coupler & Other Components
   a. Knuckle
   b. Air Brake Hose
   c. Uncoupling Rod
   d. Uncoupling Bracket

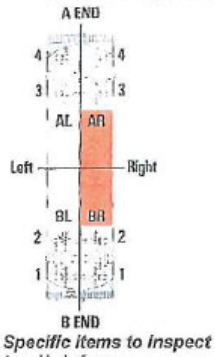
Quadrant: A-Right



Specific items to inspect

1. Running Gear/Truck
   a. Truck Side Frame
   b. Car Axle
   c. Car Wheels
   d. Truck Springs
   e. Roller Bearings
2. Placarding
   a. Placard Holder
   b. Placard
   c. Hazard Class
   d. UNID Number
3. Defect Card & Holder

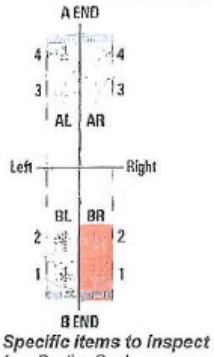
Quadrant: Right Side



Specific items to inspect

1. Underframe
   a. Stub Sill
   b. Full Sill
   c. Underframe Components
2. Tank Condition
   a. Paint
3. Tank Car Stenciling
   a. Class & Specifications
   b. Test Dates
   c. Sill & Side Frame
   d. Consolidated
   e. Chemtrec
   f. Water Capacity & Plate C
   g. Initials & Number
   h. Load Limit
   i. Light Weight
   j. Brake Shoe Stencil
4. Miscellaneous Stenciling
   a. Exemptions
   b. Commodity (Product)
   c. Inhalation Hazard
   d. Linings
   e. Insulation
   f. Leased To
   g. Ownership
5. Side Safety Railings
6. Tank Ladder
   a. Step Treads
   b. Ladder Stiles
   c. Ladder Supports

Quadrant: B-Right



Specific items to inspect

1. Routing Card
2. Running Gear/Truck
   a. Truck Side Frame
   b. Car Axle
   c. Car Wheels
   d. Truck Springs
   e. Roller Bearings

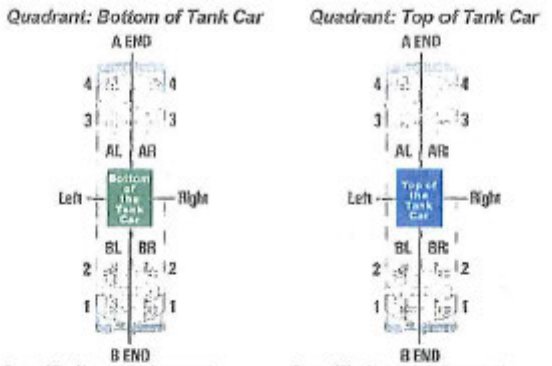
CAUTION: If a specific item has been deemed defective and/or unacceptable, the individual who conducted the inspection process is obligated to immediately notify their respective Operations Manager to alert them of their initial findings. The Ops Manager shall validate the initial findings and contact the respective shipper and await their direction; the shipper will ultimately determine the course of action (i.e., send a repair crew to the terminal to make the necessary repairs or instruct terminal personnel to mal<e the minor repairs).

1.9 If the tank car is equipped with a top- or bottom-operated valve, Operating Personnel verifies the valve handle is in the "Closed" position.

NOTE: Check for stenciling or a diagram on the side of the tank car, which will show in what position the valve must be to be closed.

1.10 If the tank car is equipped with a top- or bottom-operated valve, Operating Personnel removes the valve handle's stow pin and installs a pin lock in its place.

NOTE: If a pin lock will not fit or is unavailable, a seal threaded through and securing the stow pin is sufficient as a substitute. The pin lock shall remain installed at all times except during transfer, and it is to be removed during the Outbound/Departure Inspection before release from the terminal.



Specific Items to Inspect

1. Bottom Outlet Valve (where applicable)
   a. Flange
   b. Valve Handle
   c. Seal Pin
   d. Safety Chain
   e. Outlet Cap
   f. Pipe Plug
   g. Security Seals (where applicable)
2. Bottom Washout (where applicable)
   a. Washout Cap/Flange
3. Sump (where applicable)
   a. Sump Cap/Flange
4. Heating Coils (where applicable)
   a. Heating Pipes
   b. Steam Outlet Nozzle
   c. Pipe Caps

Specific Items to Inspect

1. Dome Safety Platform
   a. Gratings
   b. Handrails
   c. Corner Posts
   d. Safety Chain & Clip
2. Walkways (where applicable)
   a. Gratings
   b. Handrails
3. General Service Cars
   a. Liquid Valve
   b. Air Valve
   c. Safety Relief Devise
   d. Manway Cover
   e. Security Seals (where applicable)
   f. Product Tags (where applicable)
4. Acid Cars
   a. Liquid Valve
   b. Air Valve
   c. Safety Relief Devise
   d. Fill Hole
   e. Blind Flange (where applicable)
   f. Gasket (where applicable)
   g. Security Seals (where applicable)
   h. Product Tags (where applicable)
5. High Pressure Cars
   a. Manway Bonnet
   b. Liquid Valves
   c. Vapor Valves
   d. Sample Valve
   e. Thermometer Well
   f. Safety Relief Devise
   g. Security Seals (where applicable)
   h. Product Tags (where applicable)

OTHER MISCELLANEOUS REFERENCE MATERIAL

Tank Car Identification

All tank cars when built are given initials and number. They must appear in the proper locations on the tank car. Ensure to check for clarity and condition of all stenciling. Each tank car is required to be marked per AAR requirements, including stenciling and stamping.

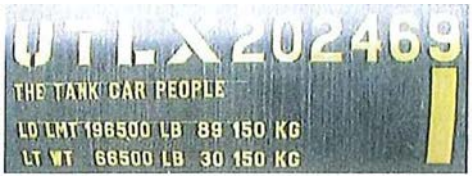


Figure 3 illustrates an example of tank car's initials, number, ownership, and weight stenciling.

The "X" of the initials stands for private ownership.

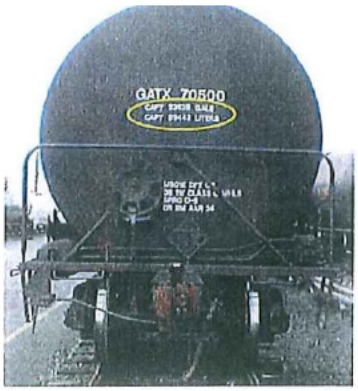
For example: UTLX 202469 is owned by Union Tank Car Company

GATX 2000 is owned by General American Transportation Corporation

Stenciling cannot be changed without contacting the owners' corporate logistics department.

Some tank cars may have a similar number or sequence but different initials, ensure that caution is exercised when reading & or documenting this information.

Not all products will explode or cause a fire if they are mistakenly mixed, but some products will. Even if two materials don't react adversely, the downtime, effort, and the added cost can all be avoided if you take the time to ensure that you are in fact at the correct tank car.



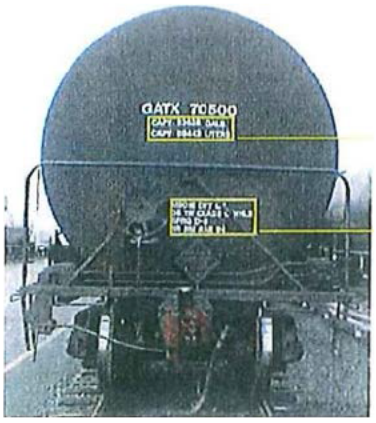
Other Markings

Other markings that are stenciled on the tank car head are shown below along with a picture that shows their location on the tank car.

Capacity of a tank car is the nominal loading of gallons and liters which a tank car is designed to carry. These figures are stenciled on the tank car and are identified as "CAPY". Other categories of markings are shown below.

A typical tank car like this one would have the following information stenciled as other markings:

Category	CATX 70500 Other Markings
Capacity in U.S. Gallons	CAPY 23628 GAL
Capacity in Liters	CAPY 89442 L
Springs	SPRG D-5
Wheel Types	36" 1W Class C WHLS
Draft Gear Type	M901E DFT GR
Brake Beam	BR BM AAR 24



Stenciling

Each tank car is required to be marked as per AAR requirements, including stenciling and stamping.

Stenciling must follow the applicable sections of the AAR "Specifications for Tank Cars", Appendix C, and AAR Rule 80, "Painting and Stenciling of Tank Cars".

The function of stenciling and markings is to provide proper information that includes:

- tank car number
- specification
- capacity of the tank in gallons, liters, and weight
- test dates
- equipment type
- owners or lessees of the equipment

Check all stenciling for legibility, and clarity. If you cannot read the stencils (as shown below), then the tank car should not be shipped until corrected. For guidance contact your Corporate Logistics Department.

Paint

Check the overall condition of the paint. If the tank car needs to be painted, notify your supervisor for additional information and guidance. Any necessary painting should be done by a qualified third-party contractor or by the transporting carrier railroad.

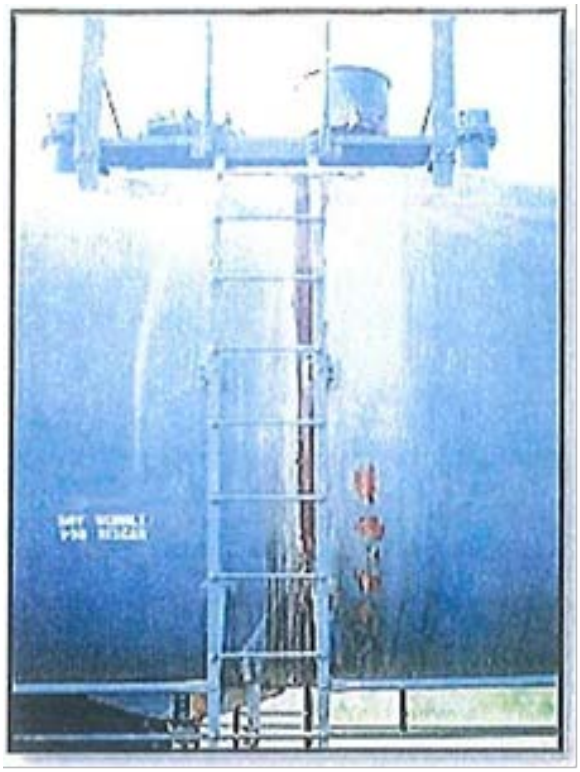
While paint is not a reason to reject a tank car for shipment, a poorly packaged product reflects badly on the quality process of your company. Paint is an item that should be kept in mind throughout the inspection.

Coupler bodies cannot be painted as per AAR Rule 18 (E)6.

A good paint system should be used to ensure long-term protection for the steel surfaces. The paint system should have excellent gloss and color retention. A contrasting color of the same paint system, such as black or white, should be used for the stenciling. Stencils, which remain legible for as long as the paint system, save time and money.

Tank cars that have not been properly maintained for paint quality are shown on the following page.

This paint damage was caused by overflowing or leaking while loading or unloading the tank car. Spilling of product is totally unacceptable for proper containment.

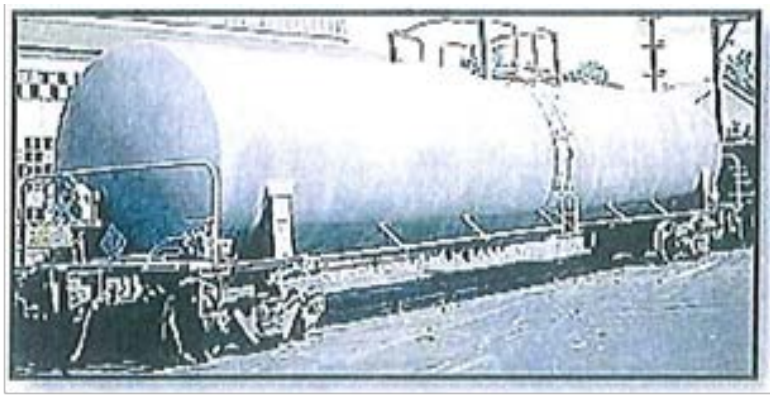


Although not a defect, this tank car should be painted for packaging quality. Does your preventive maintenance program address the issue of paint?

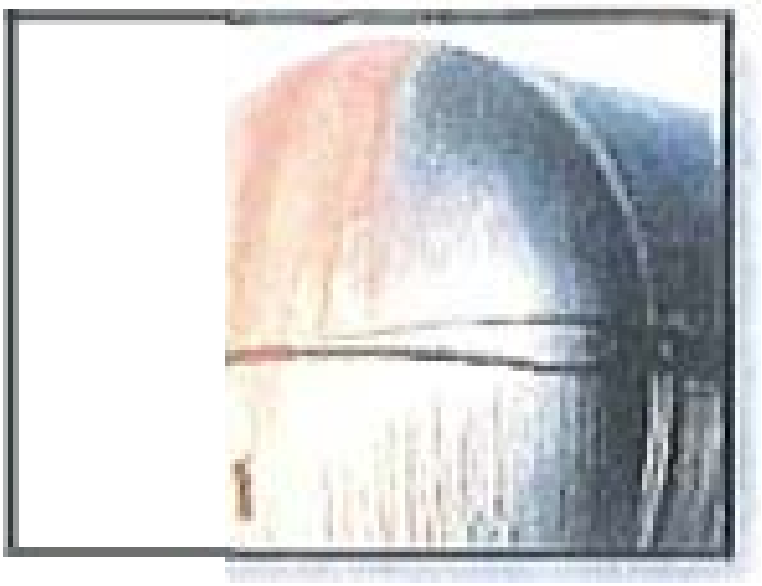
This tank car is in a shop for preventive maintenance. The paint was neglected for an extended period of time. Over time, an aesthetic issue became a maintenance issue.

The paint not only looked bad but the tank was rusting as well. As a result of the rust, the tank car needed to be fully sand blasted, primed, and painted.

If attention was paid to the paint Issue earlier, perhaps only a touchup paint job would be needed at this time. The cost would have been reduced by as much as two-thirds. Your inspection program and preventive maintenance programs should both address the issue of paint.



This defect was caused by an overhead pipe or flange leaking. The tank car prefix and number need to be restored in order to ship the tank car.



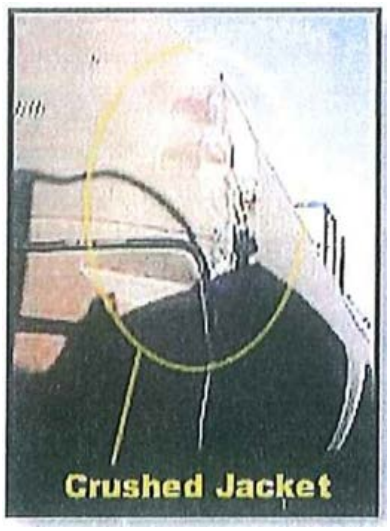
Tank Condition

Tank cars must be inspected for leakage before unloading or loading. Leaking tank cars cannot be shipped out or loaded again as per AAR Rules.

Look in general for any damage that could make the tank leak, such as abruptly bent, cut, or gouged areas of the tank sheet. If there is an indication of product leakage from under the jacket or from the shell of the tank, care should be taken to ascertain where the product is coming from. The situation should be reported immediately to your supervisor for guidance.

Uninsulated. On an uninsulated tank car with this type of damage, the tank car should not be shipped out or loaded again in the future until it has been repaired because there may be fracture cracking in the tank.

Insulated. On insulated tank cars, look for sharp or deep cuts that may have penetrated into the tank. Always consult your supervisor before loading or unloading a tank car that has this type of damage.



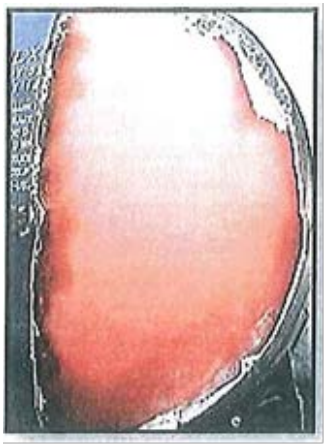
Care needs to be taken with both insulated and uninsulated tank cars that have damage that could result in a leak. If damage that could result in leakage is found, additional thorough inspection and/or information may be needed before the tank car can be unloaded (or loaded again in the future). Contact your immediate supervisor and if necessary, the customer or the tank car leasing company should be contacted for additional information and guidance.

The pictures below show tank car damage that could result in leakage:

The crushed tank on this uninsulated tank car was caused by a wheel in a derailment. The gouge is so sharp that the tank car should be repaired prior to any further use (unload or future load).

This uninsulated tank car has damage that was possibly caused by a catapulting coupler or end sill in a derailment.

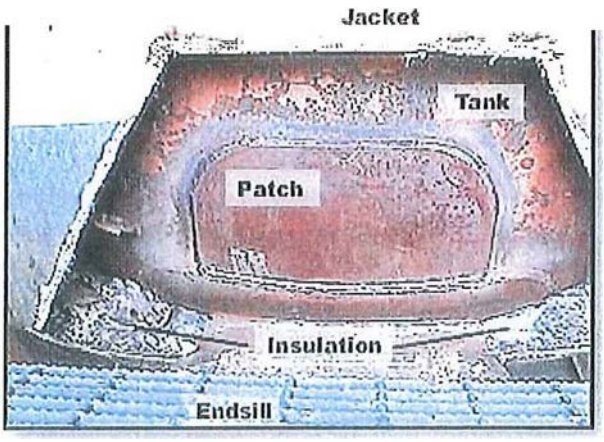
The tank car below was in a derailment. Although it sustained major damage to the end sill, body bolster and end jacket, there was no damage to the tank. This is not always the case.



You must develop a safe action plan in the event of tank damage and/or leaking product. Utilize whatever resource you need to complete the task in a timely and cost effective manner. The first step is to ask some questions:

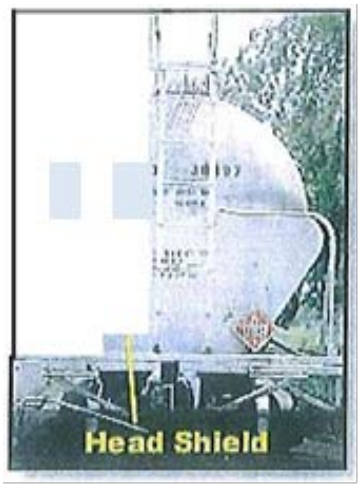
- How are you going to off-load this tank car safely?
- The tank car needs to be off-loaded before it can be repaired. Can you pump it off?
- If the product contained in the tank car is a high freezer, can you melt it? You would need to proceed carefully because if there is a crack in the head, then the hot material could run through. Would you be prepared if the heated material started to leak out. If not, preparing for such a situation before heating the material would be in order.
- If the product contained in the tank car is a high freezer, can you melt it? You would need to proceed carefully because if there is a crack in the head, then the hot material could run through. Would you be prepared if the heated material started to leak out. If not, preparing for such a situation before heating the material would be in order.
- Always seek help in making these decisions. You have already had one problem with this tank car. You don't need a second problem to develop while correcting the first problem.

This tank car was also involved in a derailment which resulted in damage caused by a coupler. The hole in the tank caused by the coupler is being prepared for repair after addressing some issues of off-loading the tank car.



A very good technique is to step back from a tank car and take an overall view. This view gives you the general perspective of the tank car, not only taking in the tank condition, but also paint and stenciling. It is often when you take this overall look that something will "just not look right".

Head Shield (if applicable)

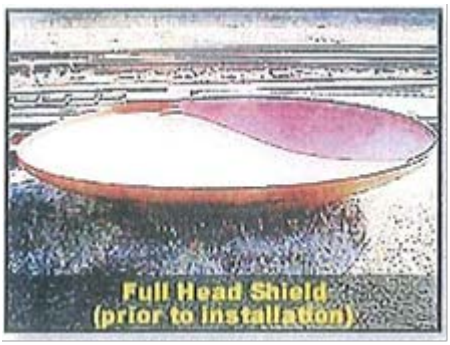


The head shield is a supplemental heavy steel plate required by AAR regulations on the ends of some hazardous commodity tank cars. Head shields lessen the chance of tank head puncture by the coupler of any adjacent car in the event of excessive end impact or derailment. Head shields can be either "full" (cover the entire end of tank head) or "partial" (cover only the lower portion of the tank head, as shown here).

If the head shield can be viewed, inspect all supports and bracing for crack welds and broken braces.

Most tank cars that have head shields use full or partial head shields which are welded to the head of the tank. If the tank car is jacketed, then you will not be able to see the head shield.

Some chemical companies make the heads of their tank cars 1- 1/2 times the shell thickness. This procedure reduces the chance of a head puncture caused by a coupler in a train wreck. It can be done on tank cars that do not require a head shield, but does not eliminate the need for head shield on tank cars which require one.



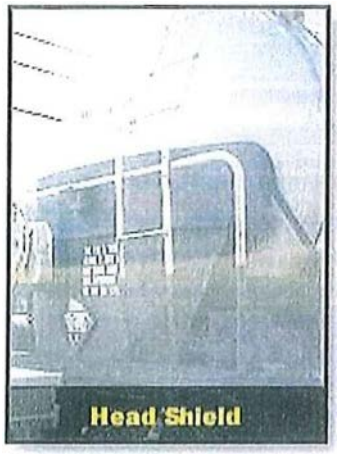
Tank cars of the 105, 112, 113, and 114 classes and with the letter indications of "S", "J", and "T" will be equipped with head shields.

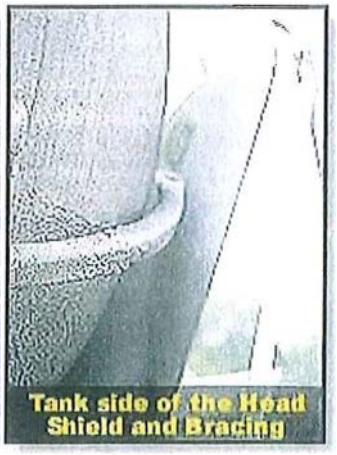
"S" Definition: Describes a tank car equipped with a DOT approved head shield as specified in parts of 49 CFR 179.100 and 49 CFR 179.105-5 of the DOT tank car regulations. This tank car does not require thermal insulation.

"J" Definition: Describes a tank car equipped with a thermal protection system and a safety relief valve with a defined minimum discharge capacity (as specified in part of 49 CFR 179. 105-5 of the DOT regulations). "J" defines that the thermal protection system is covered with a steel jacket. All tank cars with the "J" designation are required to have head protection as defined above for the "S" designated tank cars.

"T" Definition: Describes a tank car equipped with a thermal protection system and a safety relief valve as described for the "J" designation above. The "T" designation also denotes a spray-on or rolled-on thermal protection system that is applied directly to the exterior of the tank. The material hardens and provides its own protective shell, and a steel jacket is not required.

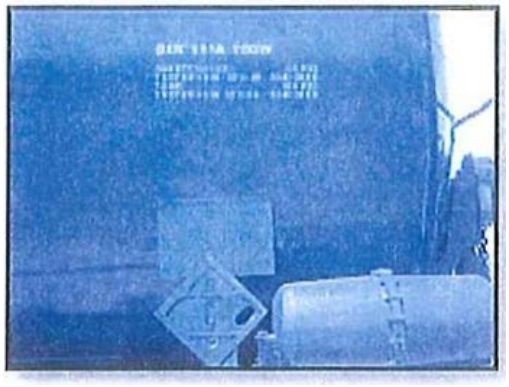
Below are pictures of a partial head shield from two different angles.





This is a DOT 111A 100 W tank car and is not required to have head shields. Tank cars of the 105, 112, 113, 114 class and with the letter indications of "S", "J", and "T" will be equipped with head shields.

While the tank car you are inspecting may have head shields, they may not be as obvious as those on the tank cars shown above.



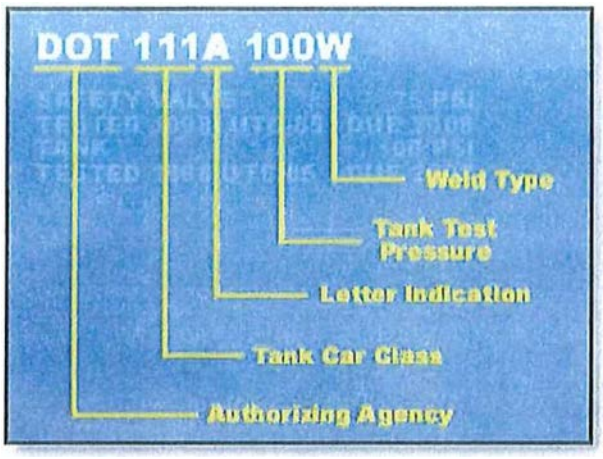
Tank Car Class and Specification Markings

The tank car DOT number designates the exact specification to which it was designed. DOT class stencils are located on the side of the tank car at the BL and AR locations just above the tank test date and below the product stencil, if one is applied.

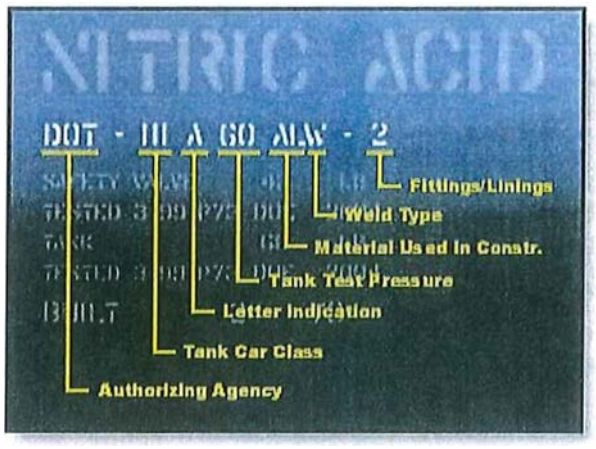
This is a DOT 111Al00 W. This stencil indicates the following:

- DOT - Designates the Department of Transportation which is the authorizing agency.
- 111 - Designates a specific design. There are over 90 designs.
- A - Equipped with top and bottom shelf couplers.
- 100 - Is the Hydrostatic and / or maximum design pressure of this unit?
- W - Designates this tank is made of a welded construction.

The picture below shows some of the markings found in this area, but there are also other designations which vary depending on the type of tank car.



Additional tank car specifications which could be found in this area are shown on the tank car below. The specifications that are present vary depending on the type of tank car. A detailed description of each item follows the picture.



Authorizing Agency

Tank car classes and specification numbers begin with a three letter prefix which represents the authorizing agency as follows:

DOT - Department of Transportation

AAR - Association of American Railroads

ICC - Interstate Commerce Commission (regulatory authority assumed by DOT in 1965)

CTC - Canadian Transport Commission

AAR tank cars differ from DOT tank cars by as little as the use of a fitting that does not meet DOT requirements but is necessary for handling the particular commodity being transported.

Tank Car Class

The DOT has specified over 90 different classes of tank cars.

Letter Indication (Number Significance)

A - Equipped with top and bottom shelf couplers

S - Equipped with tank head puncture resistance in addition to top and bottom shelf couplers

J - Equipped with jacketed thermal protection in addition to tank head puncture resistance and top and bottom shelf couplers

T - Equipped with spray-on thermal protection in addition to tank head puncture resistance and top and bottom shelf couplers

Tank Test Pressure

When present, this stencil item represents the tank test pressure in pounds per square Inch.

Letter Type of the Material Used in Construction

(No Letter) - Carbon steel

AL - Aluminum (found in Classes 103, 105, 109, and 111)

N - Nickel (found in Class 103 only)

D - Stainless steel (found in Class 103 only)

Weld Construction Type

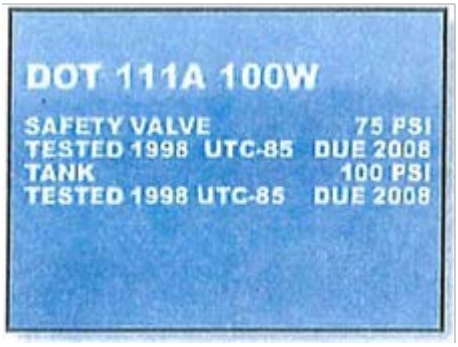
W - Fusion welding

F - Forge welding

Fittings/Material/Lining (If applicable)

Linings can be made of lead, rubber, or other elastomeric material.

Safety Valves



Safety valve stencils are also found here: SAFETY VALVE 75 PSI

TESTED 1998 UTC-85 DUE 2008

The UTC 85 - Union Tank Car Shop # 85 performed the tank and safety valve test. They must be a DOT approved shop to hydrostatically test, repair and test safety valves as well as repair tank cars. The safety valve was tested for 75 PSI in 1998 and will be due on or before December 31, 2008.

Most tank cars only have one safety valve.

Tank Test

The tank was tested for 100 PSI in 1998 and will be due on or before December 31, 2008:

TANK 100 PSI

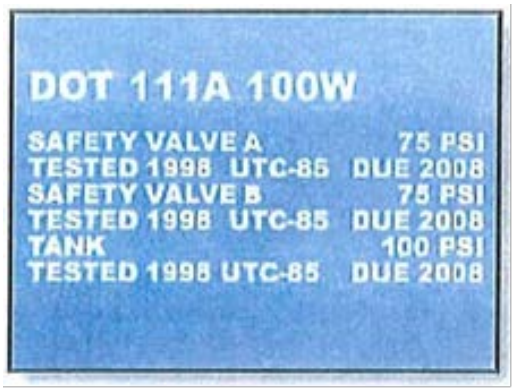
TESTED 1998 UTC-85 DUE 2008

All testing on tank cars (except those In Chlorine service) must be completed by the last day of the year due, regardless of the month tested. Chlorine tank cars must be tested on or before the last day of the month (originally) tested, in the year due.

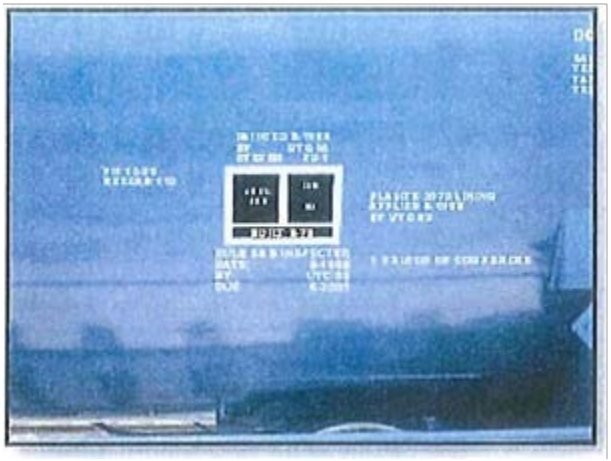
The certified testing papers must be kept in the main tank car file. They are usually kept by the Corporate Logistics Department. Even though the tank car stencil indicates the test has been performed, without the certified test papers the tank car would not have been inspected as required by the DOT.

Important: File records are the only true indication a test was completed. Stencil records that do not match file records will be discarded.

The tank car shown to the right has two safety valves. They are identified by the letters "A" and "B". They both must be properly inspected and documented on or before the inspection due date.



Consolidated Stencil, Stencils for the Lining, Rule 88.B2, PM, Paint, and Brake Shoes



Consolidated stencils or decals are applied to all tank cars. They are located on each side of the tank car at the BL and AR positions.

The consolidated stencil shown here consists of:

- ABDW/ABD - This is the type of air brake triple valve that our tank car is equipped with.

  ABDW

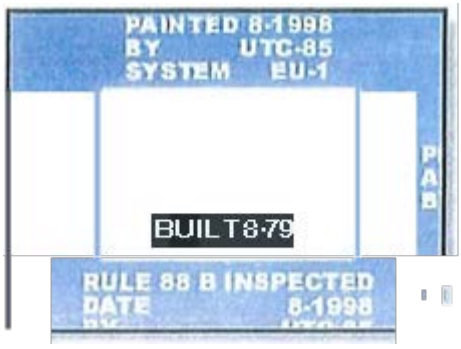
  ABD

- LUB - This tank car has roller bearing trucks that do not need lubrication.

  NO

- BUILT 8-79 - This was the year the tank car was built. To extend the useful life of a tank car, the tank car had been rebuilt. If the tank car had been rebuilt, this date would have been stenciled here as well. To meet the rebuilt criteria, it is necessary to spend more than one-half the tank car's replacement cost on repairs. This spending criteria discourages many rebuilding plans.

  BU LT 8-79



Tank cars have a limited service life and must be taken out of service at the end of their service life. The service life of tank cars is as follows:

- Tank cars built on or after 7/ 1/74 are limited to (50) fifty years of service. The tank cars must be taken out of service on December 31st of their 50th year.
- Tank cars built prior to 7/1/74 are limited to (40) forty years of service. The tank cars must be taken out of service on December 31st of their 40th year.

Tank cars in chlorine service are the exception to this service life specification. They must be taken out of service on the last day of the month in which they were built after forty or fifty years of service, depending upon the year they were built.

Tank cars past their inspection date or out of service life cannot be loaded and can only be shipped as per conditions set forth by the AA R. Tank cars which are already loaded must be offloaded. For further information check with your Corporate Logistics Department.

Lining

This stencil must be applied to tank cars equipped with the following: exterior thermal coatings, interior protective coatings, or coatings made of rubber, polyvinyl chloride, or polyurethane elastomeric. This stencil must be in lettering at least 2" high and include:

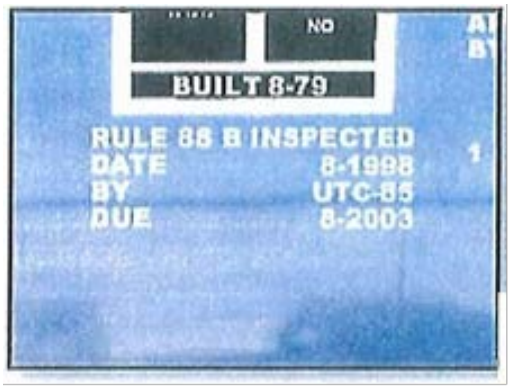
- Kind of coating or lining (name)
- Date (Month and Year) of application"
- By (Who applied it)

As shown here, AIDX 2000 has Plasite lining. The stencil includes:

- PLASITE 3070 LINING
- APPLIED 6-1998
- BY UTC - 85

Rule 88.B2 Stencil

When tank cars have been inspected in compliance with AAR Field Manual Rule 88 B.2, they must be stenciled accordingly. The stencil should have letters at least 1" high and be applied on both sides of the tank car near the consolidated stencil. This inspection must be completed every ten years.



The first inspection(s) are due by June 1,2002 if not inspected for other reasons set forth in this rule (i.e., undergoing stub sill inspection in accordance with FRA emergency order 17). AIDX is properly stenciled:

- RULE 88 BINSPECTED
- DATE 8-1998
- BY UTC - 85
- DUE 8- 2003

PM Stencil

If a PM (Preventive Maintenance) stencil is present, the stencil will indicate what location/shop performed the PM and the date it was completed.

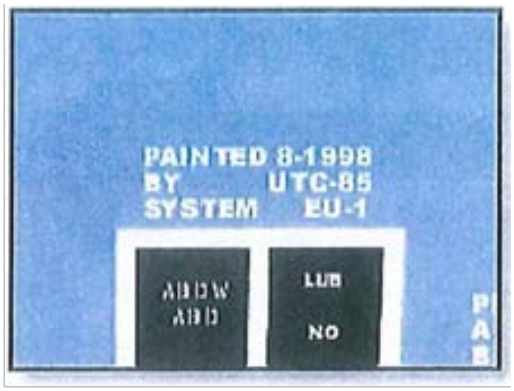
- PM 10-99
- RESCAR 110

Paint Stencil

You may also find a Paint Stencil. This stencil indicates what location performed the painting and stenciling, and the date it was completed. It also includes the paint system used on the tank car. System EU-1was used on this tank car.

- Painted 8-1998
- By UTC- 85
- SYSTEM EU - 1

The PM and Paint Stencil do not have to be on the tank car but most companies do so for auditing purposes.



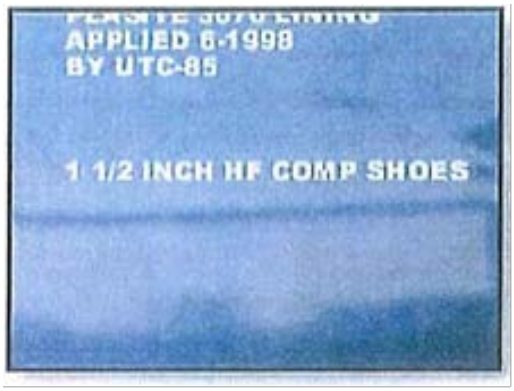
Brake Shoe Stencil

Tank cars using high friction composition brake shoes must be stenciled on all four corners of the tank car with the type and size of the brake shoe. This tank car has 1-1/2" high friction composite brake shoes as indicated by the stencil "1-1/2 INCH HF COMP SHOES".

- 1-1/2 INCH HF COMP SHOES

This stencil is located on the tank near the consolidated stencil.

This stencil is sometimes also found on end sill just above the grab iron.



Chemtrec Decal and Canutec Decal

CHEMTREC: The Chemical Transportation Emergency Center provides a 24-hour telephone hotline for chemical emergencies.

For Product Emergency

Spill, Leak, Fire, Exposure, Accident

Call Chemtrec - Day or Night

800-424-9300

The Chemtrec decal has black letters on a yellow background. This decal is not required, but most companies apply it and use Chemtrec for their 24-hour emergency number. A 24-hour emergency number specific to your company can also be used in place of Chemtrec.

Example:

For Product Emergency

Spill, Leak, Fire, Exposure, Accident

Call World Wide Solutions - Day or Night

800-000-000

Canadian chemical companies have organized a group similar to the US Chemtrec. Transport Canada, located In Ottawa, Ontario operates the Canutec Emergency System.

Canadian regulations generally mirror the US regulations. When dealing with a transportation incident involving a tank car from Canada, some of the terminology is different. For example, the Canadian term "dangerous goods" is synonymous with "hazardous materials" as used in the United States.

Tank cars operated out of Canada do not require a 24-hour emergency number to be stenciled on tank cars. Most of the major chemical producers however, have opted to use the Canutec decal and service. Their emergency number is 613-996-6666. The Canutec decal also lists the Chemtrec phone number.

Water Capacity Stencil

The water capacity must be stenciled within four feet to either side of the tank ladder.

If the tank car does not have a tank ladder to measure from, the dome area is used. The stencil must be within four feet to either side of the dome and approximately one third down from the top portion of the tank car. Water capacity must be in pounds and kilograms.

The water capacity of is

- WATER CAPY
- 256071 LBS
- 116396 KG

Plate C - Limited Interchange Service

The Plate C stencil must be legible. This stencil plays an important role in ensuring that your tank car is delivered safely.

In order for a tank car to travel in unrestricted interchange service throughout the majority of North America, it must conform to certain size specifications. These size specifications are necessary to ensure that the tank car will be able to proceed unrestricted along greater than 95% of the total mileage of track.

If a tank car bears a Plate C, then the tank car is unrestricted on all railroads except for twenty-two routes. Your routing group has Information on restricted routes and uses it to route all of your rolling stock.

The maximum height for a plate C rail car is 15 feet 6 inches and the maximum width is 10 feet 8 inches. The Plate B, E and F stencil indicates the rail car conforms to the following size limitations:

- Plate B indicates that the tank car is 15 feet 1inches high by 10 feet 8 inches wide.
- Plate E indicates that the tank car is 15 feet 9 inches high by 10 feet 8 inches wide.
- Plate F indicates that the tank car is 17 feet 0 inches high by 10 feet 8 inches wide.

Initials and Number, Load Limit, Light Weight, Brake Shoe Stencil

When tank cars are built, they are given initials and number. This number must appear in the correct locations on the tank car. This number is kept in the Train & Umler Data Specifications file.

Check for clarity and condition of all stenciling. Each tank car is required to be marked per AAR.

Load Limit and Light Weight

The Load Limit and Light Weight for this tank car are:

The Load Limit and Light Weight for our tank car are:

LD LMT - Load Limit is the maximum weight of lading that can be loaded in a tank car.

- LD LMT
- 196500 LB
- 89 150 KG

LT WT - Light Weight is the total weight of an empty tank car, including the trucks and all appliances, rounded to the nearest hundred pounds. A tank car's weight is determined by a certified scale.

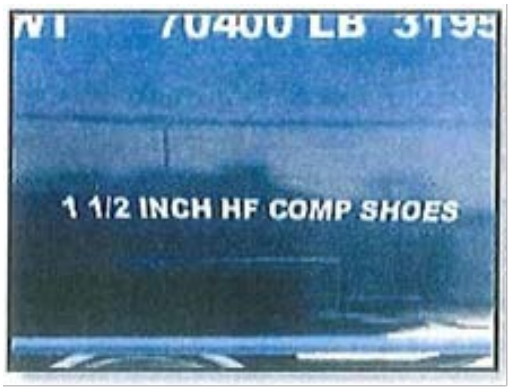
- LT WT
- 66500 LB
- 30 150 KG

Total weight on rail is determined by adding the LD LMT and LT WT together. The combined weight must not exceed the axle capacity limit (i.e., 6- 1/2" by 12" axles are rated for 263,000 pounds).

* LD LMT - When a Star (*) is next to the LD LMT, the load limit is less than the original capacity. The star must be applied immediately to the left of the LD LMT. This fixed Load Limit must only be altered by the owner of the tank car.

Brake Shoe Stencil

Tank cars using high friction composition brake shoes must have a brake shoes stencil on all four corners of the tank car. This stencil must indicate the type and size of the brake shoe. This tank car has 1-1/2" high friction composite brake shoes as indicated by the stencil "1-1/2 INCH HF COMP SHOES".

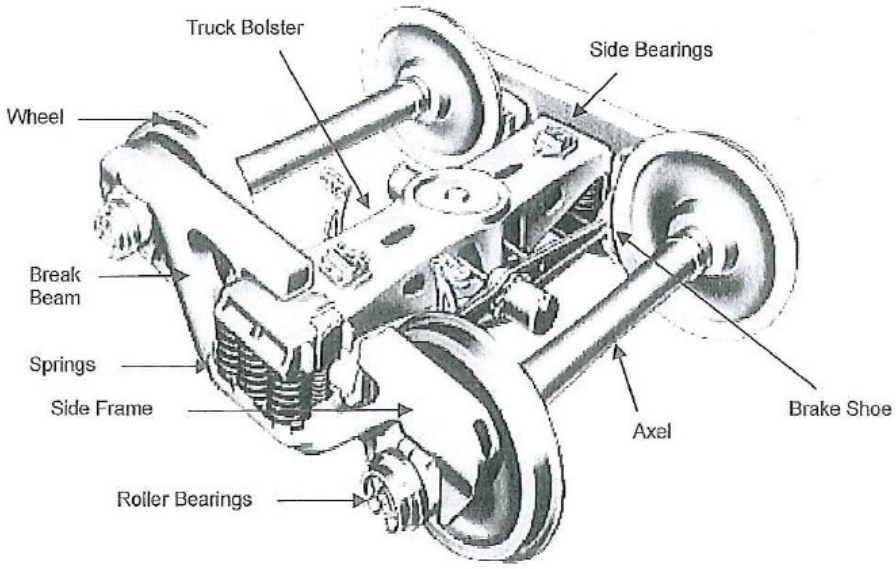


Running Gear or Trucks

Tank car trucks come in a variety of types and sizes, but are virtually the same and can be used under any type of railcar of similar design, size and weight. Truck assemblies must meet rail gauge requirements, width and centerline restrictions, and accept standard wheel sets, brake beams and other associated standard size components. The purpose of the trucks, regardless of type, size or manufacturer is to support the tank mounted above them and guide that load down the track to and from its shipping point and destination. To inspect these groupings, you may either click on a component grouping or its picture.

To inspect the truck component groupings shown here, you may either click on a component grouping or its picture.

- Wheels & Axles
- Roller Bearings
- Brake Beams
- Brake Shoes
- Side Frame
- Springs
- Truck Bolster
- Side Bearings



The size of the truck axles determines the amount of weight that can be carried by it. For instance, 6-1/2" by 12" axles can carry a 100-ton load.

Most truck components simply interlock together without fasteners. Interlocking components move continually and as a result wear down. To minimize wear on large components wear plates are used. A large part of the inspection process involving truck components is to monitor wear and replace wear plates as necessary before costly damage to a major component takes place.

The truck's components that control movement are usually checked first to ensure their presence and then their effectiveness. The components that control the bolster movement from "A" and "B" ends within the side frame are friction blocks and friction block springs. The up, down, and side to side motion is controlled by the large springs under the bolster. There are also casting devices on the bolster and side frame such as rotation stops and gibs that also limit unwanted truck movement.

Tank Car (top platform) Valve Configurations

Photo illustrates the valve configuration of a general service tank car.

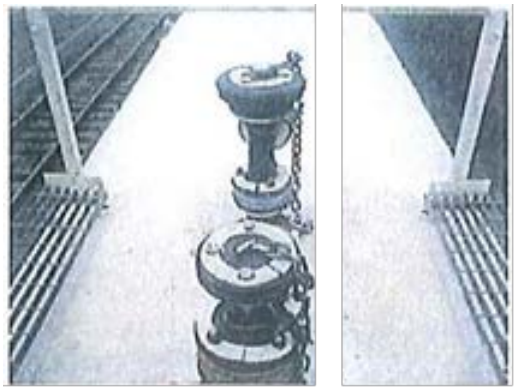


Photo is the valve configuration of an HFS acid tank car.

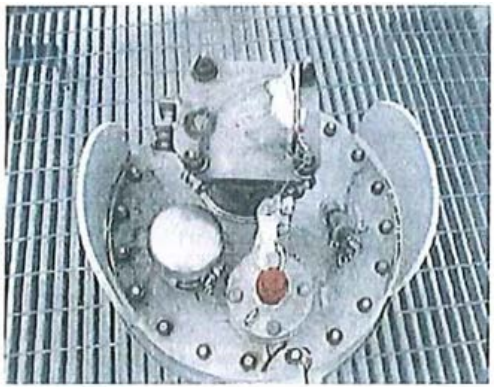


Photo is the valve configuration of an H2SOF acid tank car.

Photo is the valve configuration of an HCL acid tank car.

Tank car equipped with a bottom outlet valve.

Tank car equipped with a bottom wash out.

Tank car equipped with a bottom sump.

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ADMINISTRATIVE PROCEDURE
Tank Car Outbound Inspection

PURPOSE: This procedure outlines and defines the necessary steps needed to safely conduct an outbound tank car inspection in accordance with applicable 49 CFR § 173.31 (d) and Association of American Railroads (AAR) standards and/or rules.

SCOPE: This procedure applies to all Vancouver Energy terminals that prepare outbound tank cars for transportation.

RESPONSIBILITY: The Operations Manager shall ensure that this procedure is followed by their respective Operating Personnel (i.e., Operators, Lead Operator, Ops Supervisor, etc.) who are responsible for inspecting outbound tank cars, and that those employees are trained and provided with the necessary personnel protective equipment (PPE) and tools to execute this procedure.

TANK CAR OUTBOUND INSPECTION

***NOTE:* Terminal personnel are required to conduct an outbound rail car inspection prior to placing the specific rail car (e.g., empty and/or loaded) onto their respective switch list; corresponding documentation is required to be completed and retained for a period of three years.**

1.1 The Coordinator/CSR provides Operating Personnel a tentative listing of departing tank cars (e.g., empty and/or loaded) that require an outbound inspection.

1.2 Operating Personnel obtains a blank outbound tank car inspection form for each of the aforementioned rail cars. Ops Personnel begins to complete the general information section of the form (e.g., date, terminal, rail car number, shipper, product & grade).

1.3 Operating Personnel (e.g., Operator, Lead Operator) obtains & dons the appropriate PPE based on the associated product hazards; refer to minimum product specific PPE listing.

1.4 Operating Personnel obtains the necessary tools (e.g., pipe wrench, rail car chocks) and ascertains the Service Vehicle. Upon completion, Ops Personnel proceeds to the location of the first tank car which is designated on the outbound list.

1.5 Operating Personnel ensures that the siding is protected by a bi-directional derail and/or a switch lock and the blue flag which reads "Stop- Tank Car Connected" or "Stop- Men at Work" is in the raised position.

1.6 Operating Personnel sets the tank car's handbrake by turning the wheel in a clockwise motion; the handbrake is fully applied when you can no longer turn it. The handbrake is located on the rail car's B- end.

1.7 Operating Personnel utilizes the rail car chocks by placing each individual chock around one of the tank car's wheels, thus restricting any incidental movement.

1.8 Operating Personnel utilize 3-point contact while ascending the tank car's ladder. Once on top of the tank car's platform, Ops Personnel verifies that all previously applied product fitting(s) have been removed from the rail car's product outlet.

***NOTE:* If product fitting(s) are still attached to the tank car's product outlet, Operating Personnel utilizes an adjustable wrench to remove these items. Prior to removal, it is essential to ensure that both the primary product valve (e.g., tank car component) and the secondary valve (e.g., product fitting component) are placed in the closed position.**

1.9 Operating Personnel re-applies the cap and/or plug to the tank car's product outlet and utilizes an adjustable wrench to properly torque the closure into place.

1.10 Operating Personnel ensures that the tank car's internal pressure has been properly vented. Ops Personnel slowly opens the rail car's air intake valve and listens for air escaping (e.g., hissing sound); if no sound is detected, the pressure has been previously bled off.

CAUTION: Do not stand directly over the valve when opening. The tank car's internal pressure could possibly force some residual product up the air induction pipe and strike you.

1.11 Operating Personnel verifies that all previously applied air fitting(s) have been removed from the tank car's air induction pipe.

NOTE: **If air fitting(s) are still attached to the tank car's air induction pipe, Operating Personnel utilizes an adjustable wrench to remove these items.**

1.12 Operating Personnel re-applies the cap and/or plug onto the tank car's air induction pipe and utilizes an adjustable wrench to properly torque the closure into place.

1.13 If the specific tank car's closures (e.g., air intake outlet & product outlet) have been fabricated with flanged assemblies, Operating Personnel ensures that the appropriate blind flanges have been applied to the housing and all corresponding lug nuts are wrench tight.

1.14 If the specific tank car is equipped with a hinged stuffing box and/or valve assembly bonnet, Operating Personnel ensures that it is placed in the closed position and properly pinned in place.

1.15 If the tank car is equipped with a manway cover/fill hole, Operating Personnel ensures to open the closure and conduct a thorough inspection of the gasket.

NOTE: **If the manway/fill hole gasket is in poor condition (e.g., frayed, deteriorated, missing sections, etc.), it is required to be replaced under the guidance of the respective shipper.**

1.16 If the gasket has been inspected and deemed to be in good repair, Operating Personnel closes the cover on the rail car's manway/fill hole. Upon completion, Ops Personnel engages all bolts around the manway/fill hole's housing & torques the lug nuts into place while utilizing a 24" crescent wrench.

NOTE: **Manway covers which are configured with six or eight bolts and accompanying lug nuts, it is a requirement to apply proper torque via 24" crescent wrench and tighten the lug nuts in a crisscross pattern, thus ensuring to maintain a level even seal.**

1.17 Operating Personnel conduct a thorough inspection of the tank car's pressure relief devise (e.g., safety valve assembly, rupture disk assembly), ensuring that it operates efficiency and is in good repair.

NOTE: **If the specific tank car is equipped with a rupture disk assembly, Ops Personnel are required to open the cover, ensure that the appropriate size rupture disk is present and intact (e.g., not broken/burst). Upon completion, Ops Personnel close the rupture disk assembly cover and pin it into place. In addition, Ops Personnel are required to ensure that the four lug nuts on the outer housing of the rupture disk assembly are wrench tight.**

1.18 Per customer request, Operating Personnel may be required to apply a numerical product security seal and corresponding product tags to certain areas of the tank car (e.g., stuffing box/valve assembly bonnet, manway safety bolt, etc.); for further information refer to the respective Shipper's Service Delivery Specification Sheet (SDSS) and/or Customer Service Profile.

1.19 Operating Personnel utilizes 3 point contact while descending the tank car's ladder.

1.20 If the tank car is equipped with a bottom operated outlet, Operating Personnel verifies that all previously applied product fitting(s) have been removed.

***NOTE:* If product fitting(s) are still attached to the tank car's bottom outlet, Operating Personnel utilizes an adjustable wrench to remove these items. Prior to removal, it is essential to ensure that rail car's bottom operated *valve* handle is placed in the closed position. If a pin-lock and or cable seal was utilized to secure the *valve* handle it is prudent to *remove* these items and replace them with the seal pin.**

1.21 Operating Personnel ensures that both the outlet cap and accompanying pipe plug have been applied to the tank car's bottom outlet and is in fact wrench tight; it is prudent to utilize a 36 inch pipe to ensure that proper torque has been applied to this closure.

1.22 If the tank car was fabricated with a flanged type bottom operated outlet, Operating Personnel ensures that the blind flange has been replaced with accompanying lug nuts applied wrench tight; it is prudent to utilize the appropriate size adjustable wrench when tightening this closure.

1.23 If the tank car is fabricated with either a bottom washout or sump, Operating Personnel ensures that those aforementioned closures and corresponding lug nuts are wrench tight.

1.24 If the tank car contains a hazardous material, Operating Personnel ensures that the appropriate placards are displayed in the four affixed brackets (e.g., A-End, B-End, A-Right, B-Left); for further information, refer to 49 CFR § 172.516, 172.519.

1.25 Operating Personnel walks around the four sides of the tank car ensuring that no visual evidence of leakage is present and/or detected. If leakage is present and/or detected, this issue is to be immediately reported to the respective Operations Manager or designee. The Operations Manager or designee shall investigate the incident and take the appropriate precautionary measures (e.g., communicate the issue to the respective shipper soliciting their guidance, contact the local repair shop/crew & contain the spill).

1.26 Operating Personnel ensure to *remove* all miscellaneous articles (e.g., hand tools, transfer equipment, fittings, pin-locks, PPE, etc.) from the tank car and stores these items in the designated area.

1.27 Operating Personnel removes each of the previously placed rail car wheel chocks out from underneath the tank car's wheel; upon completion, Ops Personnel releases the rail car's handbrake.

1.28 Operating Personnel ensures that the outbound rail car inspection form has been completed; noting any deficiencies, or other miscellaneous comments/actions. Upon completion, the inspecting party is required to print sign the form.

***NOTE:* If any item on the outbound rail car inspection form was deemed to be not in compliance, the issue is to be immediately reported to the respective Operations Manager or designee. The Operations Manager shall in turn communicate the issue to the respective shipper and solicit their guidance till conclusion. Under no circumstances is a rail car permitted to depart the facility without being deemed fit for transportation.**

1.29 Operating Personnel are required to return all completed outbound rail car inspection forms to the Coordinator/CSR.

END OF THIS PROCEDURE

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BASELINE PROCEDURES
Rail Operations
02 Working around Tracks

PURPOSE: This procedure outlines and defines the basic necessary steps to safely work around tracks.

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: You must obtain authorization prior to walking in or around a rail yard.

Distance

1.1. When possible maintain 4 feet from the outside of the rail using your arm length from the rail as a guide.

1.2. Keep a safe distance from passing rail movements. Do not stand by a switch or switch stand if possible. Stand in the clear in the event of dragging lading, equipment or a derailment.

Hazards

2.1 Avoid stepping on rail structure as they may be slippery.

2.2 Avoid stepping on ties as they may be slippery from residue and creosol.

Walking on or About Tracks

3.1 Walk clear of the rail staying off head-block ties and looking in the direction of movement. Only walk in the gauge when duties require and only for the shortest amount of time necessary to complete the required work. If at all possible remain in the clear of all tracks unless protected.

3.2 Look in both directions for approaching rail equipment when preparing to foul tracks. Foul tracks only when necessary for the purposes of assigned duty.

3.3 Walk straight across the tracks to avoid crossing on a diagonal thus reducing your time in the gauge.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely work around rail equipment

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: Ensure equipment is secured as per Red Zone if power is attached. Ensure, you have the authorization to be around equipment. Follow Working Around Tracks Procedure 01.

Distance

1.1 Employees shall not cross in front of moving equipment unless it is clearly determined there is sufficient distance (not less than 150 ft. or three rail cars) is available and the speed is less than 5 mph. Employees shall not cross behind moving equipment (moving away) at a distance less than 25 ft.

1.2 Crossing over, under or between railcars and equipment is prohibited unless in performance of duties and only when the proper protection is provided. When required to do so, use the proper running boards and hand-holds. Follow Crossing over Procedure 04.

1.3 When crossing between rail cars or equipment, a distance of 50 ft. or greater must be available unless under Blue Signal protection and only when such equipment is chocked. When crossing behind or around standing equipment, a distance of no less than 25ft. must be maintained.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely operate rail switches

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary persona l protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: Ensure consist is at a safe distance from switch to be operated. Ensure you have authorization to operate switch.

Warning: Always inspect for (rhyme) Tags, Locks, Spikes and Blocks prior to operating a switch for the first time each shift.

Operating switches

Switch Inspection

1.1. After ensuring authorization and direction of move, approach the switch stand.

1.2. Visually identify if there are any Tags, Locks, Spikes, Blocks or warning devices. If none are found go to the next step. If any are found do not operate the switch.

1.3. Verify that no debris or blocks would impair movement from switch point to heel block and around number 1 and 2 connecting rods.

Debris Removal

2.1 To remove debris from between switch points and stock rail never use your hand, use a broom, scraper, brake shoe key, stick or other suitable device.

Operating switch

Warning: Employees must not exert force beyond their normal physical capabilities in order to line a switch, which is difficult to operate. They must obtain assistance to complete task and notify supervisor of problem.

3.1 Look in both directions to ensure that no moving equipment is approaching on adjacent tracks prior to operating a switch or derail.

3.2 Ensure that your body position, while operating the switch, does not place you between rail traffic and the switch stand or within the travel area of the switch lever.

3.3 Ensure that you are facing the switch stand and your body is well braced with both feet firmly planted on the ground or on the switch ties before operating switch

3.4 For operating a ball type switch or derail, bend your knees and use your leg muscles to steadily lift lever while keeping your feet clear of ball.

3.5 For operating high stand switch or derail, take a firm grip with both hands near the end of the operating lever and exert a steady pull. Avoid jerking, pushing or kicking to try and move or seat the switch lever.

3.6 If the switch is equipped with a latch or lock, replace latch or lock.

Reporting

Warning: Gap between switch point and stock rail must not exceed 1/8".

4.1 Ensure that the switch is properly lined for the route to be used.

4.2 Ensure that the switch points fit tightly to the stock rail.

4.3 Stand clear of switch area allowing proper distance for rail and switch movement.

4.4 Report to movement controller, the switch is lined for route to be used.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely Cross over Rail Cars

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: Ensure that you have the authorization to cross over. Ensure you have protection refer to Protection Procedure 05

Hazards

1.1 Ensure authorization and protection

1.2 Never step between the coupler horn and striker casting or on the striker casting.

1.3 Only cross over rail cars equipped with a cross over platform.

1.4 Verify that no bad order tags will interfere with your crossing over.

Crossing over

Warning: Ensure you have proper protection if needed as per Protection Procedure 05

2.1 After properly mounting as described in Mount and Dismount Procedure 06, maintain 4 points of contact
- a. Place the closest hand to the inside car on the end ladder rung
- b. Or the closest foot to the inside car on the ladder rung to the far inside thus not allowing your foot to slide on the rung

2.2 Follow with opposite of step 2.1

2.3 Move only a foot or a hand to next spot to cross over using cross over platform or grab iron.

2.4 Continue with same moves as 2.4 until you've reached the end of the platform.

2.5 Visually check by looking both ways around the end of railcar for obstacles and moving equipment.

2.6 Place the closest hand to the outside of the car on the side ladder rung or the closest foot to the outside ladder rung. Place hand or foot far enough to allow safe 4 point movement.

2.7 Follow opposite of step 2.7 until you are fully secured to the side ladder.

2.8 Follow Mount and Dismount Procedure 06

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely Protect People Property and Equipment.

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Blue Flag
	Hard Toe Safety Boots (ASTM Certified)			Red Flag
	Safety Glasses (ANSI Z87.1 Certified)			Portable Derail
	Gloves			Head Lamp
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: Ensure consist is at a safe distance from protection to be provided. Ensure that you have the authorization to apply flags or derails.

Blue Flag Protection: *To protect men who are working on, under or around rolling equipment.* Use *one of the following methods of protection or a combination of these methods must be provided:*

1.1 Each manually operated switch that provides direct access must be lined against movement into the track and secured by an effective locking device. A blue signal must be placed at or near each switch.

1.2 A derail capable of restricting access to the track where work will occur must be locked in the derailing position with an effective locking device and positioned at least 50 feet from the rolling equipment to be protected.

1.3 Communicate to appropriate personnel that protection is in place.

Removal* of *Blue Flag

2.1 Blue signals may only be removed by the craft or group who placed them.

2.2 When blue flag signal protection has been removed from one entrance of a double ended track or from either end of rolling equipment, that track is no longer under blue signal protection.

Switch as Protection

3.1 You are only protected by locking a switch, when it is a facing point movement.

3.2 Operate the switch to allow traffic to be diverted from the protected area.

3.3 Lock out the switch with an effective locking device.

3.4 Notify the appropriate personnel that the switch is locked out.

Red Flag

Warning: Red Flags are for track maintenance and safety personnel only.

4.1 Flags or lights are to be displayed only on the tracks that will be affected. However, when red flags or red lights are used for protection without a flagman these flags must be placed to protect all possible access to the restricted area

4.2 Flags must be displayed to the right of the track as viewed from an approaching movement, except red flags or red lights may be displayed between the rails of the track affected.

4.3 When flags are displayed beyond the first rail of an adjacent track, the flags will not apply to the track on which the movement is moving.

4.4 Always notify the appropriate personnel of protection

WARNING: Removal may only be performed by the same class worker that applied the Red Flag.

Red Zone Protection Applied

5.1 The employee in charge will request Red Zone protection for all in need from the Locomotive Operator.

5.2 The Engineer will perform the following
a. Apply 10lbs automatic brake with full independent brake
b. Center the reverser
c. Open the generator field switch (down)
d. Notify the employee in charge

5.3 Then the worker(s) must verify Red Zone by listening for air brakes applying and visually verifying the brake piston is out before entering the Red Zone area.

Red Zone Protection Removed

6.1 The employee in charge will clear Red Zone protection for all those who were protected.

Note: Red Zone Protection is not to be removed until all personnel are in the clear.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely Mount or Dismount tanker type cars

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: Ensure movement is completely stopped.

Inspection

1.1 Verify all safety appliances are in good repair

1.2 Ensure there are no bad order tags that would be of concern for mounting.

1.3 Look at the area at the base of the ladder for feet placement.

Mounting

2.1 First ensure a solid grasp of handrails and/or grab irons with both hands.

2.2 With feet firmly planted and body facing the equipment, pull with arms and with the foot that is closest to the grab iron, place it on the corner of bottom stirrup closest to the grab iron, while the other foot stays planted on the ground.

2.3 Place the other foot in the opposite corner of the stirrup without moving your hands or the opposite foot.

2.4 Continue on to cross over platform by moving only one hand or one foot at a time.

Warning: Ensure movement is completely stopped before moving again

Inspection

3.1 Observe area at base of ladder looking for debris, holes or other hazards

Dismounting

4.1 Ensure your body is facing the equipment as you dismount onto the ground.

4.2 Climb down to the stirrup moving only one of following at a time: hand or foot. Move the foot closet to the grab iron first.

4.3 From the stirrup look down for foot placement

4.4 Move the foot on the opposite side of the grab iron; step down to contact ground, while keeping both hands and opposite foot in solid contact with grab irons.

4.5 Bring down other foot

4.6 When both feet are firmly on the ground, and then release handholds.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely Ride Rail Cars

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties. Riding rail cars should only occur for rail switching operations, such as to provide visual point protection. Note that rail cars should not be ridden for other purposes, such as during normal rail operations on the loop tracks to index cars through the unloading stations.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Riding Cars

Warning: Be aware that slack action and the use or brakes has a tendency to jerk the cars. Maintain a firm hand hold at all times. Always expect movement in any direction at any time. Maintain 4-point contact 100% of the time.

Hopper Type Rail Car

1.1 After following the Mounting Procedure 06

1.2 Ride only the leading car in a yard movement or the trailing car in a cut of cars.

1.3 Maintaining 4 point contact, with your body facing the equipment on the side ladder.

1.4 Looking in the direction of travel

Tanker Type Rail Car

2.1 After following the mounting procedure 06 B.

2.2 Ride only the leading car in a yard movement or the trailing car in a cut of cars.

2.3 Maintaining 4 point contact, with your body facing the equipment.

2.4 Stand on the crossover platform with toes pointed in toward s the rail car and heels at the edge of the platform.

2.5 Looking in the direction of travel.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely apply and release hand brakes

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: Ensure rail cars are secured. Ensure the operator has set train brakes thus allowing the brakeman to turn the hand brake wheel until the chains slack has been taken up eliminating the need to put the hand brake on with excessive force.

Applying Hand Brake

1.1 Ask for and receive Red Zone Protection as directed in the Protection Procedure 05.

1.2 Mount rail car as described in Mount and Dismount Procedures 06 or 068.

1.3 Position yourself on the left side of the handbrake as described in Cross Over Procedure 04.

1.4 You may place your right foot on the edge of the brake platform securing it against your heel, maintaining good balance.

1.5 Visual check of hand brake components, including brake wheel, lever, pawl, ratchet and chain.

1.6 Place release lever in "on" position.

1.7 With right hand begin applying hand brake by rotating wheel in clockwise motion. Always keep hand on the outside of the wheel rim while applying. (By not holding onto the spokes you will not apply too much pressure on your spine.)

1.8 If sufficient force cannot be applied by using the wheel rim additional brakes and/or wheel chocks may be necessary.

1.9 Follow Cross Over Procedure 04 and Dismount Procedures 06/068.

1.10 Clear Red Zone when appropriate.

Release* of *Handbrake

Warning: If hand brakes have been applied so tight assistance may is required to release them. The application of the automatic brake may be required to loosen the tension on the brake rigging.

Warning: While releasing the handbrake, ensure hands and body are clear of brake wheel and feet are clear of the chain, as it may release with great force under tension.

Warning: When the engine is coupled to railcars standing on a grade, do not release the hand brakes until the air brake system is fully charged.

2.1 Start with 1.1 to 1.3 of applying hand brake procedure

2.2 Move release lever to "off" position (if needed) with enough force to disengage the hand brake locking feature or turn the wheel counterclockwise using your right hand.

2.3 Follow Cross Over Procedure 04 and Dismount Procedures 06/068.

2.4 When appropriate clear Red Zone.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely couple air hoses.

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: Be aware of slack action. Cars may move 3 inches or more per car. Proper train brake will help alleviate slack action.

Warning: Be aware of pinch point areas while coupling the air hoses.

Coupling Hoses

1.1 Ask for and receive Red Zone protection as per Protection Procedure 05.

1.2 Place one foot between the rails while leaving the other foot outside, with your body angled.

1.3 Right hand grasps the glad hand of the nearest air hose, while the left hand grasps the glad hand of the air hose farthest away.

1.4 Kink the air hose in your right hand while bringing it up to a 90-degree angle.

1.5 Bring the glad hand of the air hose in your left hand up to meet the other glad hand, then let both glad hands slide into place to engage coupling.

1.6 Clear Red Zone when appropriate.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely Adjust Knuckles.

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: Employees must not adjust coupler or components with feet. Ensure that feet are kept clear of the knuckle in case it falls. When opening a knuckle both feet must be outside the nearest rail to prevent injury.

Warning: Before coupling is made, the couplers must be checked to ensure they are properly lined up. Whenever possible, cars should be left on straight track for coupling. If not possible, extreme caution must be used when coupling.

Coupler/Drawbar Adjustment

Protection

1.1 Before making adjustments to a coupler/drawbar, separate equipment by at least 50 feet and secure the equipment using Red Zone Protection as prescribed in Protection Procedure 05

Adjustment of Coupler/Drawbar

2.1 Enter the gauge placing both feet firmly on the ground toes up against the inside base of the rail.

2.2 With both hands firmly gripping the underside of the coupler, using the legs, lift the coupler applying pressure with the lower back against the coupler to move it over.

2.3 Clear Red Zone Protection when appropriate.

End of this procedure

PURPOSE: This procedure outlines and defines the basic necessary steps to safely Open angle cock.

SCOPE: Vancouver Energy is engaged in rail switching. Vancouver Energy is a safety-oriented organization, committed to the responsible discharge of its duties.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when switching cars and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat (ANSI Z89.1 Certified)		Miscellaneous Safety Equipment	Head Lamp
	Hard Toe Safety Boots (ASTM Certified)			
	Safety Glasses (ANSI Z87.1 Certified)			
	Gloves			
	Reflective Vests (ANSI class 2 or 3 hiviz requirements)			

Tools & Transfer Equipment	Trainman Lantern or Flashlight		Environmental Equipment	
	Radio w/Holder			

Warning: You must ask for Red Zone Protection as per Protection Procedure 05.

Warning: It only takes 1 to 1-1/2 pounds of air brake pressure change to cause an automatic release of the brakes, that will be the first thing that happens to the cars when the angle cock is opened. Expect sudden movement.

Opening Angle Cock

1.1 Place one foot inside the gauge with your leg against train line hose and place other leg outside the gauge. (This will stop the train line hose from whipping freely)

1.2 Notify the locomotive operator before you cut in the air (open the angle cock).

1.3 Do not open angle cock too fast as this will put the air brake system into emergency.

1.4 Gently tap angle cock handle while holding handle with other hand. This will help alleviate opening too fast.

1.5 Clear Red Zone

End of this procedure

SITE SPECIFIC RULES
Hot Work Permit

PURPOSE: The purpose of this procedure is to establish a standard to achieve safe work conditions and protect employees and property by preventing explosions and fires during Hot Work.

SCOPE: This procedure includes various activities that could provide a source of ignition and/or cause a fire or explosions.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment (PPE)			Miscellaneous Safety Equipment	
	Hard Hat (ANSI Z89.1 Certified			Bi-directional Derail (Engaged & Locked-out)
	Vancouver Energy Approved Uniform			Blue Flag w/Blue Light (Raised & Light Illuminated)
	Safety Toed Boots (ASNI Z41.1 Certified)			Rail Car Handbrake (Set & Restricting Movement)
	Hearing Protection			Rail Car Wheel Chocks (In Place & Restricting Movement)
	Safety Vest (ANSI class 2 or 3 hiviz standards)			
	Safety Glasses			

Tools & Equipment for Day Shift			Tools & Equipment for Night Shift	
	Radio			Radio
	Gloves			Gloves
				Lantern

REQUIREMENT

1.1 Hot Work permits are required in all areas of the facility when performing work such as:

- Using electric or portable welding machines
- Using a cutting torch, with cutting head, heating tips, or gas welding tips attached
- Using a grinder that may produce sparks
- Using tools such as chisels, punches, hammers, saws that could create a spark.
- Equipment or Use of power tools, or other tools that use motors with brushes, slip rings (i.e. drills, saws), in areas referenced in 2.8.
- Sandblasting
- CAD welding
- Use of hilti gun
- Any other activity that may cause ignition of flammable gases or vapors, wood , paper, dust, rags and any other combustibles

Exceptions:

- Fossil fueled and electric equipment and vehicles in all areas except those listed in 2.8.
- Electric powered equipment and vehicles specifically designed and certified for use in Class I and Class II areas. (Examples: Certified flashlights, radios, forklifts, electric golf carts, electric cranes)

Except in area primarily designed to allow Hot Work (e.g. maintenance shops). If work is being done in shop areas on vessels, heat exchangers. etc., which have been in chemical service, the hot work procedure must be followed with the same precautions that are taken with any other hot work activities.

1.2 Designated how work locations include (no permit required): Area A shop, Area C shop, Machine shop, Electric shop and Instrument shop.

1.3 No Hot Work is to be permitted in areas with the LEL levels above 0%, areas with combustible dust, flammable vapors, or equipment that contains or had contained flammable contents.

(Without special precautions).

1.4 Prohibited conditions: a Hot Work permit will not be issued in an area deemed unsafe or unauthorized. Examples would be in buildings where sprinkling systems are impaired, explosive atmospheres or in areas where there could be a large quantity of readily ignitable materials.

WORK AREA PREPARATION AND TESTING

2.1 Permits must not be issued unless all stored combustible material has been moved at least 35 feet from welding operations or protected with flame-proof curtains, metal guards, or flame-proofed tarpaulins (not ordinary tarpaulins). Wet down combustibles which cannot be moved or completely covered.

2.2 Wood floors, wood railings and wood window sills that are in line of falling hot metal and flying sparks must be wetted down with water.

2.3 Process lines and vessels will be shielded when welding or cutting is to be done in close proximity. This can be done in several ways, including fire blankets, sheet metal, removing the line or object to another safer location, or using mild steel plate or angle iron for shielding.

2.4 Sulfuric acid and chlorine lines and vessels may not be welded or cut on unless special precautions are developed and implemented to mitigate hazards. Sulfuric acid gives off hydrogen and chlorine supports combust ion upon being heated. If nuts and bolts cannot be removed by wrenches, they will be hack sawed off or cut with a nut splitter. In addition, hot work performed on or adjacent to rubber-lined piping and tanks also requires precautions to prevent damaging the liner material.

2.5 Chlorinated Poly Vinyl chloride (CPVC) lines, fiberglass lines and rubber-lined vessels must be protected from flames or sparks to prevent damage.

2.6 Hydrogen and other flammable gas lines and systems will be treated as follows:

- Blind from hydrogen source
- Line or system will be opened and vented
- Purge with nitrogen and then purge with air to check LEL
- System check for explosive atmosphere with LEL meter
- Constant monitoring for LEL while job is done

2.7 Atmospheric Testing: the supervisor issuing the permit shall check the work site before work starts using a combustible gas/oxygen meter. Prior to using the combustible gas/oxygen meter, a combustible gas "function check" must be performed daily by the instrument technician to ensure it is functioning properly. If any problem is found the meter must be returned to the Instrument shop for calibration and/or repair.

NOTE: No job should be started if the combustible gas reading is over 0% LEL, or if the oxygen reading is below 20.5% or above 21.5%.

2.8 Hot Work performed in the following areas requires continuous combustible gas/oxygen monitoring:

- Acid Plant
- Hydrogen Handling Areas (including but not limited to the boiler house, hydrogen houses, transfer piping, vents and hydrogen water purges).
- Sulfuric Acid Equipment
- All equipment in the Cell line working zone.
- Fuel oil, Natural Gas, Propane, Hydrogen, Lube Oil, and Gasoline Piping or Equipment

2.9 If hot work is to be performed in a confined space vessel or an area where flammable gases or liquids may be present, the space shall be continuously monitored for combustible gas and oxygen. A remote sensor inside attached to an explosimeter/Oxygen deficiency detector outside shall be used. The fire watch must maintain visual contact of the work being performed to ensure sparks or hot molten metal do not ignite any nearby material.

2.10 When burning on Freon or chlorinated organic piping and equipment, cleaning and purging of lines is necessary and PPE (i.e. Respiratory Protection) is required. Residual material may give off toxic vapors if heated and should be thoroughly removed before beginning work.

2.11 Gas Detector Usage Guidelines: Like any instrument, combustible gas/oxygen detectors are only as helpful as (1) the skill of the person using them allows it to be and (2) the diligence with which it is cared for and taken in for calibration and servicing. Here are some guidelines on how to use them most effectively.

2.11.1 Don't use these instruments to measure combustible gas if the oxygen gauge (or alarm) shows less than 19.5% nor more than 25% oxygen.

2.11.2 All gases and vapors have a range in which they are ignitable. The ranges are represented by percentage of containment by volume of air within the sensing area of the instrument (usually about 20 feet in diameter).

2.11.3 The lowest point at which ignition can occur is known as the Lower Explosive Limit or LEL. For instance, dry hydrogen has an LEL of 4% by volume of air.

2.11.4 The highest point at which ignition can occur is known as the Upper Explosive Limit or UEL. For instance, dry hydrogen ha a UEL of 74%+/- by volume.

2.11.5 The limit used to decide whether to approve a job starting (or keep it from starting) used in the Henderson Plant is 0% LEL combustibles by volume in air.

2.11.6 Recalibration with test gas is required once per month regardless of whether the instrument appears to be in calibration or not. Gas calibration checks shall be recorded on a sticker on the instrument which shows the date of the last calibration and the initials of the person who performed it.

2.11.7 Keep your instrument clean! Clean the face of the oxygen sensor with a soft, damp, clean cloth after each use. But under no circumstances clean the combustible gas sensor. In addition, the gas detector shall be function tested each day with calibration gas by the instrument technician.

2.11.8 If batteries will not recharge, check the condition of the battery charger cord and male plug.

FIRE WATCH

3.1 A properly trained fire watch will be assigned with a fire extinguisher during any cutting or welding operation where a hot work permit is required in the following situations.

- When combustible/flammable materials are within 35 feet.
- When working on or within 35 feet of hydrogen system/lines.
- Whenever working on or within 35 feet of natural gas lines.
- Whenever working on or within 35 feet of sulfuric acid or chlorine system/lines.
- Whenever welding or torch cutting (unless in shop)
- Anytime the permit issuer thinks it is necessary.

3.2 The fire watch shall be dedicated to the Hot Work job in order to view the vicinity of the Hot Work and shall act to prevent and control an inadvertent fire. A fire watch may not be assigned to more than one hot work job at a time. A person may not be performing other duties while being a fire watch.

3.2.1 Fire watches must be stationed on the opposite side of walls where heat may be conducted, or each floor level for Hot Work where floor openings cannot be covered and the potential for fire exists at lower levels.

3.2.2 Fire watches must have operable fire extinguishing equipment at the Hot Work site, and must be trained in the use of such equipment.

3.2.3 Fire watches must have a rapid means of sounding alarms and calling for assistance in the event of uncontrollable fires (e.g. audible alarms, radio communication, other workers within shouting distance, etc.)

3.2.4 Where welding or cutting must be done in the vicinity of combustible material, fire watches shall be maintained for at least one-half hour after completion of cutting or welding operations to detect and extinguish latent fires, then the area must be checked every hour for 4 hours, by the area owner.

3.2.5 The permit issuer will ensure that combustibles within 35 feet (such as cartons, bagged chemicals, etc.) are removed or covered with fire resistant material or properly disposed.

3.2.6 Fire watchers must be present during all hot work and at least observe area, if no combustibles are around for up to 1 hour.

3.2.7 If at any time during the job the combustible gas indicates greater than 0% LEL, the job will be stopped and the Hot Work Permit is voided.

3.2.8 If at any time during the job the oxygen reading drops below 20.5% or goes above 21.5%, the job will be stopped and the Hot Work Permit is voided.

PERMIT ISSUE AND HANDLING

4.1 The area owner will be responsible for completing all items on the Hot Work Permit. This person is also responsible to ensure that each item is checked off as carried out. The supervisor issuing the permit is responsible for checking out the entire job and signing the hot work permit along with the Maintenance supervisor or designee. The permit also needs to be signed by the fire watch and persons performing work.

4.2 Any supervisor can void the permit should it be found that any permit condition is not being met or they consider current job practice(s) to be unsafe.

4.3 The hard copy of all Hot Work Permits shall be posted at the job site. Other copies shall be retained in the control room (if applicable).

4.4 Hot Work Permits expire at the end of the work period listed on the permit. A new permit is necessary at the beginning of each new work period.

4.5 If an unsafe condition occurs in the immediate or surrounding area of work; (e.g. accidental spillage of flammable liquids, site emergency, etc.) the "Hot Work" must be stopped immediately and not restarted until the unsafe condition is corrected and a new permit has been issued.

AFTER THE WORK IS DONE

5.1 The area owner shall inspect the site and equipment worked on to satisfy that it can be safely put back into service and that employees have removed all waste generated by their work . All used fire extinguishers shall be turned into the warehouse. Extinguishers assigned to a specific location shall be exchanged for a new one at the warehouse and replaced in the proper location. Only then will he accept the work as completed.

5.2 The area owner shall sign the bottom of the permit as cancelled.

5.3 Both copies of the completed permit will be forwarded to the Safety Department.

TRAINING

6.1 All plant employees who enter process areas must be aware of the Hot Work permit Procedure and will be trained to this awareness level.

6.2 Employees who may perform or supervise hot work will be trained to complete a Hot Work Permit.

6.3 Supervisors and their designees, who approve Hot Work Permits, will be trained in the procedure, permit, and other significant aspects of hot work activities.

6.4 Refresher training will be performed annually.

End of this procedure

PURPOSE:
This procedure outlines general information on methods of air testing for Hydrogen Sulfide (H2S).

SCOPE: This procedure is to be followed by terminal employees when working in area with possible Hydrogen Sulfide exposure.

RESPONSIBILITY: The respective Operations Manager & Maintenance Manager shall ensure that this procedure is followed by qualified terminal personnel working in areas where exposure to Hydrogen Sulfide is possible and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task. This procedure is to be reviewed on an annual basis.

The below listings are the specific items required to successfully accomplish this task.

FIXED AREA H2S MONITORS

1.1 Fixed area monitors are usually located in transfer areas of high H2S where hydrogen sulfide releases are most likely to occur.

1.2 Fixed monitors may also be installed in air intakes for buildings located downwind from possible H2S release points.

1.3 The function of air intake H2S monitors includes shut-off of air intakes on air conditioning units when predetermined concentrations are detected. Typically 10 ppm is selected.

1.4 Visual and/or audible alarms may be located in the area where detectors are located and/or in a remote location such as the control room.

1.5 When determining where to place fixed detectors the follow factors can be considered:
- Probable H2S emission points nearest employee breathing zones.
- Natural ventilation or lack thereof
- Operational history.
- H2S reported incidents
- Amount of H2S in the process
- Phase of H2S rich product in the liquid)
- Temperature of H2S rich product in process
- Routine work duties of employees assigned to the area
- Potential for generating downwind exposures
- Intakes that could introduce H2S into occupied buildings.

1.6 Fixed alarms are typically configured to provide remote read outs and alarms on consoles and/or in the control room. Area alarms may also be provided.

FIXED AREA H2S MONITOR CALIBRATION

2.1 Fixed detector sensors require calibration at least quarterly (more often if recommended by manufacturer). Monthly calibration is frequently required.

2.2 The function of the panel alarm in remote locations (i.e., control room) should be checked when the fixed monitor sensors are calibrated.

2.3 Records of calibration should be maintained per facility requirements. Typical information recorded for calibration checks include the following:
- Person performing calibration check
- Date

- Unit/Location
- Sensor I.D.
- Sensor Reading (ppm)
- Calibration Gas (ppm)
- Description of Adjustments to System or Panel/Comments
- Notification of Abnormal conditions (made to whom and date)

2.4 Calibration gas should contain a known concentration of H2S high enough to activate the H2S instrument's alarm (25 to 50 ppm are typical calibration gas concentrations).

2.5 Failure of a sensor or zero drift of a sensor can occur and cause false alarms.

CAUTION: You need to safely verify that there* has *been no "release event" before sirens are silenced manually.

CALIBRATION AND BUMP TESTING

3.1 All instruments should be calibrated according to manufacturer instructions.

3.2 Instrument manufacturers will typically provide an appropriate calibration kit for their instruments, these kits may include docking stations and should be used whenever possible.

3.3 Calibration gas should be purchased specifying National Bureau of Standards (NBS) traceable standards.

3.4 Calibration gases should not be "field mixed". The concentration of the calibration gas used should conform to the manufacturer's recommendations.

3.5 Manufacturers typically indicate a recommended calibration frequency. This recommendation is often considered a minimum acceptable frequency. Facility experience with detector calibration may indicate that more frequent calibration is needed for accurate concentration measurements.

3.6 Bump tests can be done to calibration-capable instruments prior to instrument use and between specific and documented calibration intervals.

3.7 A bump test simply exposed the instrument to a calibration gas and serves as a "go" or "no go" test. It indicates that the instrument is working properly. However, bump tests do not eliminate the need for regular, documented and more thorough calibrations for instruments that can be calibrated.

3.8 Some personal H2S monitors can only be subjected to bump testing, resulting in a pass or fail test result. Personal monitors that fail bump testing must be replaced immediately unless repair and re-calibration is possible.

3.9 Documentation of each calibration in a calibration log is important and should include the following:

- Calibration date/time
- Person performing calibration
- Calibration gas used
- Instrument serial number
- Readings prior to calibration
- Readings following calibration

3.10 Individuals who perform calibrations should be trained and qualified.

3.11 Retention time for training records and retention time for calibration records should be specified in a written program.

PERSONAL H2S MONITORS

Use Locations

4.1 Personal H2S monitors with alarms are used in transfer areas or other locations such as tank farms where over-exposure to H2S might occur without benefit of an early warning alarm from continuous area monitor.

4.2 Facilities that handle H2S-containing streams and provide H2S alarms should develop a list of areas where personal H2S monitors are to be worn.

4.3 Personal H2S gas detectors must be worn in the breathing zone (an area approximately one (1) square foot around the nose and mouth).

4.4 Suggested locations for placement of the detector include:

- Shirt collar or pocket (sensor should be OUTSIDE the pocket)
- Upper half of the shirt
- In cold weather, and when donning chemical protective clothing, the detector must be placed on the outermost layer of clothing.
- If worn on a hard hat, the hard hat cannot be removed in an area where H2S exposure above 10 ppm might occur.
- Personal gas monitors should not be worn on the belt which is out of the breathing zone, or covered inside a coat or inside a pocket.
- Personal H2S detectors should be worn so that it is likely to be seen and /or heard if the device alarms.

Instrument Specifications

5.1 Personal electronic gas detectors (for H2S) should be equipped with audible and visual signals to alert the user when the alarm set points have been exceeded. Detectors with vibrating alerts are also available, and are recommended.

5.2 Personal H2S monitors should be set to alarm at 10 ppm. High alarm set points are typically set at 15 or 20 ppm.

5.3 Personal gas detectors SHOULD NOT be used as a gas testing device for permitting or for area monitoring.

5.4 Examples of brand names of personal H2S monitors include Industrial Scientific Corporation (ISC) and BW Technologies.

ALARM RESPONSE

6.1 All employees in the area where the H2S is detected should evacuate immediately.

6.2 Employees should immediately leave the area if a personal H2S monitor goes into alarm.

6.3 Evacuate crosswind, then upwind in a manner that will not entail closer approach to the source.

6.4 H2S may overcome quickly--DO NOT remain to investigate, try to stop the leak or to perform rescue.

6.5 Notify the appropriate operation personnel of the release.

6.6 Entry into the release area should only be attempted by properly trained emergency response personnel wearing a Self-Contained Breathing Apparatus (SCBA), and then only if back-up personnel with proper protective equipment are standing by.

6.7 Two SCBA wearing emergency responders may be required for entry into a release zone or hot zone at some facilities.

PERSONAL H2S MONITOR CALIBRATION

7.1 Manufacturer recommendations on calibration and/or bump testing should be followed. Requirement for additional daily bump testing can be added to facility procedures. For some instruments, calibration and/or bump testing can be done using docking stations made specifically for the instrument used.

7.2 Calibration or bump testing should be done using a designated calibration station or equipment that does not allow personal exposure to a concentration of H2S high enough to cause the monitor to alarm.

7.3 Monitors that do not pass calibration or bump testing, or that reach their end of service life must be immediately replaced with a functioning monitor.

PERSONAL H2S MONITORS DURING TURNAROUNDS (MAJOR PREVENTATIVE MAINTENANCE WORK)

8.1 Personal H2S monitor needs can vary during turnarounds in areas where personal monitors are normally required. Before a turnaround in an area where monitors are required, management should consider factors such as the following :

8.1.1 If the area is drained, cleaned and hydrocarbon and H2S free in preparation for turnaround, personal H2S monitors may not need to be required in the turnaround area. This would clearly apply if the entire Facility is shut down and/or if there is no potential for H2S release from adjacent equipment.

8.1.2 If the area is hydrocarbon and H2S free, but an adjacent unit might release H2S that could enter the turnaround area, at least four options, or a combination of these options, can be considered as alternatives:

- Require a personal H2S monitor for each turnaround operator, maintenance employee, and contractor employee in the area.
- Require at least one member of each contractor crew to wear a personal H2S monitor.
- Set up perimeter H2S monitors (using semi-portable instruments like rig Rats or Crowcons) between the area under turnaround and areas where H2S might be released. Provide an "alarm watch" person to continuously watch the H2S monitors and sound an evacuation signal if a perimeter H2S monitor alarms. Perimeter monitors could also continuously test for flammable vapors or other airborne hazardous material if appropriate (such as SO2).
- Fixed monitors in adjacent units may provide an early warning system for personnel working in an area undergoing turnaround. Some method of communicating the alarm to personnel in the turnaround area would have to be provided. Local alarms for the fixed monitors, or area operators, might be able to provide the evacuation signal if an H2S release occurred.

MULTI-GAS METERS

9.1 Multi-gas meters are used to test atmospheres before writing permits for work such as hot work or confined space entry.

9.2 Multi-gas meters may be used to monitor atmospheres during work if there is a possibility that atmospheric condition may change during the work.

9.3 Multi-gas meters should be calibrated at least as often as the manufacturer recommends. Monthly calibration is typically required as a minimum calibration frequency.

9.4 Daily bump testing or bump testing the device before each use can be required.

9.5 In addition to the regularly scheduled calibration or bump test, detectors should be calibrated if they fail the bump test, are dropped, get wet, or if subjected to extreme high exposure episodes to ensure the circuits are intact and the sensor has not been poisoned.

9.6 Multi-gas alarms for H2S should activate at no higher than 10 ppm.

POTENTIAL PRECAUTIONS FOR SAMPLING H2S STREAMS

10.1 Personal protective equipment may be needed for sampling H2S or monitoring atmospheric concentrations of H2S.

10.2 When performing routine operational tasks involving equipment potentially containing H2S, workers should avoid venting to atmosphere at grade, draining to the slab, and/or draining to the open sewer whenever feasible.

10.3 Appropriate safety precautions should be followed for any maintenance work where H2S exposure above 10 ppm can reasonably be expected.

10.4 The facility should ensure that personnel working in an H2S area have adequate indicators of wind direction. Windsocks, streamers, flags or other wind indicators shall be maintained in good working order.

10.5 Personnel shall have a pre-plan of escape based upon current wind direction. The preferred evacuation route is normally crosswind, then upwind in a manner that will not entail closer approach to the source.

PERSONAL PROTECTIVE EQUIPMENT FOR H2S MONITORING

11.1 Air purifying respirators are not used for protection from hydrogen sulfide.

CAUTION: H2S is considered to have poor warning properties because the odor may go unrecognized and unnoticed in high concentrations.

12.1 Only supplied air, positive pressure, respiratory protection should be used to enter atmospheres that may have H2S over 10 ppm. Either an SCBA or an airline respirator with separate egress emergency escape air bottle it typically allowed.

12.2 Entering atmospheres with potentially hazardous concentrations of H2S above 10 ppm requires supplied air respiratory protection.

12.3 When monitoring for airborne H2S while looking for sources of leaks, supplied air respiratory protection may be appropriate, even if the general area atmosphere does not have airborne concentrations above 10 ppm.

12.4 Egress emergency escape air bottles for airline respirators usually are rated 5 minutes, but may not last that long during actual use. Respirator wearers need to be aware that the egress bottles should remain closed unless needed to escape.

DEFINITIONS

13.1 The following definitions are applicable to this procedure:

Breathing Zone-- Area within one (1) foot radius of the mouth and nose.

Bump Test-- Exposing a personal H2S monitor to a known concentration of H2S above the alarm point to make sure it is working properly. This must be performed in a controlled fashion using a small quantity of calibration gas.

Calibration-- Introduction of a known concentration of H2S and adjustment of the instrument as needed for proper response and accurate reading.

Fixed H2S Detector-- A fixed device, normally located in an operating, pumping, or storage area, which detects high levels of H2S and displays a visual and audible warning.

H2S Hydrogen Sulfide-- A natural component of crude oil. A colorless and HIGHLY TOXIC gas that is also extremely soluble in water and liquid hydrocarbons. In the right concentration, H2S can be explosive, flammable, or corrosive, and is dangerously reactive with other chemicals. H2S can be detected in low concentrations by its characteristic, "rotten egg" odor, but because it temporarily deadens the sense of smell, its odor is not an adequate means of detecting it presence.

H2S Exposure Limits-- 10 ppm for 8-hour exposure and 15 ppm for 15-minute exposures should be used at facilities that handle H2S-containing streams. Federal OSHA currently has a 15-minute short term exposure limits of 20 parts per million (ppm). Federal OSHA also has an allowable 10-minute peak exposure limit of 50 ppm that can be used only if no other measurable H2S exposure occurs during the full shift. The ACGIH currently has established 10 ppm as an 8-hour average exposure limit and 15 ppm as a 15- minute short term exposure limit. Several States have adopted an 8-hour TWA of 10 ppm and a 15- minute STEL of 15 ppm as exposure levels.

H2S Stream-- For the purpose of this document, a hydrogen sulfide stream is defined as any gas, vapor or liquid that can release 10 ppm or more of H2S into the breathing zone or into an area that may become the breathing zone of employees.

IDLH (Immediately Dangerous to Life and Health)-- The lowest atmospheric concentration of any toxic, corrosive or asphyxiating substance that poses an immediate threat to life or would cause irreversible adverse health effects or would impair an individual's ability to escape from a dangerous atmosphere, the IDLH concentration for H2S is set at 100 ppm by NIOSH.

Odor of H2S-- The odor of hydrogen sulfide is described as a rotten egg odor. The lack of an H2S odor is not a reliable indicator of the absence of H2S. The odor threshold is low at around 0.02 ppm or (20ppb). But high H2S concentrations can cause an inability to detect odors so rapidly that the odor may not be noticed at all.

One problem with the "it's okay as long as you can smell it" attitude is that when the odor disappears, the cause may be either the absence of H2S or a concentration increase to a dangerously high level.

Personal H2S Monitor/Alarm (PA)-- Gas detectors for personal use, small enough to be clipped onto exterior clothing. Personal alarms alert personnel to presence of the toxic gas they were designed to detect in the local atmosphere. They provide continuous, direct reading gas detection with visual and audible alarms, and they are designed to be worn when working in locations where toxic gases may be released.

End of Procedure

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OPERATING CERTIFICATION
Genie Z-45/25 Aerial Lift

PURPOSE: This procedure outlines and defines the basic necessary steps essential for the promotion of proper machine operation for its intended use.

SCOPE: This procedure covers the safety aspects of operating the Genie Z-45/25 Aerial Lift.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when operating Genie Z-45/25 Aerial Lift and those personnel are adequately trained and qualified and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE			Miscellaneous Safety Equipment	
	Hard Hat (ANSI Z89.1 Certified)	Hearing Protection (Optional)		
	Vancouver Energy Approved Uniform (FRCs)	Fall Protection		
	Safety Toed Boots - 6" laced above ankle with a defined heel (ASNI Z41.1 Certified)			
	Side Shield Safety Glasses (ANSI Z87.1 Certified)			
	Vancouver Energy Approved Gloves			
	Vancouver Energy Safety Vest			

OPERATING REQUIREMENTS

1.1 Only trained and authorized operators shall be permitted to operate the aerial lift.

1.2 Operators must avoid hazardous situations. Employees using aerial lifts shall be instructed on how to recognize and avoid unsafe conditions and hazards

1.3 Operators must perform a pre-operation inspection for each shift using the aerial lift.

1.4 Operators must perform function tests prior to use for each shift using the aerial lift.

1.5 Operators must inspect the workplace each shift.

1.6 Operators must only use the machine as it was intended. This machine is intended to be used only to lift personnel, their tools and materials to an aerial work site.

1.7 Operators must understand and obey all instructions, safety rules and governmental regulations associated with use of the aerial lift.

1.8 Any damaged or missing safety signs must be replaced.

1.9 Operator safety must be kept in mind at all times.

1.10 Safety signs should be kept clean, use only mild soap and water to clean these signs. Using a solvent based cleaner may damage the safety sign material.

1.11 A malfunctioning lift shall be shut down until repaired.

1.12 The controls shall be plainly marked as to their function.

1.13 The controls shall be tested each shift prior to use to determine that they are in safe operating condition.

1.14 All personnel in the platform shall, at all times, wear approved fall protection devices and other safety gear as required. A lanyard is to be attached to the anchor provided in the platform.

1.15 Load limits specified by the manufacturer shall not be exceeded.

1.16 Instruction and warning placards must be legible

1.17 Aerial lifts shall not be used near electric power lines unless the lines have been de-energized or adequate clearance is maintained. (See OSHA 29 CFR 1910.67 and 1926.453)

1.18 Ground controls shall not be operated unless permission has been obtained from personnel in the platform, *except in case of an emergency.*

1.19 Regular inspection of the job site and aerial lift shall be performed by competent persons.

1.20 Personnel shall always stand on the floor of the platform, not on boxes, planks, railing or other devices, for a work position.

NOTE: Your operating manual is your most important tool, keep it with the machine. Remember any equipment is only as safe as the operator.

WARNING: Modification or alteration of an aerial platform shall be made only with prior written permission of the manufacturer.

TIP-OVER HAZARDS

2.1 Occupants, equipment and materials shall not exceed the maximum platform capacity listed below.

Maximum platform capacity	500 lbs.	227 kg
Maximum Occupants		2

2.2 The weight of options and accessories, such as pipe cradles, panel cradles and welders, will reduce the rated platform capacity and must be factored into the total platform load.

2.3 The Operator must not raise or extend the boom unless the machine is on a firm and level surface.

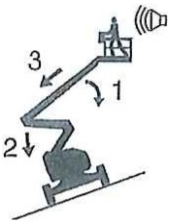
2.4 The Operator must not depend on the tilt alarm as a level indicator. The tilt alarm will sound in the platform only when the machine is on a severe slope.

2.5 If the tilt alarm sounds while the boom is lowered the Operator must not extend, rotate or raise the boom above horizontal.

2.6 If the tilt alarm sounds while the boom is lowered the Operator should move the machine to a firm, level surface prior to raising the platform.

2.7 If the tilt alarm sound when the platform is raised the Operator must use extreme caution.

Tilt Alarm Sounds with the Platform Uphill

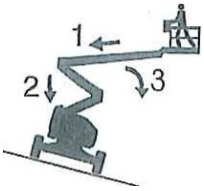


2.7.1 The Operator will lower the primary boom.

2.7.2 The Operator will lower the secondary boom.

2.7.3 The Operator will retract the primary boom.

Tilt Alarm sounds with the Platform Downhill



2.8 The Operator will retract the primary boom.

2.8.1 The Operator will lower the secondary boom.

2.8.2 The Operator will lower the primary boom.

2.9 The Operator must not raise the boom when wind speeds exceed 28 mph/ 12.5 m/s. If wind speed exceed 28 mph when the boom is raised the Operator must lower the boom and not continue to operate the machine.

2.10 The Operator must not operate the machine in strong or gusty winds.

2.11 The Operator must not increase the surface area of the platform or load. Increasing the area exposed to the wind will decrease the machine stability.

2.12 The Operator must use extreme care and slow speeds while driving the machine in the stowed position across uneven terrain, debris, unstable or slippery surfaces and near holes and drop-offs.

2.13 The Operator must not drive the machine on or near uneven terrain, unstable surfaces or other hazardous conditions with the boom raised or extended.

2.14 The Operator must not use the machine as a crane.

WARNING: Failure to comply with the safety precautions listed in this procedure and on the machine could result in machine damage, personnel injury or death and is a safety violation.

MINIMUM SAFE APPROACH DISTANCES (M.S.A.D.) TO ENERGIZED (exposed or insulated) POWER LINES AND PARTS.	
Voltage Range (Phase to Phase)	**Minimum Safe Approach Distance in Feet (Meters)**
0 to 50V	10 (3)
Over 50V to 200KV	15 (4.6)
Over 200Kv to 350Kv	20 (6.1)
Over 350Kv to 500Kv	25 (7.6)
Over 500Kv to 750Kv	35 (10.6)
Over 750Kv to 1OOOKv	45 (13.7)

DANGER: DO NOT maneuver the machine or personnel inside the PROHIBITED ZONE. ASSUME all electrical parts and wiring are ENERGIZED unless known otherwise.

3.1 Operator must maintain safe clearance from electrical lines and apparatus.

3.2 Operator must allow for boom sway, rock or sag and electrical line swaying.

WARNING: The machine does NOT provide protection from contact with or proximity to an electrically charged conductor.

3.3 Operator must maintain a clearance of at least 10 feet (3 Meters) between any part of the machine or its load and any electrical line or apparatus carrying up to 50,000 volts. One foot of additional clearance is required for every additional 30,000 volts or less.

3.4 Operator must allow for platform movement, electrical line sway or sag and beware of strong or gusty winds.

3.5 Keep away from the machine if it contacts energized power lines.

3.6 Personnel on the ground or in the platform must not touch or operate the machine until energized power lines are shut off.

3.7 Never use the machine as a ground for welding.

3.8 Never operate the machine during lightening or storms.

PRE-OPERATIONAL SAFETY PRECAUTIONS

4.1 Operators should read the manual and understand what he/she has read prior to beginning operations.

4.2 Only authorized and qualified personnel are allowed to operate the aerial lift. These persons must be able to demonstrate that they understand safe and proper operation and maintenance of the unit.

4.3 An operator must not accept operating responsibilities until adequate training has been given by competent and authorized persons.

4.4 Prior to operation, the Operator should check the work area for overhead electric lines, machine traffic such as bridge cranes, highway, and railway and construction equipment.

4.5 Never disable or modify the footswitch or any other safety device.

WARNING: Any unauthorized modification of the machine is a safety violation and a violation of OSHA regulations and ANSI standards.

WORK AREA SAFETY

5.1 Do not push the machine or other objects with the boom.

5.2 Do not contact adjacent structures with the boom.

5.3 Do not tie the boom or platform to adjacent structures.

5.4 Do not place loads outside the platform perimeter.

5.5 Do not push off or pull toward any object outside of the platform.

NOTE: The maximum allowable side force-ANSI & CSA is 150 lbs/667 N.

5.6 Do not alter or disable machine components that in any way affect safety and stability.

5.7 Do not replace items critical to machine stability with items of different weight or specification.

5.8 Do not replace factory-installed tires with tires of different specification or ply rating.

5.9 Do not use air-filled tires as these machines are equipped with foam-filled tires. Wheel weight and proper counterweight configuration are critical to stability. Operator must ensure tires are in good condition and lug nuts are properly tightened prior to use.

5.10 Do not modify or alter an aerial work platform without prior written permission from the manufacturer.

5.11 Do not place or attach overhanging loads to any part of this machine.

5.12 Do not place ladders or scaffolds in the platform or against any part of the machine.

5.13 Tools and materials must not be transported unless they are evenly distributed and can be safely handled by the person(s) in the platform.

5.14 The machine should not be used on a moving or mobile surface or vehicle.

5.15 The platform controls must not be used to free a platform that is caught, snagged or otherwise prevented from normal motion by an adjacent structure.

5.16 Prior to attempting to free the platform using the ground controls all personnel must be removed from the platform.

FALL HAZARDS

6.1 All occupants must wear a safety belt or harness, lanyards are to be attached to the anchor provided in the platform.

6.2 Occupants must not sit, stand or climb on the platform guard rails.

6.3 Occupants must maintain a firm footing on the platform floor at all times.

6.4 Never climb down from the platform when raised.

6.5 The platform floor must be kept clear of debris.

6.6 Before operating the platform entry must be lowered mid-rail or the entry gate closed.

6.7 The platform must not be entered or exited unless the machine is in the stowed position and the platform is at ground level.

COLLISION HAZARDS

7.1 Operator must be aware of limited sight distance and blind spots when driving or operating the machine.

7.2 The Operator must be aware of the boom position and tail swing when rotating the turntable.

7.3 The Operator must check the work area for overhead obstructions or other possible hazards.

7.4 The Operator needs to be aware of crushing hazards when grasping the platform guard rail.

7.5 Operators must observe and use the color-coded direction arrows on the platform controls and drive chassis for drive and steer functions.

7.6 The boom must not be operated in the path of any crane unless the controls of the crane have been locked out and/or precautions have been taken to prevent any potential collision.

7.7 Stunt driving or horseplay while operating a machine is prohibited.

7.8 The boom must not be lowered unless the area below is clear of both personnel and obstructions.

7.9 Travel speed should be limited according to the condition of the ground surface, congestion, slope, location of ground personnel and any other factors which may cause a collision.

BODILY INJURY HAZARD

8.1 The machine must not be operated with a hydraulic oil or air leak.

8.2 The machine should be operated in a well-ventilated area to avoid carbon monoxide poisoning.

8.3 Any improper contact with components under any cover will cause serious injury. Only trained maintenance personnel should access compartments. Access by the Operator is only advised when performing a pre-operation inspection.

8.4 During operation all compartments must remain closed and secured.

EXPLOSION AND FIRE HAZARDS

9.1 If you smell or detect liquid petroleum gas (LPG), gasoline, diesel fuel or other explosive substances do not start the engine.

9.2 The machine is not to be refueled with the engine running.

9.3 The machine is to be refueled and the battery charged only in an open, well ventilated area away from flames, sparks or lighted tobacco.

9.4 The machine is not to be operated in hazardous locations or locations where potentially flammable or explosive gases or particles may be present.

9.5 In engines with glow plugs do not spray ether into the engine.

DAMAGED MACHINE HAZARDS

10.1 Never use a damaged or malfunctioning machine.

10.2 Each operator must conduct a thorough pre-operation inspection of the machine and test all functions prior to his/her work shift.

10.3 Any damaged or malfunctioning machine must be immediately tagged and removed from service

10.4 All maintenance must be performed in accordance with this procedure and the Genie service manual.

10.5 The Operator must ensure all decals are in place and are legible.

10.6 The Operator must ensure the operator's, safety and responsibilities manuals are complete, legible and properly stored in the storage container located on the platform.

COMPONENT DAMAGE HAZARDS

11.1 Do not use any battery or charger that is greater than 12V to jump start the engine.

11.2 The machine is never to be used as a ground for welding.

BATTERY SAFETY

12.1 Batteries contain acid therefore the Operator should always wear protective clothing and eyewear when working with batteries.

12.2 Avoid spilling or contacting battery acid. To neutralize battery acid spills use baking soda and water.

12.3 Keep sparks, flames and lighted tobacco away from batteries as batteries emit explosive gas.

12.4 Avoid contact with electrical terminals.

PRE-OPERATION INSPECTION

13.1 It is the responsibility of the Operator to perform a pre-operation inspection and routine maintenance. A pre-operation inspection is a visual inspection done by each operator prior to his/her shift. (See Pre- Operation Inspection Sheet)

13.2 If during the inspection any damage or unauthorized variation from factory delivered condition is discovered the machine must be tagged and removed from service.

13.3 Repairs made to the machine are to be made only by a qualified service technician.

13.4 After repairs are completed, the Operator must perform a pre-operational inspection again prior to performing function tests.

13.5 Scheduled maintenance inspection shall be performed by qualified service technicians.

***FUNCTION* TEST**

14.1 Function tests are designed to discover any malfunctions before the machine is put into service.

14.2 Never use a malfunctioning machine. If malfunctions are discovered the machine must be tagged and removed from service.

14.3 Repairs made to the machine are to be made only by a qualified service technician.

14.4 After repairs are completed, the Operator must perform a pre-operational inspection again prior to performing function tests.

INSPECTIONS AT THE GROUND CONTROLS

15.1 The Operator selects a test area that is firm, level and free of obstructions.

15.2 The Operator turns the key switch to ground control.

15.3 The Operator pulls out the red Emergency Stop button to the ON position. The beacon, if equipped, should flash.

15.4 The Operator starts the engine.

Test the Emergency Stop

15.5 The Operator pushes in the red Emergency Stop button to the OFF position. The engine will shut off after 2-3 seconds.

15.6 The Operator pulls out the red Emergency Stop button to the ON position and restarts the engine.

Test the Machine Functions

15.7 Do not hold the function enable switch to either side. The Operator attempts to activate each boom and platform function toggle switch. At this point all boom and functions should not operate.

15.8 The Operator holds the function enable switch to either side and activates each boom and platform function toggle switch. All boom and platform functions should operate through a full cycle. The descent alarm should sound while the boom is lowering.

Test the Tilt Sensor

15.9 The Operator turns the key switch to the platform control.

15.10 The Operator pulls out the platform red Emergency Stop button to the ON position.

15.11 The Operator opens the engine side turntable cover and locates the tilt sensor to the right of the hydraulic pump.

15.12 The Operator presses down one side of the tilt sensor. The alarm, located in the platform, should sound.

Test the Auxiliary Controls

15.13 The Operator turns the key switch to ground control and shuts off the engine.

15.14 The Operator pulls out the red Emergency Stop button to the ON position.

15.15 The Operator simultaneously holds the auxiliary power switch ON and activates each boom function toggle switch. All boom functions should operate.

NOTE: To conserve battery power, test each function through a partial cycle.

AT THE PLATFORM CONTROLS

Test the Emergency Stop

15.16 The Operator turns the key switch to platform control and restarts the engine.

15.17 The Operator pushes in the platform red Emergency Stop button to the OFF position. The engine will shut off after 2-3 seconds.

15.18 The Operator pulls out the red Emergency Stop button and restarts the engine.

Test the Horn

15.19 The Operator pushes the horn button. The horn should sound.

Test the Foot Switch

15.20 The Operator pushes in the platform red Emergency Stop button to the OFF position.

15.21 The Operator pulls out the red Emergency Stop button to the ON position but does not start the engine.

15.22 The Operator presses down the foot switch and attempts to start the engine by moving the start toggle switch to either side. The engine should not start.

15.23 Do not press down the foot switch and restart the engine. The engine should start.

15.24 Do not press down on the foot switch and test each machine function. The machine functions should not operate.

Test the Machine Functions

15.25 The Operator presses down the foot switch.

15.26 The Operator activates each machine function control handle or toggle switch. All boom/platform functions should operate through a full cycle.

Test the Steering

15.27 The Operator presses down the foot switch.

15.28 The Operator presses the thumb rocker switch on top of the drive control handle in the direction

indicated by the blue triangle on the control panel OR slowly moves the control handle in the direction indicated by the blue triangle. The steer wheel should turn in the direction that the blue triangles point on the drive chassis.

15.29 The Operator presses the thumb rocker switch on top of the drive control handle in the direction indicated by the yellow triangle on the control panel OR slowly moves the control handle in the direction indicated by the yellow triangle. The steer wheel should turn in the direction that the yellow triangles point on the drive chassis.

Test Drive and Braking

15.30 The Operator presses down the foot switch.

15.31 The Operator slowly moves the drive control handle in the direction indicated by the blue arrow on the control panel until the machine begins to move, then returns the handle to the center position. The machine should move in the direction that the blue arrow points on the drive chassis and then come to an abrupt stop.

15.32 The Operator slowly moves the drive control handle in the direction indicated by the yellow arrow on the control panel until the machine begins to move, then returns the handle to the center position. The machine should move in the direction that the yellow arrow points on the drive chassis and then come to an abrupt stop.

NOTE: The brakes must be able to hold the machine on any slope it is able to climb. Test the Drive Enable System

15.33 The Operator presses down the foot switch and lowers the boom to the stowed position.

15.34 The Operator rotates the turntable until the primary boom moves past one of the non-steer wheels. The drive enable indicator light should come on and remain on while the boom is anywhere in the range shown below.

15.35 The Operator moves the drive control handle off center. The drive function should not operate.

15.36 The Operator moves and holds the drive enable toggle switch to either side and slowly moves the drive control handle off center. The drive function should operate.

NOTE: When the drive enable system is in use, the machine may drive in the opposite direction that the drive and steer control handle is moved. Use the co/or-coded direction arrows on the platform controls and the drive chassis to identify the direction of travel.

Test Limited Drive Speed

15.37 The Operator pressed down the foot switch.

15.38 The Operator raises the primary boom approximately 2 feet (61 cm).

15.39 The Operator slowly moves the drive control handle to the full drive position. The maximum achievable drive speed with the primary boom raised should not exceed 1 foot per second.

15.40 The Operator lowers the primary boom to the stowed position.

15.41 The Operator raises the secondary boom approximately 2 feet.

15.42 The Operator slowly moves the drive control handle to the full drive position. The maximum achievable drive speed with the secondary boom raised should not exceed 1 foot per second.

15.43 The Operator lowers the secondary boom to the stowed position.

15.44 The Operator extends the primary boom approximately 1 foot.

15.45 The Operator slowly moves the drive control handle to the full drive position. The maximum achievable drive speed with the primary boom raised should not exceed 1 foot per second.

15.46 The Operator retracts the boom to the stowed position.

NOTE: If the drive speed with the primary boom raised, the secondary boom raised or the primary boom extended exceeds 1foot per seconds you must immediately tag and remove the machine from service.

Test the Oscillate Axle (oscillating axle-equipped models)

15.47 The Operator starts the engine from the platform controls.

15.48 The Operator drives the right steer tire up onto a 6 inch block or curb. The three remaining tires should stay in firm contact with the ground.

15.49 The Operator drives the left steer tire up onto a 6 inch block or curb. The three remaining tires should stay in firm contact with the ground.

15.50 The Operator drives both steer tires up onto a 6 inch block or curb. The non-steer tires should stay in firm contact with the ground.

Test Auxiliary Controls

15.51 The Operator shuts the engine OFF.

15.52 The Operator pulls out the red Emergency Stop button to the ON position.

15.53 The Operator presses down the foot switch.

15.54 The Operator simultaneously holds the auxiliary power switch ON and activates each function control handle or toggle switch. All boom and steer functions should operate. Drive functions should not operate with auxiliary power.

NOTE: To conserve battery power, test each function through a partial cycle. Test the Lift/Drive Select Function (if equipped)

15.55 The Operator presses down the foot switch.

15.56 The Operator moves the drive control handle off center and activates a boom function toggle switch. No boom function should operate. The machine will move in the direction indicated on the control panel.

15.57 Repair any malfunctions before operating the machine.

WORKPLACE INSPECTION

NO TIE: The workplace inspection helps the Operator determine if the workplace is suitable for safe machine operation. It should be performed by the Operator prior to moving the machine to the workplace.

NOTE: It is the responsibility of the Operator to read and remember the workplace hazards, then to watch for and avoid them while moving, setting up and operating the machine.

15.58 The Operator should be aware of and avoid the following hazardous situations:

- drop-offs or holes
- bumps, floor obstructions or debris
- sloped surfaces
- unstable or slippery surfaces
- overhead obstructions and high voltage conductors
- hazardous locations
- inadequate surface support to withstand all load forces imposed by the machine
- wind and weather conditions
- the presence of unauthorized personnel
- other possible unsafe conditions

OPERATING INSTRUCTIONS

NO TIE: Only trained and authorized personnel should be allowed to operate the machine. If more than one operator is expected to operate a machine at different times in the same work shift, they must all be qualified operators and are all expected to follow all safety rules and instructions in the operator's safety and responsibilities manual.

NOTE: Every new operator should perform a pre-operation inspection, function tests and workplace inspection prior to using the machine.

STARTING THE ENGINE

16.1 At the ground controls the Operator turns the key switch to the desired position.

16.2 The Operator ensures both the ground and platform control red Emergency Stop buttons are pulled out to the ON position.

16.3 On gasoline or LPG models, the Operator chooses the fuel by moving the fuel select switch to the desired position. On diesel models, the Operator moves the glow plug to either side and holds for 3-5 seconds.

16.4 On gasoline/LPG models the Operator moves the engine start toggle switch to either side. If the engine fails to start or dies, the restart delay will disable the start switch for 3 seconds. On diesel models, the Operator moves the engine start toggle switch to either side. If the engine fails to start or dies the restart delay will disable the start switch for 3 seconds.

16.5 If the engine fails to start after 15 seconds of cranking, the Operator needs to determine the cause and repair any malfunction. The Operator must wait 60 seconds before trying to start the machine again.

16.6 In cold conditions, 20°F/-6°C and below, the Operator needs to warm the engine for 5 minutes before operating to prevent hydraulic system damage.

16.7 In extreme cold conditions, 0°F/ -18°C and below, machines should be equipped with an optional cold start kit. Attempting to start the engine when temperatures are below 0°F may require the use of a booster battery.

NOTE: Gasoline/LPG models: In cold conditions, 20°F/ -6°C and below the machine should be started on gasoline and warmed for 2 minutes then switched to LPG. Warm engines can be started on LPG.

EMERGENCY STOP

17.1 The Operator pushes in either ground or platform red Emergency Stop button to the OFF position to stop all functions and turns OFF the engine.

17.2 The Operator repairs any function that operates when the red Emergency Stop button is pushed in.

NOTE: Selecting and operating the ground controls will override the platform red Emergency Stop button.

AUXILIARY CONTROLS

NOTE: Use auxiliary power if the primary power source (engine) fails.

18.1 The Operator turns the key switch to ground or platform control.

18.2 The Operator pulls out the red Emergency Stop button to the ON position.

18.3 The Operator presses down the foot switch when operating the auxiliary controls from the platform.

18.4 The Operator simultaneously holds the auxiliary power switch ON and activates the desired function.

NOTE: The drive and steer functions will not operate with auxiliary power.

OPERATION FROM GROUND

19.1 The Operator turns the key switch to ground control.

19.2 The Operator pulls out the red Emergency Stop button to the ON position.

19.3 The Operator starts the engine.

To Position Platform

20.1 The Operator holds the function enable switch to either side.

20.2 The Operator moves the appropriate toggle switch according to the markings on the control panel.

NOTE: Drive and steer functions are not available from the ground controls.

OPERATION FROM PLATFORM

21.1 The Operator turns the key switch to platform control.

21.2 The Operator pulls out both ground and platform red Emergency Stop buttons to the ON position.

NOTE: On gasoline/LPG models: The Operator chooses the fuel by moving the fuel select switch to the desired position.

21.2 The Operator starts the engine. Do not press down the foot switch when starting the engine.

To Platform Position

22.1 The Operator presses down the foot switch.

22.2 The Operator slowly *moves* the appropriate function control handle or toggle switch according to the markings on the control panel.

To Steer

23.1 The Operator presses down the foot switch.

23.2 The Operator slowly moves the control handle in the direction indicated by the blue or yellow triangles OR presses the thumb rocker switch located on the top of the drive control handle.

23.3 The Operator will use the color-coded direction triangles on the platform controls and the drive chassis to identify the direction the wheels will turn.

To Drive

24.1 The Operator presses down the foot switch.

24.2 To increase speed, the Operator slowly moves the drive control handle off center.

24.3 To decrease speed, the Operator slowly moves the drive control handle toward center.

24.4 To stop, the Operator returns the drive control handle to center or releases the foot switch.

24.5 The Operator will use the color-coded direction arrows on the platform controls and the drive chassis to identify the direction the machine will travel.

CAUTION: Machine travel speed is restricted when the booms are raised.

DRIVING ON A SLOPE

CAUTION: Do not drive the machine on a slope that exceeds the maximum uphill, downhill or side slope rating of the machine. Slope rating applies only to machines in the stowed position.

Maximum Slope Rating, stowed position, 2WD	
Platform downhill	30% (17°)
Platform uphill	25% (14°)
Side slope	25% (14°)

Maximum Slope Rating, stowed position, 4WD	
Platform downhill	45% (24°)
Platform uphill	25% (14°)
Side slope	25% (14°)

NOTE: Slope rating is subject to ground conditions and adequate traction.

25.1 The Operator determines the uphill, downhill and side slope ratings for the machine and determines the slope grade.

NOTE: Slope rating is subject to ground conditions and adequate traction. The term gradeability applies to the platform downhill configuration only.

25.2 The Operator ensures the boom is below horizontal and the platform is between the non-steer wheels.

25.3 The Operator moves the drive speed select switch to machine on incline symbol.

To Determine the Slope Grade

NOTE: To determine the slope grade the Operator will measure the slope with a digital inclinometer OR use the following procedure

Procedure

26.1 The Operator obtains the following items:
- carpenter's level
- straight piece of wood, at least 3 feet long
- tape measure

26.2 The Operator lays the piece of wood on the slope.

26.3 At the downhill end, the Operator lays the level on the top edge of the piece of wood and lifts the end until the piece of wood is level.

26.4 While holding the piece of wood level, the Operator measures the vertical distance from the bottom of the piece of wood to the ground.

26.5 The Operator divides the tape measure distance (rise) by the length of the piece of wood (run) and then multiplies by 100.

NOTE: If the slope exceeds the maximum uphill, downhill or side slope rating, then the machine must be winched or transported up or down the slope.

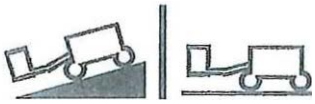
Drive Enable

27.1 The light on indicates that the boom has moved just past either non-steer wheel and the drive function has been interrupted.

27.2 To drive, the Operator holds the drive enable switch to either side and slowly moves the drive control handle off center.

27.3 The Operator needs to be aware that the machine may move in the opposite direction that the drive and steer controls are moved. Always use the color-coded direction arrows on the platform controls and the drive chassis to identify the direction the machine will travel.

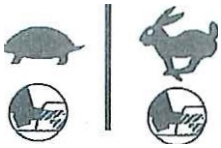
Drive Speed Select



28.1 Machine on incline symbol: Low range operation for inclines

28.2 Machine on level surface symbol: High range operation for maximum drive speed

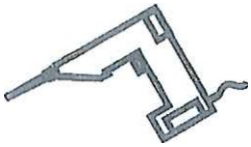
Engine Idle Select (rpm)



29.1 When the foot switch is not pressed, the engine will idle at the lowest rpm.

29.1.1 The Turtle symbol: foot switch activated low idle.

29.1.2 The Rabbit symbol: foot switch activated high idle.



30.1 To start the generator, the Operator moves the generator toggle switch to the ON position.

30.2 The Operator plugs a power tool into the power to platform GFCI outlet.

30.3 The turn off the generator, the Operator moves the generator toggle switch to the OFF position.

NOTE: Machine functions will not operate while the generator is running and the foot switch is not pressed down. When the foot switch is pressed down, the generator will turn off and the machine functions will operate.

Machine Not Level Indicator (if equipped)

31.1 Light on indicates the machine is not level. The tilt alarm will be sounding when this light is on. The Operator will move the machine to a firm level surface.

Check Engine Light (if equipped)

32.1 Light on and engine stopped: The Operator tags the machine and removes it from service.

32.2 Light on and engine still running: The Operator contacts service personnel within 24 hours.

LOCKOUT AFTER EACH USE

33.1 The Operator selects a safe parking location. The location is to be a firm level surface, clear of obstruction and traffic.

33.2 The Operator retracts and lowers the boom to the stored position.

33.3 The Operator rotates the turntable so that the boom is between the non-steer wheels.

33.4 The Operator turns the key switch to the OFF position and removes the key to secure from unauthorized use.

33.5 The Operator chocks the wheels.

TRANSPORT AND LIFTING INSTRUCTIONS

34.1 Drivers are solely responsible for making sure machines are properly secured and the correct trailer is selected pursuant to US Department of Transportation regulations.

34.2 Only qualified aerial lift operators should move the machine on or off the truck.

34.3 The transport vehicle must be parked on a level surface.

34.4 The transport vehicle must be secured to prevent rolling while the machine is being loaded.

34.5 Be sure the vehicle capacity, loading surfaces and chains or straps are sufficient to withstand the machine weight. Genie lifts are very heavy relative to their size. See the serial label for the machine weight.

34.6 Be sure the turntable is secured with the turntable rotation lock before transporting.

34.7 Be sure to unlock the turntable for operation.

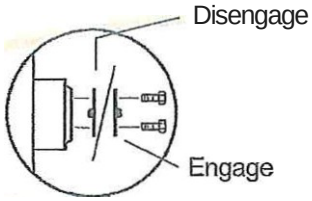
34.8 Do not drive the machine on a slope that exceeds the uphill, downhill or side slope rating.

34.9 If the slope of the transport vehicle bed exceeds the uphill or downhill maximum slope rating the machine must be loaded and unloaded using a winch.

FREE-WHEEL CONFIGURATION FOR WINCHING

35.1 The Operator chocks the wheels to prevent the machine from rolling.

35.2 The Operator releases the non-steer wheel brakes by turning over the drive hub disconnect caps.



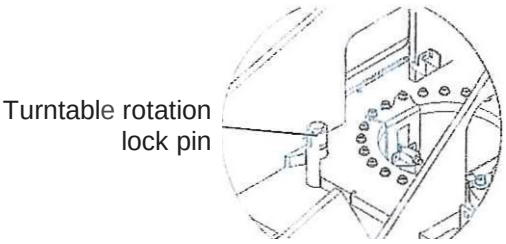
35.3 The Operator ensures that the winch line is properly secured to the drive chassis tie points and the path is clear of all obstructions.

35.4 The Operator will reverse the procedures to re-engage the brakes.

NOTE: Towing the Genie z-45/25 is not recommended. If the machine must be towed, do not exceed 2 mph.

SECURING TO TRUCK OR TRAILER FOR TRANSIT

36.1 Always use the turntable rotation lock pin each time the machine is transported.



36.2 The Operator turns the key switch to the OFF position and removes the key before transporting.

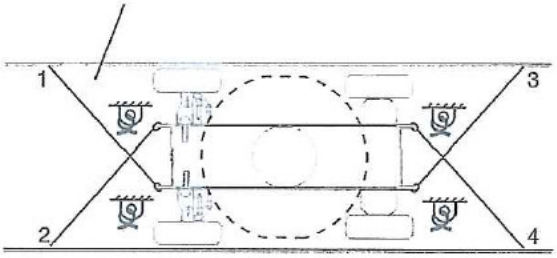
36.3 The Operator inspects the entire machine for loose or unsecured items.

Securing the Chassis

36.4 Ensure to use chains of ample load capacity.

36.5 Ensure to use a minimum of 4 chains.

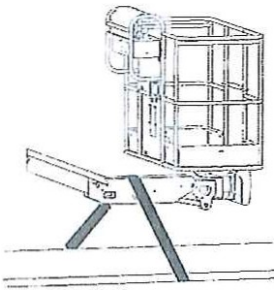
36.6 Adjust the rigging to prevent damage to the chains.



Securing the Platform

36.7 The Operator ensures the platform is in the stowed position.

36.8 The Operator secures the platform with a nylon strap placed over the platform mount near the platform rotator (see below).



36.9 Do not use excessive downward force when securing the boom section.

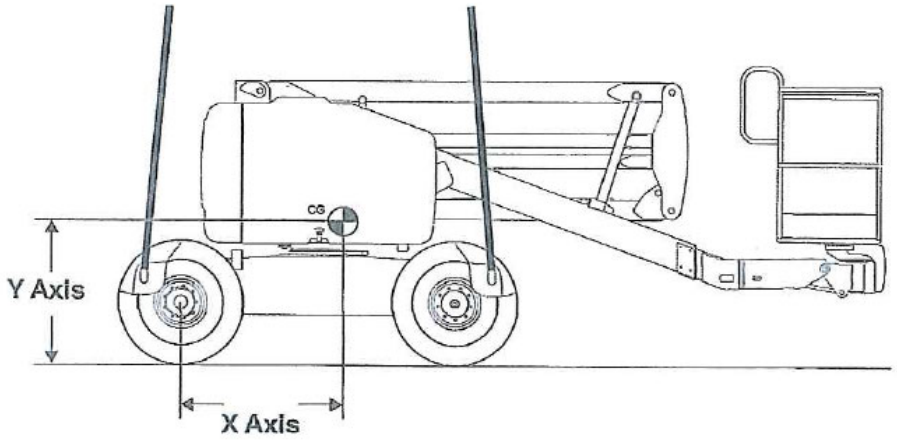
LIFTING INSTRUCTIONS

37.1 The Operator fully lowers and retracts the boom.

37.2 The Operator fully lowers the jib (if equipped).

37.3 The Operator removes all loose items on the machine.

37.4 The Operator determines the center of gravity of your machine using the table and picture below.

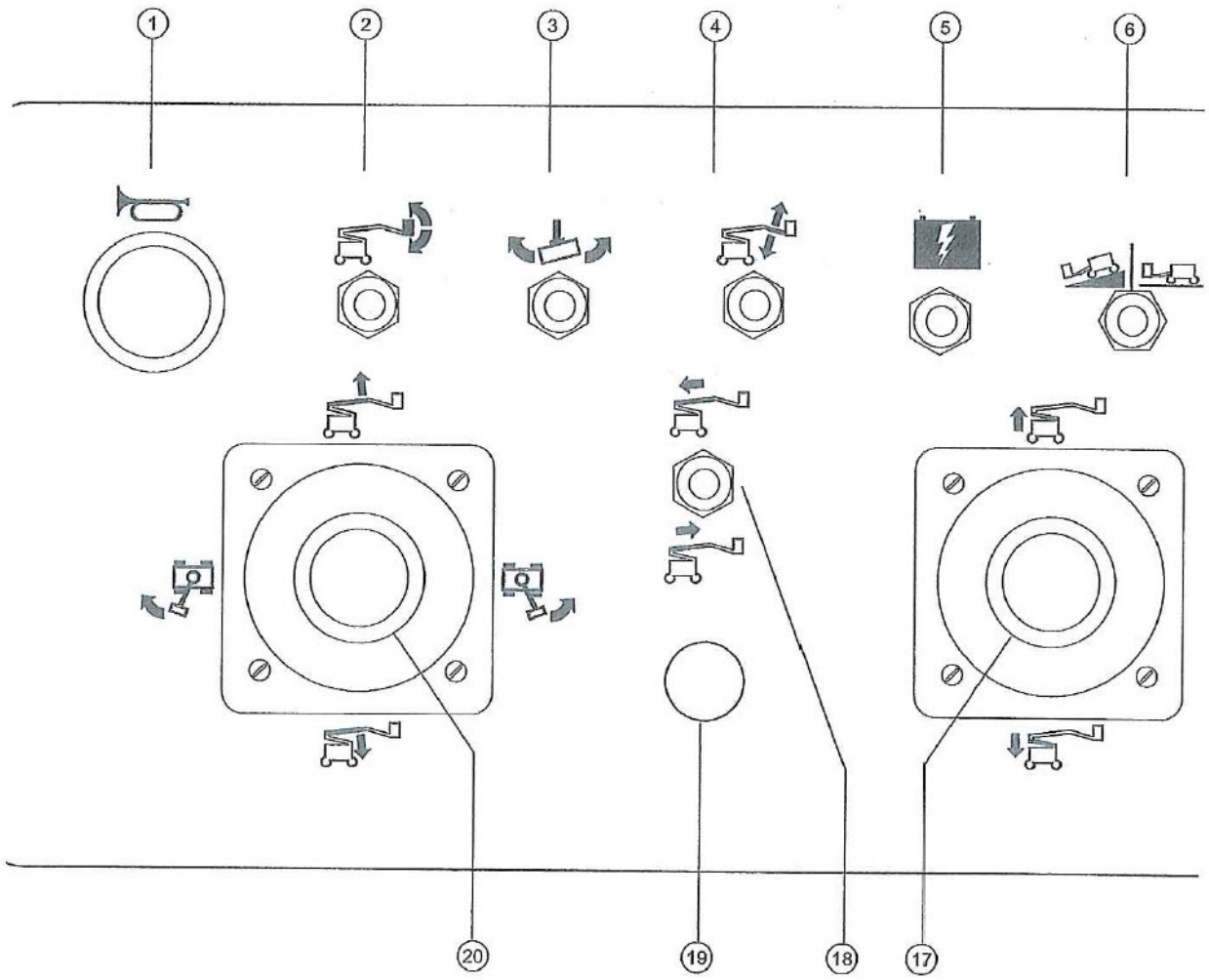


	X Axis	*Y Axis*
Z-45/25	47 inches/ 1.19 m	42 inches/ 1.06 m

37.5 The Operator attaches the rigging only to the designated lifting points on the machine. There are 4 lifting points on the chassis.

37.6 The Operator adjusts the rigging to prevent damage to the machine and to keep the machine level.

38.0 CONTROLS



38.1 Platform Control Panel

Horn Button (1)-- Push the horn button and the horn will sound. Release the horn button and the horn will stop.

Platform Level Switch (2)-- Move the platform level switch up and the level of the platform will raise. Move the platform level switch down and the level of the platform will lower.

Platform Rotate Switch (3)-- Move the platform rotate switch to the right and the platform will rotate to the right.
Move the platform rotate switch to the left and the platform will rotate to the left.

Jib boom up/down Switch (4)-- Move the jib boom switch up and the jib boom will raise. Move the jib boom switch down and the jib boom will lower.

Auxiliary Power Switch (5)-- Use auxiliary power if the primary power source (engine) fails. Simultaneously hold the auxiliary power switch to either side and activate the desired function.

Drive Speed Select Switch (6)-- Machine on incline symbol: Low range operation for inclines.
Machine on level surface symbol: High range operation for maximum drive speed.

Glow Plug Switch (7)-- Move the glow plug switch to either side and hold for 3-5 seconds.

Engine Start Switch (8)-- Move the engine start switch to either side to start the engine.

Engine Idle (rpm) Select Switch (9)-- Move the engine idle select switch to the turtle position for foot switch activated low idle.
Move the engine idle select switch to the rabbit position for foot switch activated high idle.

Gasoline/LPG models: Fuel Select Switch (10)-- Move the fuel select switch to the gasoline position to select gasoline.
Move the fuel select switch to the LPG position to select LPG.

Red Emergency Stop Button (11)-- Push in red Emergency Stop button to the OFF position to stop all functions and turn the engine off.
Pull out the red Emergency Stop button to the ON position to operate the machine.

Dual axis proportional control handle for drive and steer functions OR Proportional control handle for drive function and thumb rocker for steer function (12)-- Move the control handle in the direction indicated by the blue arrow on the control panel and the machine will drive forward.
Move the control handle in the direction indicated by the yellow arrow and the machine will drive backwards.
Move the control handle in the direction indicated by the blue triangle and the machine will steer to the left.
Move the control handle in the direction indicated by the yellow triangle and the machine will steer to the right.

OR

Move the control handle in the direction indicated by the blue arrow on the control panel and the machine will drive forward.
Move the control handle in the direction indicated by the yellow arrow on the control panel and the machine will drive backwards.
Press the left side of the thumb rocker and the machine will steer to the left. Press the right side of the thumb rocker and the machine will steer to the right.

Not Used (13)

Machine not level indicator light (if equipped) (14)-- The machine not level indicator light will come on when the tilt alarm sounds.

Drive enable indicator light (15)-- Light on indicated that the boom has moved just past either non-steer wheel and drive function has been interrupted.

Drive Enable Switch (16)-- To drive when the drive enable light is on, hold the drive enable switch to either side and slowly move the drive control handle off center. Be aware that the machine may move in the opposite direction that the drive and steer controls are moved.

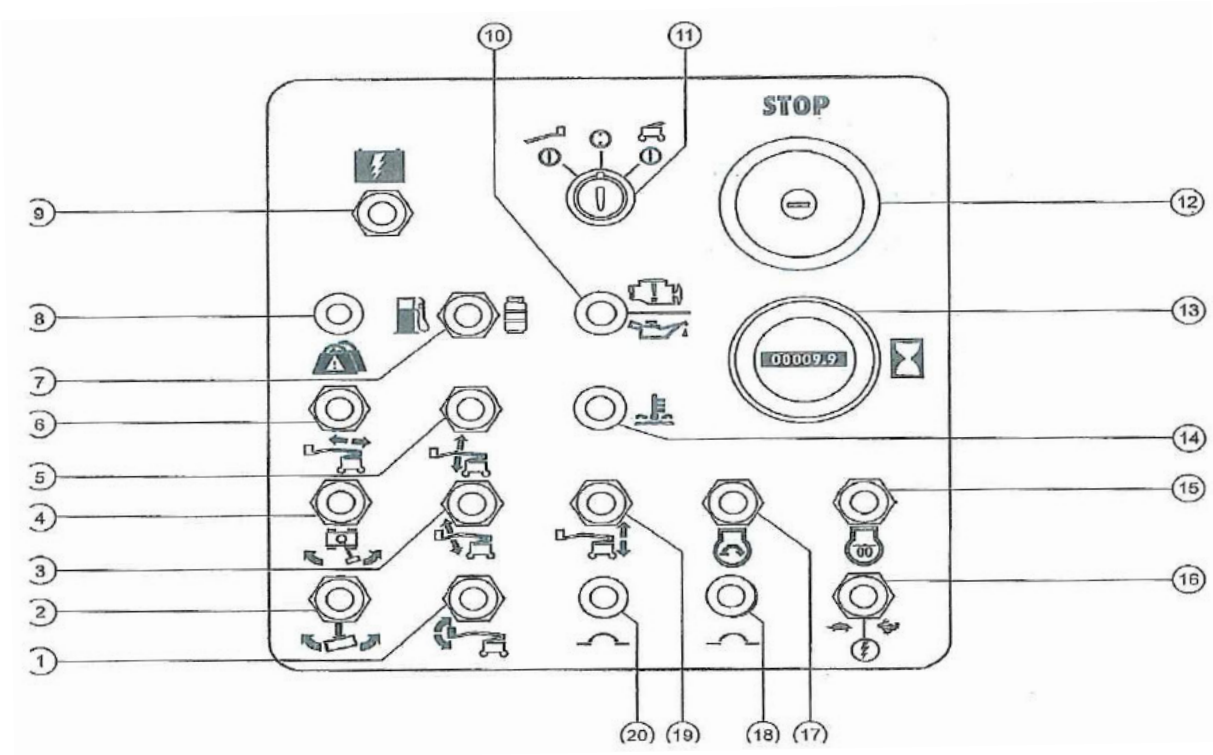
Proportional control handle for secondary boom up/down function (17)-- Move the control handle up and the secondary boom will raise. Move the control handle down and the secondary boom will lower.

Primary boom extend/retract switch (18)-- Move the primary boom switch up and the primary boom will retract. Move the primary boom switch down and the primary boom will extend.

Used for Optional Equipment (19)

Dual axis and proportional control handle for primary boom up/down and turntable rotate left/right functions (20)--
Move the control handle up and the primary boom will raise.
Move the control handle down and the primary boom will lower.
Move the control handle to the right and the turntable will rotate to the right.
Move the control handle to the left and the turntable will rotate to the left.

38.2 Ground Control Panel



Platform level switch (1)-- Move the platform level switch up and the level of the platform will raise. Move the platform level switch down and the level of the platform will lower.

***Platform rotate switch* (2)--** Move the platform rotate switch to the right and the platform will rotate to the right.
Move the platform rotate switch to the left and the platform will rotate to the left.

Jib boom up/down switch (3)-- Move the jib boom switch up and the jib boom will raise.
Move the jib boom switch down and the jib boom will lower.

Turntable rotate switch (4)-- Move the turntable rotate switch to the right and the turntable will rotate to the right.
Move the turntable rotate switch to the left and the turntable will rotate to the left.

Primary boom up/down switch (5)-- Move the primary boom up/down switch up and the boom will raise.
Move the primary boom up/down switch down and the boom will lower.

Primary boom extend/retract switch (6)-- Move the primary boom extend/retract switch to the right and the boom will retract.
Move the primary boom extend/retract switch to the left and the boom will extend.

Gasoline/LPG models: Fuel select switch (7)-- Move the fuel select switch to the gasoline position to select gasoline.
Move the fuel select switch to the LPG position to select LPG.

Not Used (8)-

Auxiliary power switch (9)-- Use auxiliary power if the primary power source (engine) fails.
Simultaneously hold the auxiliary power switch to either side and activate the desired function.

Gasoline/LPG models: Check engine light or Diesel models: Oil pressure light (10)-- Light on and engine stopped: Tag the machine and remove from service
Light on and engine running: Contact service personnel within 24 hours

Key switch for platform/off/ground selection (11)-- Turn the key switch to the platform position and the platform controls will operate.
Turn the key switch to the OFF position and the machine will be off.
Turn the key switch to the ground position and the ground controls will operate.

Red Emergency Stop button (12)-- Push in the red Emergency Stop button to the OFF position to stop all functions and turn the engine off.
Pull out the red Emergency Stop button to the ON position to operate the machine.

Hour meter (13)-- The hour meter displays the number of hours the machine has operated.

Diesel models: Water temperature light (14)-- Light on and engine stopped: Tag the machine and remove from service.
Light on and engine running: Contact service personnel within 24 hours

Diesel models: Glow plug switch (if equipped) (15)-- Move the glow plug switch to either side and hold for 3-5 seconds.

Function enable switch (16)-- Move the function enable switch to either side to enable the functions on the ground control panel to operate.

Engine start switch (17)-- Move the engine start switch to either side to start the engine.

15A breaker for engine electrical circuits (18)

Secondary boom up/down switch (19)-- Move the secondary boom up/down switch up and the secondary boom will raise.
Move the secondary boom up/down switch down and the secondary boom will lower.

15A breaker for control electrical circuits (20) MAINTENANCE

NOTE: Only routine maintenance items specified in this manual shall be performed by the operator.

NOTE: Scheduled maintenance inspections shall be completed by qualified service technicians.

NOTE: Use only Genie approved replacement parts.

CHECK ENGINE OIL LEVEL

NOTE: Maintaining the proper engine oil level is essential to good engine performance and service life. Operating the machine with an improper oil level can damage engine components.

NOTE: Check the oil level with the engine off.

39.1 The Operator removes the safety pin from the engine pivot plate latch.

NOTE: The engine pivot plate latch is located under the engine turntable pivot plate at the counterweight end of the machine.

39.2 The Operator opens the engine pivot plate latch and swings the engine pivot plate out and away from the machine.

39.3 The Operator checks the oil dipstick. Add oil as needed.

39.4 The Operator installs the engine pivot plate safety pin.

Perkins 404C-22 Engineer	
Oil type	15W-40
Oil type-cold conditions	SW-40
Ford DSG-423 EFI Engine (EPA Compliant)	
Oil type	SW-20
Deutz F3L 2011 Engine	
Oil type	15W-40
Oil type-cold conditions	SW-30

CHECK THE HYDRAULIC OIL LEVEL

NOTE: Maintaining the hydraulic oil at the proper level is essential to machine operation. Improper hydraulic oil levels can damage hydraulic components. Daily checks allow the inspector to identify changes in oil level that might indicate the presence of hydraulic system problems.

40.1 The Operator ensures that the boom is in the stowed position.

40.2 The Operator visually inspects the sight gauge located on the side of the hydraulic oil tank. Level should be within the top 2 inches/5 cm of the sight gauge.

NOTE: Use Chevron Rykon Premium MV equivalent hydraulic oil.

CHECK THE ENGINE COOLANT LEVEL (FORD AND PERKINS MODELS)

NOTE: Maintaining the engine coolant at the proper level is essential to engine service life. Improper coolant level will affect the engine's cooling capability and damage engine components. Daily checks will allow the inspector to identify changes in the coolant level that might indicate cooling system problems.

WARNING: Burn Hazard. Beware of hot engine parts and coolant. Contact with hot engine parts and/or coolant may cause severe burns.

41.1 The Operator checks the fluid level in the coolant recovery tank. The fluid level should be at the FULL mark.

41.2 The Operator will add fluid as needed.

NOTE: Do not remove the radiator cap.

CHECK THE BATTERIES

NOTE: Proper battery condition is essential to good engine performance and operational safety. Improper fluid levels or damaged cables and connections can result in engine component damage and hazardous conditions.

WARNING: ELECTROCUTION HAZARD! Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

WARNING: BODILY INJURY HAZARD/ Batteries contain acid. Avoid spilling or contacting battery acid. Neutralize battery acid spills with baking soda and water.

42.1 The Operator ensures he/she dons protective clothing and eyewear.

42.2 The Operator ensures that the battery cable connections are tight and free of corrosion.

42.3 The Operator ensures that the battery hold-down bracket is secure.

42.4 The Operator removes the battery vent caps.

42.5 The Operator checks the battery acid level. If needed, replenish with distilled water to the bottom of the battery fill tube. Do no overfill.

42.6 The Operator installs the vent caps.

NOTE: Adding terminal protectors and a corrosion preventative sealant will help eliminate corrosion on the battery terminals and cables.

CHECK THE TIRE PRESSURE

WARNING: TIP-OVER HAZARD/ An over-inflated tire can explode which may compromise machine stability and cause the machine to tip over.

WARNING: TIP-OVER HAZARD/ The use of temporary flat tire repair products may lead to tire failure which could compromise machine stability and cause the machine to tip over.

WARNING: BODILY INJURY HAZARD! An over inflated tire can explode and may cause death or serious injury.

NOTE: This procedure does not need to be performed on machines equipped with foam-filled tires.

43.1 The Operator checks each tire with an air pressure gauge and adds air as needed.

TIRE SPECIFICATIONS	*2WD MODELS*	*4WD MODELS*
Standard base models Industrial tire Tire size: 9-14.5 LT	100 psi/ 6.9 bar	
Standard base models Rough Terrain Tire Tire size: 355/55D625 14 ply	50 psi/ 3.5 bar	50 psi/ 3.5 bar
High Flotation Tires Tire size: 33/16LL500	38 psi/ 2.6 bar	38 psi/ 2.6 bar

SCHEDULED MAINTENANCE

44.1 Maintenance performed quarterly, annually and every two (2) years must be completed by a person trained and qualified to perform maintenance on this machine according to the service manual for this machine.

44.2 Machines that have been out of service for more than three (3) months must receive the quarterly inspection before they are put back in service.

End of this procedure

	PRE-OPERATION INSPECTION				
ITEM	***SHIFT***	***N/A***	***PASS***	***FAIL***	***COMMENTS***
Operator's safety and responsibilities manuals are complete, legible and in the storage container located in the platform.					
All decals are legible and in place.					
Engine Oil					
Any leaks present					
Oil at proper level					
Oil added					
Hydraulic Oil					
Any leaks present					
Oil at proper level					
Oil added					
Engine Coolant					
Any leaks present					
Coolant at proper level					
Coolant added					
Battery Fluid					
Any leaks present					
Proper fluid level					
Fluid Added					
Tires					
In good condition					
Air pressure (if equipped with air filled tires)					
Check the following components or areas for damage, improperly installed or missing parts and unauthorized modifications					
Electrical components, wiring and electrical cables					
Hydraulic hoses, fittings, cylinders and manifolds					
Fuel and hydraulic tanks					
Drive and turntable motors and drive hubs					
Boom wear pads					
Tires and wheels					
Engine and related components					
Limit switches and horn					
Alarms and beacons (if equipped)					
Nuts, bolts and other fasteners					
Platform entry mid-rail or gate					
Check entire machine for the following					
Cracks in welds or structural components					
Dents or damage to machine					
Excessive rust, corrosion or oxidation					
Ensure that all structural and other critical components are present and all associated fasteners and pins are in place and properly tightened					
After inspection is complete ensure that all compartment covers are in place and latched.					
Date ***Terminal***					
Signature					

PURPOSE: This procedure outlines and defines the basic necessary steps needed to safely inspect Trains and perform an Air Brake Test.

SCOPE: This procedure is to be followed by terminal employees when inspecting trains and performing air brake tests in accordance with FRA regulations.

RESPONSIBILITY: The respective Quality Supervisor and Logistics Director shall ensure that this procedure is followed by terminal personnel when performing train inspections and air brake tests and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task. This procedure is to be reviewed on an annual basis.

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment PPE	Hard Hat		Miscellaneous Safety Equipment	
	Vancouver Energy Approved Uniform (FRCs)			
	Safety Toed Boots - 6" laced above ankle with a defined heel (ASNI Z41.1 Certified)			
	Side Shield Safety Glasses (ANSI Z77.1 Certified)			
	Leather Gloves			

NOTE: All Employees helping with any part of this procedure must don all PPE (Personal Protection Equipment)

Tools & Transfer Equipment			Environmental Equipment	

SAFETY INSPECTIONS OF FREIGHT CARS

1.1 The Employee will inspect and test the brake equipment on locomotives and cars in accordance with FRA regulations.

1.2 The Employee will perform a safety inspection on all cars at the initial terminal or that are added enroute.

1.3 Inspections and air brake tests may be performed by either a "Qualified Person" (Trainman who has been given fundamental training on freight car inspections and air brake tests. In this procedure all trainmen are "Qualified Persons") or a "Qualified Mechanical Inspector" (A person who has received more extensive training that provides for a more detailed inspection. Inspections and air brake tests by Qualified Mechanical Inspectors provide for a greater distance that a train may travel before additional inspections are required.)

1.4 The Employee must inspect equipment on both sides during an inspection and air brake test to verify that all moving parts of the brake system is functioning properly on each car.

NOTE: Roll-by inspections may only be used to determine that all brakes have released and may not be used to perform all other inspection requirements for either side of the train.
COUPLING AND SECURING HOSES

2.1 Before coupling air hoses between locomotives and/or cars the Employee must shake out the debris out of the hoses.

2.2 The Employee must also blow all condensation from the locomotive brake pipe or yard airline before coupling air hoses between locomotives and /or cars.

2.3 Whenever possible the Employee should secure the air hoses on locomotives and cars during all movements in order to prevent the hoses and glad-hands from dragging and becoming damaged.

OPERATIVE BRAKES

3.1 Unless the brakes fail enroute, air brakes on all cars must be operative unless they are being moved for repairs and properly tagged.

3.2 A Qualified Mechanical Inspector is to provide three (3) tags on cars given to train crews to be moved to repair facilities.

3.3 Cars with defective air brake equipment are to be tagged on each side and the third tag is to be kept on the locomotive.

3.4 Tags will only be required on one (1) side of the car and on the locomotive when no crossover platform is available to crossover between cars or when adjacent tracks are involved which could present a risk of injury.

Exception: Scale test cars are not required to be equipped with air brakes. If however, they are equipped with air brakes the brakes must be operable.

3.5 Cars discovered with brakes that fail enroute have to be tagged on both sides of the car and also noted on the space provided on the train documentation. This must be left in the controlling locomotive cab form holder for the relieving crew.

3.6 The Employee must include the following information on the tags:

- Reporting Mark and Number of the defective locomotive or car (i.e., BNSF 601234)
- Name of the inspecting or discovering Railroad (i.e., SBG Railroad)
- Name and Job Title of the Inspector Inspection Location and Date (i.e., Trenton, ND 07/30/12)
- Type of Defect (i.e. Brake was cut out because it would not release)
- Movement Restrictions (i.e., None)
- Repair Destination (Mechanical Desk will advise on location)
- Employee Signature

3.7 The Train documentation may also reflect such cars by electronic means to subsequent crews after defective brakes are initially discovered and reported.

3.8 At least 85% of the cars in a train must have operative brakes under all circumstances.

3.9 The Engineer must allow his/her train to be inspected when departing terminals, where required.

PERSON IN CHARGE OF AIR BRAKE TEST

4.1 The Employee performing the air brake test is in charge of the train while the test is being conducted.

4.2 It is the responsibility of the Employee in charge to ensure that all other employees are safely positioned prior to giving permission to apply or release the brakes.

4.3 The Engineer at the controls of the locomotive may not apply or release train brakes without receiving permission from the Employee performing the air brake test.

STANDARD BRAKE PIPE PRESSURE

5.1 The regulating valve must be set at 90 psi for freight service or yard.

CHARGING THE AIR BRAKE SYSTEM

6.1 The Employee will need to charge the air brake system to ensure that the system is functioning properly.

6.2 The Employee should not charge the train's air brake system with more than one automatic brake valve cut in unless using distributed power locomotives.

6.3 The Employee should not increase diesel engine RPM to maintain main reservoir pressure unless the pressure fails to stay 10 psi above the regulating valve setting.

6.4 Should the Employee need to increase the diesel engine RPM he/she must not exceed throttle 4 position.

NOTE: Locomotive consists with a single locomotive equipped with an electric air compressor (GE C40-8 or C44-9, for example) may only require advancing the throttle to Run 1position in order to increase charging speed. Some EMD locomotives (such as SD70MAC) will automatically increase the engine speed as needed to maintain main reservoir pressure.

6.5 In yards where trains are made up unattended locomotives may be used to charge the brake system when the ambient temperature requires additional charging time.

AIR BRAKE TESTS USING AN END-OF- TRAIN TELEMETRY DEVICE (ETD)

7.1 When an air brake test requires determining that the brake pipe pressure is restored or the air brake system is to be charged to a specified pressure at the rear end of the train any of the following may be used:

- An accurate gauge
- an ETD
- A DP locomotive consist

7.2 When an air brake test requires an inspection to determine that the brakes apply and release on the rear car of the train, the requirement is considered to be fulfilled when either an ETD or a distributed power unit attached to the rear of the train indicates the following:

- A brake pipe pressure decrease of at least 5 psi, the brakes are applied
- A brake pipe pressure increase of at least 5 psi, the brake are released.

AIR BRAKE TESTS USING HANDHELD GAUGES

8.1 The Employee must verify that the handheld gauges used for performing an air brake test has been determined to be accurate within the last 92 days.

To Check the Accuracy of Handheld Gauges

8.2 Using a locomotive brake pipe gauge the Employee will have the engineer release the automatic brake valve and charge the brake pipe to 90 psi.

8.3 The Employee will attach the handheld gauge to the brake pipe of the controlling locomotive.

8.4 The Employee will compare the pressure indicated by the handheld gauge to the locomotive brake pipe gauge.

8.5 If the pressure indicated by the handheld gauge is within 3 psi of the locomotive brake pipe gauge reading, the handheld gauge may be used to conduct the air brake tests. If the gauge reading is not within 3 psi of the locomotive reading the gauge must not be used to conduct the air brake test and must be turned into the mechanical department for repair or recalibration.

8.6 The Employee must note on a sticker the date of the most recent pressure comparison and apply the sticker to the gauge or on a document in the possession of the user.

INITIAL TERMINAL AND ROAD AIR BRAKE* TEST *(CLASS I AIR BRAKE TEST)

9.1 A Qualified Employee must conduct an initial terminal air brake test to inspect the air brake and safety appliances and to test the brake pipe integrity.

9.2 The Employee will perform the test when any of the following occur:

- Where the train is originally assembles (the initial terminal)
- Where the train consist is changed, other than by adding or removing a car or a solid block of cars, or by removing cars that are determined to be defective
- Where a unit or cycle train has traveled 3,000 miles since it's last Class I Air Brake Test, or where the train is received in interchange and the train consist is changed. However, an inspection and test are not needed if the train consist is changed by any one or a combination of the following:
  - Removing a solid block of cars from the train
  - Changing motive power
  - Removing or changing the caboose, if used

- On a portion of the train as specified below:
  - On one or more cars added that have not been pre-tested by the initial terminal air brake test.
  - On a portion of train that has not been kept charged (off air for over 4 hours)
  - On a solid block of cars being added to the train that is comprised of cars from more than one previous train
  - On each solid block of cars that is comprised of cars from only one previous train but the cars have not remained continuously and consecutively coupled together with the train line remaining connected, other than for removing defective equipment , since being removed from its previous train.

NOTE: Cars are still considered a "solid block" if from only one previous train and divided into smaller segments to accommodate space or trackage constraints as long as placed back in the same relative order as when removed from the previous train.

PROCEDURE FOR INITIAL TERMINAL AND ROAD AIR BRAKE TEST AND INSPECTION

***Note: The Employee will inspect each of the following both before and during the air brake* test.**

10.1 The Employee will inspect the angle cocks and verify that they are properly positioned.

10.2 The Employee will inspect the air hoses to verify that they are in good condition for service and are properly coupled.

10.3 The Employee will inspect the system for leakage. If leakage occurs the Employee will make the necessary repairs to reduce the leakage to a minimum.

10.4 The Employee will inspect the retaining valves and verify that they are in EXHAUST.

AIR BRAKE TEST PROCEDURE

11.1 The Employee charges the air brake system to within 15 pounds of the locomotive regulating valve setting as indicated by a gauge or device at the rear of the train.

11.2 The Employee performs a leakage test as specified in the Brake Pipe Leakage Test.

11.3 The Employee in charge gives the Engineer permission to apply the brakes. The Engineer will then make a 20 pound brake pipe reduction.

11.4 The Employee inspects the entire train or cars added not pre-tested to ensure that the brakes are applied and remain applied on each car until he/she gives the signal to release the brakes.

NOTE: Any car whose brakes release prior to the signal to release the brakes is given may be re-tested once. The brakes must remain applied until a release is initiated for a period of not less than 3 minutes.

11.5 The Employee also verifies that the piston travel meets the requirements listed below:

- As outlined on the stenciling or badge plate or
- On Truck Mounted Brake Cylinders the piston travel must:
  - Provide brake shoe clearance when brakes are released
  - Not exceed 4" where the piston acts directly on the brake beam

- On Body Mounted Brake Cylinders the piston travel must be adjusted to between 6 and 9" at the initial terminal.
- On Body Mounted Brake Cylinders the piston travel must not exceed 10 1/2' at Intermediate Inspection Points

11.6 The Employee needs to make sure 100% of the train brakes are operative before departing.

11.7 The Employee verifies that the brake rigging does not bind or foul.

11.8 The Employee verifies that all parts of the brake equipment are properly secured.

11.9 When the test and inspection of the air brake application is complete the Employee will notify the Engineer and have him/her release the brakes.

11.10 After receiving permission to release the brakes, the Engineer will place the automatic brake valve handle in the RELEASE position.

11.11 The Engineer will notify the Employee in charge of the brake test that the brakes have been released.

11.12 The Employee will inspect each brake to verify that all brakes have released. This inspection may be made as the train departs at a speed not to exceed 10 MPH.

NOTE: An ETD pressure drop and rise of 5 psi during the air brake test may be used to determine application and release of cars within the train that have been previously tested.
ENGINEER NOTIFICATION

12.1 A written record of Class I inspections that are performed at the train's origin and at any 1500 mile Extended Haul inspection location (either at origin or enroute) must be retained on the locomotive to the train's destination.

12.2 Cars that are picked up, inspected and air tested enroute by the train crew do not require written documentation of the Class I inspections.

NOTE: Since which trains are designated as "Extended Haul" trains may not be communicated to train crews assume all car man inspections re for "Extended Haul", unless notified otherwise. Retain all Form 15287 inspection forms provided by a car man to the destination.

12.3 When a written record is required a Qualified person or Qualified Mechanical Inspector who participated in the test and inspection or anyone who knows the test was completed must notify the Engineer in writing that the initial terminal air brake test has been completed satisfactorily including the name, date, time, location and number of cars inspected. Class I inspections and tests may also be communicated to the Engineer so that it may be entered on the space provided on train documentation.

Engineers Responsibilities

12.4 Engineers receiving written notification of the air brake test must accept the notification as authority that the initial terminal air brake test has been completed satisfactorily.

12.5 The Engineer must maintain the written record of all Class I inspections and brake test in the cab of the locomotive in the form holder provided until the train reaches its final destination.

12.6 The written notification of the initial terminal inspection and air brake test may be provided the locomotive engineer by any one of the following methods:

- On Form 15287 at the initial terminal
- By written record on space provided on TRAIN PROFILE. NOTE: Any written record is acceptable if profile is unavailable.
- By electronic means on the space provided on the TRAIN PROFILE.

NOTE: Electronic records of Class I inspections on TRAIN PROFILE are only to be used in the absence of the originals and should a discrepancy occur, the original will be used as the official record. All other brake tests other than Initial Terminal Tests (Class I) do not require any written documentation to be maintained in the train. The number of cars indicated on your Class I test record(s) may not correspond to the number of cars on your train due to pick-ups and set outs enroute.

12.7 In addition to maintaining written documentation on locomotive as outlined above, the conductor must use the Voice Train Reporting (VTR) method to report all Class I inspections performed by the train crew at the train's origin (where the train is initially made up) and at all locations where the train crew performs an Intermediate Brake Test and Inspection (Class IA Brake Test) enroute.

BRAKE PIPE LEAKAGE TEST

13.1 The brake system leakage can be tested by using either the Air Flow Method (AFM) or the Brake Pipe Leakage Method.

13.2 The Air Flow Method is the preferred method when required equipment is available.

13.3 A brake pipe leakage test is required when:

- Conducting an Initial Terminal and Road Air Brake Test
- Conducting an Initial Terminal Air Brake Test From Yard Test Plant

- Conducting an Intermediate Brake Test
- Adding cars to a train that have not been pre-tested
- An Air Turbine ETD is used to replace an existing end-of-train device on a train.

AIR FLOW METHOD

14.1 To qualify a train's air brake system using AFM, the train must be equipped as follows:
- The controlling locomotive has a maintaining-type automatic brake valve
- The train has a gauge or device at the rear of the train
- The locomotive has an air flow indicator with a direct reading of air flow in increments no greater than 10 cubic feet per minute (CFM).

NOTE: Some locomotives without digital displays of air flow have air flow meters with a scale that does not correspond to a specific CFM and may not be used for conducting an air flow method brake pipe leakage test. These are identified by their lack of any reference to CFM on the gauge.

AFM Test Procedure

14.2 The Engineer charges the brake system to within 15 psi of the regulating valve setting as indicated by a gauge or device at the rear of the train.

14.3 When the air flow does not exceed 60 CFM the test is complete. If air flow exceeds 60 CFM the train must be inspected for leakage.

Brake Pipe Leakage Method

15.1 If the train does not meet AFM test conditions the Employee conducts a brake pipe leakage test.

15.2 The Engineer charges the brake system to within 15 psi of the regulating valve setting as indicated by a gauge or device at the rear of the train.

15.3 The Engineer waits for the signal to apply the brakes.

15.4 When the Engineer receives the signal to apply the brakes he/she reduces the brake pipe pressure by 20 psi.

15.5 The Engineer allows the brake pipe exhaust to stop.

15.6 The Engineer will wait 1 minute and cut out the automatic brake valve.

15.7 The Employee waits 1 additional minute to allow the brake pipe pressure to equalize.

15.8 The Employee will time the brake pipe leakage for 1 minute, if the leakage does not exceed 5 psi the test is complete.

15.9 If the leakage exceeds 5 psi the Employee must inspect the train for leakage and re-test.

15.10 When the Engineer is given the signal to release the brakes, he/she moves the automatic brake valve handle to RELEASE position and cuts the automatic brake valve in.

NOTE: Use the Distributed Power Systems automated brake pipe leakage mode when checking leakage on DP trains.

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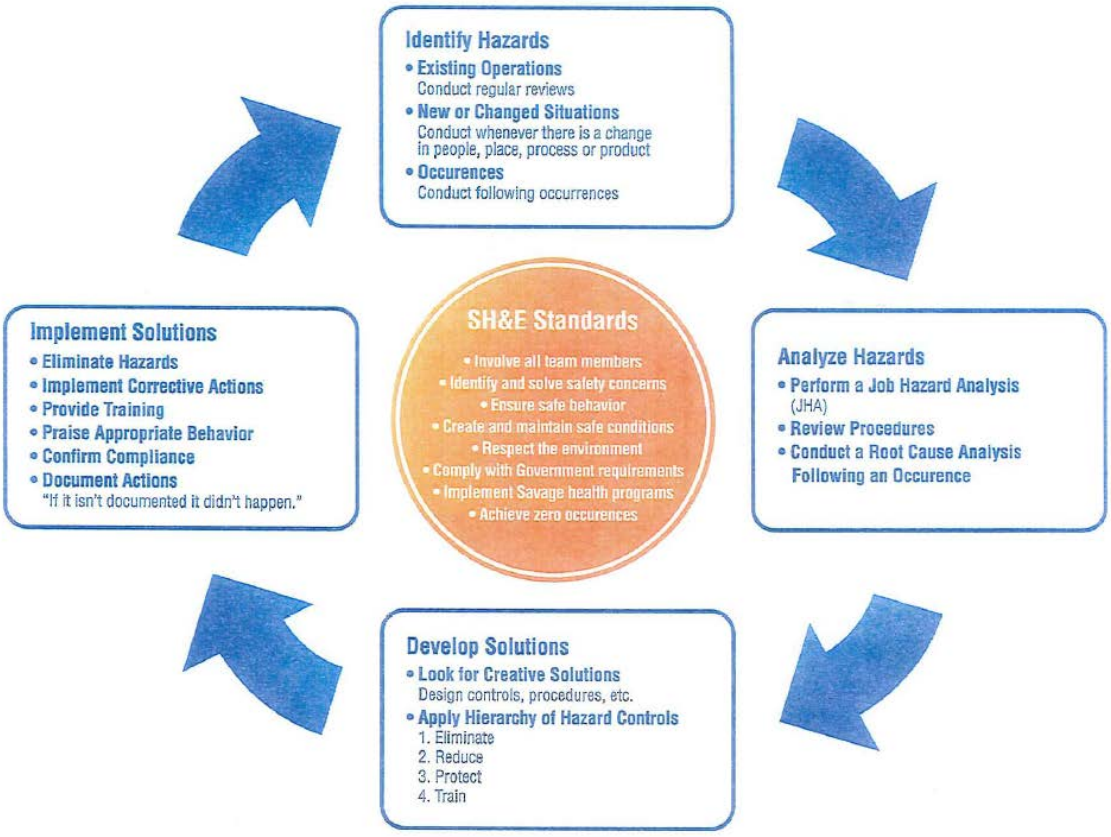
9.0 SHAPS
Savage Hazards Analysis & Prevention System



SHAPS WORKSHEET

Operation: _____

Prepared by: _____

Date: _____

IDENTIFY: What are the hazards?

_____

_____

_____

ANALYZE: Prioritize the list of hazards above and for the top hazards (high frequency, probability, or severity), list key issues or ways you could be injured or damage property. Do you need more detail? If so, a more formal JHA may need to be done.

_____

_____

_____

DEVELOP SOLUTIONS: Come up with as many ideas as you can for creative ways to control the hazards. Keep in mind you first want to eliminate the hazard, then to reduce the hazard, protect against it, and lastly to train to avoid the hazard.

_____

_____

_____

IMPLEMENT SOLUTIONS: For the creative solutions, list the things you will do to ensure they are implemented and effective and any changes are managed.

_____

_____

_____

ACTIONS TAKEN: Document any actions taken to control hazards in the workplace. This includes changes to procedures, JHAs, equipment, training, etc.

_____

_____

_____

_____

SHAPS: Identifying Hazards in New or Changed Situations

SHAPS should be used whenever there is a change in people, place, process, or product. In other words, we should make a conscious effort to *identify hazards* in situations such as:

- New employees, or an employee is helping out from another operation
- Assignment of a process to an employee for the first time, or when an employee is unfamiliar with a particular step in a process
- New piece of equipment, new hose, new fitting, new gasket, new tool, etc.
- New business, new products, additional products shipped from the same shipper, different grades of product
- Change in procedure, or a modification in the process
- A change in assignment or personnel, such as passing off a task from one employee to another to finish a task already in process
- Difficulties, troubleshooting, abnormal railcars or trailers

Any time there is a unique, out of the ordinary, different, or other than normal situation or exception, it is time to STOP, regroup, and discuss the hazards.

Suggested discussion point:

- Discuss some upcoming new or changed situations that we are expecting at our operation. How should we approach this situation with SHAPS?
- Discuss how even repetitive tasks might be hazardous. Is it possible for "repetitive" tasks to be different each time and present us with the choice and opportunity each time to do the task safely or unsafely?

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Week Number:
Effective: 05/21/2012

SAFETY TOPIC OF THE WEEK

With safety there is no room for guesswork.
If you don't know, STOP and REGROUP.

Purpose

To establish a weekly Safety Topic that all Rail Solutions site employees will know and focus on for the week. Designating one Safety Topic per week will give each employee ample opportunity to:

1. Have broad knowledge of specific rules.
2. Increase individual knowledge of the Safety process.

Responsibilities for Safety

The Company shall ensure that the safety and health at work of every person employed by them is protected.

All managers, supervisors and employees of the Company share the responsibility for developing and maintaining a safe and healthy work environment.

This week's Safety Topics of the Week addresses **Alert and Attentiveness**

Technology has come a long way in our lifetime and will only continue to become more affordable and accessible. All this technology can be a huge time saver but can also become a huge distraction. Telephones ;they went from hanging on your wall, to being mounted in your vehicle, to being able to hang on your belt, to slipping them in your pocket, to receiving texts and email messages on them, to being able to watch anything from the Super Bowl to your favorite television program on them. Cell phones, or the new term Smart phones, become very tempting to slip into your pocket while you are out working and check for messages, look at scores, or just call that favorite someone. But not only is that not smart, it is not fair. It is not fair to you, your coworker, your customer, your family, and anyone else who might be exposed to you while you have taken a hiatus from using that gray mass that is tucked inside your hardhat wisely.

When you are doing anything that requires you to focus on the task, any distraction no matter how minor can take your focus away for a split second. As we all have been made aware of too many times that moment of non-focus can create severe and most often unpleasant consequences.

Leave the phone in the office so when you have the oppo1iunity to use it you can give it your undivided attention.

Alert and Attentive

Employees must be careful to prevent injury to themselves and to others. They must be alert and attentive when performing their duties and plan their work to avoid injury.

a. Personal Electronic Devices (cell phone, iPod, computer, etc.) are not permitted on site while performing your job duties. The only permitted use is during your scheduled lunch and breaks.

Please take some time with your teams to discuss this rule and also SHAPS this hazard at your sites and your homes where ale1and attentive operation of equipment and vehicles will become a win-win for yourself and your family.

Please take a few minutes each shift to ask yourself this simple yet powerful question: What specifically have I done, personally, to make sure that my team members go home safely?

Remember the Cardinal Rule
Cardinal Rules for Zero Occurrences

Be Knowledgeable of What Products You Handle
Review Your Operation's MSDS

Savage Services Revised 08/22/11

11.0 Rail Bulletins

Savage Rail Solution Group

SAMPLE:

Safety Director's Bulletin Date: 5/09/12

Rules to focus on during the month of May

1. Week of 5/14 -Handling of Switches/Derails
2. Week of 5/21 -Separation Of Equipment
3. Week of 5/28 -Applying/Releasing Handbrakes

Safety Director:

All SAVAGE Rail Operations Sites
General Order Bulletin

Order Number: 11-01

Effective: January 3, 2011

To: All Savage Rail Operations Employees

Purpose: Instructions for Safe and efficient Railroad Operation

Effective immediately

The following will be an addition to the Savage Rail Operations Manual:

Addition to Rule 7.1 (f)

Protection secured by the locomotive operator upon request.

This protection will, at a minimum, be: Independent brake fully applied

- Apply the Automatic Brake (10 lbs.)
- Center the Reverser Handle and
- Open the Generator Field Switch (Down position)

Steve Johnson

Director of Health and Safety

Savage Industrial Rail Operations

12.0 Ergonomics and Back Safety

What is Ergonomics?

Definition

Ergonomics is the science of adapting products and processes to human characteristics and capabilities in order to improve well-being and optimize productivity.

- Rani Lueder (ed.), The Ergonomics Payoff (Holt, Rinehart & Winston)

Why is ergonomics important?

Ergonomic injuries estimated to cost U.S. industry $20 billion per year.

- Increased worker's compensation costs
- Decreased productivity
- Increased number of lost workdays

What is an ergonomics injury?

- Terms, such as repetitive stress injury (RSI) and cumulative trauma disorder (CTD) refer to soft tissue disorders in the upper limbs and hands.
- OSHA refers to the term MSD or "musculoskeletal disorders"
- MSDs are a group of injuries that affect the nerves, tendons, muscles, and supporting structures of the body
- Examples of MSDs: carpal tunnel (wrists and fingers; keyboarding), trigger finger, and back strains

What causes MSDs?

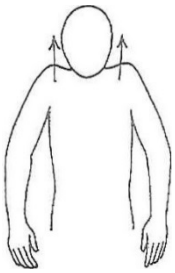
- Repetitive and heavy lifting
- Bending and twisting
- Repeating an action too frequently
- Uncomfortable working position
- Exerting too much force
- Working too long without breaks
- Adverse working environment (e.g., hot, cold)
- Psychosocial (e.g., high job demands, time pressures and lack of control)

Prevention

- Match the work station to the person
- Job/task rotation (use different muscle groups)
- Take breaks (or mini-breaks)
- Avoid unnatural motions such as twisting or lifting above head
- Get help lifting heavy objects
- Exercise! Warm up before strenuous activity

Shoulder and Arm Stretching

Raise your shoulders towards your ears until you feel a slight tension in your neck and shoulders. Hold for 5 to 10 seconds. Slowly release your shoulders downward to their normal position. Repeat 3 to 5 times.



Slowly roll your shoulders backward five times in a circular motion. Slowly roll your shoulders forward five times in a circular motion.

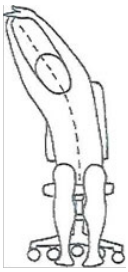
Interlace fingers. Tum palm upwards above your head as you straighten your arms. Stretch and hold for 5 to 10 seconds. Repeat 3 to 5 times.

Fingers interlaced behind your back. Slowly turn your elbow outward while straightening your arms. Hold for 5 to 10 seconds. Repeat 3 to 5 times.

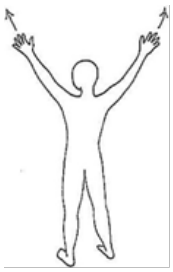
Interlace fingers. With palms facing out, straighten arms out to the front of you. Hold for 5 to 10 seconds. Repeat 3 to 5 times.

Back Stretching

Sit upright. Grasp the left knee. Lift left leg off the floor. Bend forward (curling the back), bringing the nose toward the knee. Repeat 3 to 5 times. Repeat with right leg.



Sit or stand upright. Interlace fingers and lift arms overhead. Keeping the elbows straight, press arms as far back as you can. Slowly bend to the left side until you feel a stretch. Hold for 5 to 10 seconds. Slowly bend to the right side until you feel a stretch. Hold for 5 to 10 seconds. Repeat 3 to 5 times.

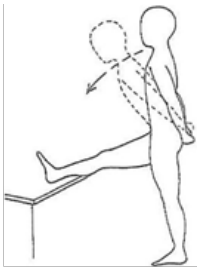


Sit or stand upright. Slowly reach your arms overhead. Reach outward and upward until you feel a stretch. Hold for 5 to10 seconds. Repeat 3 to 5 times.

Sit with left leg across right leg. Rest elbow or forearm of right arm on the outside of the left upper thigh. Gently apply pressure with right elbow or forearm towards the right. As you apply pressure, look over your left shoulder. Hold for 5 to 10 seconds. Repeat 3 to 5 times. Repeat with the other side.

Leg Stretching

Stand upright with right hand supported on a wall or the back of a stationary chair. Grab your left ankle with your left hand. Keep left knee pointed towards the ground. Slowly pull the left leg towards the buttock until you feel a stretch in the front of the thigh. Hold for 5 to 10 seconds. Repeat 3 to 5 times. Repeat with the other leg.



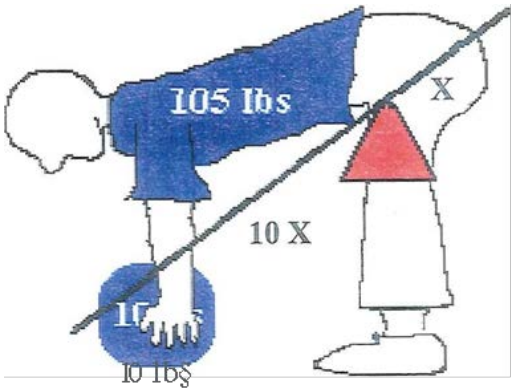
Stand upright. Place left leg on an elevated stationary surface that is at a comfortable height (knee height or lower is recommended). Keep head up and lower back arched. Slowly leaned forward until you feel a stretch in the back of the thigh. Hold for 5 to 10 seconds. Repeat 3 to 5 times. Repeat with the other leg.

Stand arm's length from a wall or other support, feet facing forward. Place right foot forward and keep the left leg straight and the heel on the ground. Lean your body towards the wall until you feel a stretch in the left calf. Hold for 5 to 10 seconds. Repeat 3 to 5 times. Repeat with the other side.

Sit slightly forward on the chair so your back is not touching the chair's back. Maintain your balance by holding onto the seat pan. Place feet flat on the floor. With leg straight, lift left foot 5 to 10 cm. off the floor. Hold for 5 to10 seconds and return it to the floor. Repeat with other side.

Back Safety

To lift a 10-pound object actually involves lifting a 105-pound torso also. As this picture indicates, this lift requires a pressure on the back of **1150 pounds**. A healthy young back can handle about 1600 pounds of pressure.



To increase capacity or reduce stress on the back, bend at the knees and not at the hips. Lift with the legs not the back. Avoid twisting.

Other Back Safety Considerations

Ask for assistance for awkward objects or objects weighing more than 50 lbs.

Plan a move by clearing a pathway, opening doors and clearing the surface where the object will be placed.

Avoid stretching, twisting or over-extending reach when lifting, transporting or placing the object.

Use lift aids (powered tables, hoists) whenever possible.

What about back belts?

The below listings are the specific items required to successfully accomplish this task.

Personal Protective Equipment (PPE)	Hard Hat (ASNI Z89.1 Certified)	Air purifying Respirator	Miscellaneous Safety Equipment	Wheel Chocks
	Vancouver Energy Approved Uniform			Vehicle Jack
	Safety-Toed Boots - 6" laced above ankle with a defined heel (ASNI Z41.1 Certified)			Jack Stands
	Safety Glasses with Side Shields (ANSI Z77.1 Certified)			Lug Wrench
	Leather Gloves			
	Hearing Protection			

The miscellaneous procedures are as follows.

REPLACE THE TRUCK TIRE

PURPOSE: This procedure outlines and defines the basic necessary steps needed to safely change a tire on a vehicle.

SCOPE: This procedure is to be followed by terminal employees when changing tires.

RESPONSIBILITY: The respective Operations Manager shall ensure that this procedure is followed by terminal personnel when changing tires and those personnel are adequately trained and are provided with the necessary personal protective equipment (PPE) and tools to accomplish this task. This procedure is to be reviewed on an annual basis.

WARNING: HAZARD OF BECOMING CAUGHT UNDER/BETWEEN EQUIPMENT EXISTS!
Precautions: Never rely on the vehicle jack. Prior to placing your body under a vehicle a sufficient number of Jack Stands must be placed under the vehicle and secured between the vehicle and the ground.

PRE-REPLACEMENT

1.1 Ensure the vehicle is on solid and level ground.

1.2 Ensure the vehicle is secured with a parking brake and chocked.

1.3 Ensure a spare or replacement tire is available and ready for service.

1.4 Review the Owner's Manual to identify proper jacking locations.

PROCEDURE

2.1 Ensure the vehicle is properly secured.

2.2 Ensure that the motor is turned off and the keys are removed and in the possession of the person performing the work.

2.3 Ensure the vehicle is properly secured with a parking brake.

2.4 Ensure the vehicle is properly chocked

2.5 Remove the jack and associated parts from the cab of the truck and inspect for condition.

2.6 Remove and inspect the Jack Stand(s) from the tool box.

2.7 Remove any lug nut covers (if applicable) and using the wrench located with the jack, loosen the lug nuts three complete rotations.

2.8 Position the jack under the vehicle at designated point for the applicable wheel (should be identifiable per owner's manual located in the glove box of the vehicle).

2.9 Jack the vehicle only as far as sufficient to install the replacement tire (note: the distance will be higher than necessary when removing the old tire so allow for sufficient space to accommodate the replacement and high enough to position the jack stand(s) under the axle.

2.10 Once the jack stand is in place, drop the jack down to allow the vehicle to come to rest on the Jack Stand located under the axle.

2.11 Place the second Jack Stand under the jacking point designated by the Owner's Manual and inspects to ensure it is stable.

2.12 Continue loosening the lug nuts on the wheel to be replaced until they are removed. Place them in a location where they will be free from debris and where they will not be misplaced.

2.13 Remove and replace the wheel. Take care to roll the wheel when possible and lift only when already stopped, using proper lifting techniques (legs, back straight).

2.14 Secure all the lug nuts on the wheel and hand tighten alternating sides.

Note: For odd number of lug nuts use a star pattern and for an even number skip each one until all have been tightened.

2.15 Remove the secondary jack stand located under the jack point and position the jack under the proper jacking location.

2.16 Jack the vehicle up sufficient to remove the jack stand under the axle.

2.17 Remove the Jack stand under the axle and lower the jack until the wheel is in contact with the ground.

2.18 Tighten the lug nuts with the same wrench provided with the jack, utilizing the same method, alternating sides, until all the lug nuts are tight.

2.19 Lower the vehicle down the rest of the way and remove the jack.

2.20 Mark the defective tire indicating in need of repair and place it in the truck bed.

2.21 Replace the lug nut covers.

2.22 Replace the Jack Stands and tools in the designated location.

2.23 Indicate on the shift report and on the vehicle inspection report that the tire was replaced and that the defective tire is located in the truck bed.

End of this procedure

NOTES:

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Communications Meeting

Date	Time	Dura ion: min.	Operation	Operations Manager	Safety Specialist

Agenda/Items/Topics for Discussion	Follow-up on assignments and items from previous meetings (e.g., status of projects, action items, other initiatives, etc.)
	1. Customer (e.g., new business start-up, service issues, changes in requirements, etc.)
	2. Employees (e.g., SH&E training topic, S7 training topic, etc.)
	3. Safety, Health, and Environmental (e.g., safety observations, safety inspections, root cause review, JHA identification, etc.)
	4. Operational Effectiveness (e.g., KPIs, transfer schedule, utilization of people or equipment, assess needs, etc.)
	5. Asset Management and Maintenance (e g., maintenance schedule, pre/post trip inspections, documentation, equipment performance, parts/vendors, etc.)
	6. Performance (e.g., financial standings in regards to employee incentive bonus program, etc.)
	7. Professionalism (e.g., cleanliness/orderliness inspection)
	8. Action items (e.g., projects, individual responsible, expected completion dates, etc.
Attendees	Employee's Name (Print) and Signature
	Employee's Name (Print) and Signature
	Employee's Name (Print) and Signature
	Employee's Name (Print) and Signature
	Employee's Name (Print) and Signature
	Employee's Name (Print) and Signature
	Employee's Name (Print) and Signature
	Employee's Name (Print) and Signature

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Confined Space Work Permit

This permit to be kept at job site. Return job site copy to Safety Officer following job completion.

Date & Time Issued: _____ Date & Time Expires: _____

Job Site/Space ID.: _____ Job Supervisor: _____

Equipment to be worked on: _____ Work to be performed: _____

Stand-by personnel: _____ _____ _____

1. Atmospheric Checks: Time _____
   Oxygen_____%
   Explosive_____% LEL
   H_2S_____%

2. Tester's Signature_____

3. Source Isolation (No Entry):

	NA	Yes	No
Pumps or lines blinded,	( )	( )	( )
disconnected or blocked	( )	( )	( )

4. Ventilation Modification:

	NA	Yes	No
Mechanical	( )	( )	( )
Natural Ventilation only	( )	( )	( )

5. Atmospheric check after Isolation and Ventilation:
   Oxygen _____% > 19.5%
   Explosive_____% LEL< 10%
   H2S_____%< 15%
   Tester's Signature

6. Communication procedures:_____

_____

7. Rescue procedures: _____

_____

8. Entry, standby and back up persons:

	Yes	No
Successfully completed required training?	( )	( )
Is it current?	( )	( )

9. Equipment:

	NA	Yes	No
Direct reading gas monitor tested	( )	( )	( )
Safety harness and lifelines for entry and standby persons	( )	( )	( )
Hoisting Equipment	( )	( )	( )
Powered Communications	( )	( )	( )
SCBA's for entry and standby persons	( )	( )	( )
Protective Clothing	( )	( )	( )
All electric equipment listed Class I, Division I, Group D and non-sparking tools	( )	( )	( )

10. Periodic atmospheric tests:

Oxygen_____% Time_____	Oxygen_____% Time_____
Oxygen_____% Time_____	Oxygen_____% Time_____
Oxygen_____% Time_____	Oxygen_____% Time_____
Explosive_____% Time_____	Explosive_____% Time_____
Explosive_____% Time_____	Explosive_____% Time_____
Explosive_____% Time_____	Explosive_____% Time_____
H_2S_____% Time_____	H_2S_____% Time_____
H_2S_____% Time_____	H_2S_____% Time_____
H_2S_____% Time_____	H_2S_____% Time_____

We have reviewed the work authorized by this permit and the information contained herein. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Permit Prepared By: (Supervisor) _____ _____

Approved By: (Unit Supervisor) _____ _____

Reviewed By: (Cs Operational Personnel) _____ _____

(printed name) (signature)

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HOT WORK PERMIT

All temporary operations involving open flames or producing heat and/or sparks require a Hot Work Permit. This includes, but is not limited to, brazing, cutting, grinding, soldering, thawing and welding.

Name of Person or Contractor doing the How Work: _____

Date: _____ Time Started: _____ Time Expires: _____

Operations Manager: _____

Emergency Phone Numbers: (1) _____ (2) _____

Location (be specific): _____

_____

Description of Work Being Performed: _____

_____

_____

_____

List Flammable and Combustible Materials Located within 35 Feet of the Hot Work Area: _____

_____

_____

_____

_____

List Hazards within 35 Feet of the Hot Work Area: _____

_____

_____

Person Assigned Fire Watch: _____
(name and signature)

Person Assigned doing Hot Work: _____
(name and signature)

I certify that I have reviewed the above conditions and the location of the Hot Work and approve the proposed Hot Work Operation.

Operations Manager: _____
(name and signature)

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Report of Satisfactory Initial Terminal Air Brake Test (Class 1) has been performed on The Train Identified Below as Prescribed in CFR 232.205

CLASS 1 AIR BRAKE TEST

LOCATION _____

DATE _____

TIME COMPLETED _____

TRAIN _____

LOCATION _____

ENGINE NUMBER _____

REAR CAR # _____

BRAKE PIPE LEAKAGE _____

AIR FLOW _____

QUALIFIED PERSON(s) PARTICIPATING IN AIR BRAKE TEST

_____

HEAD END DEVICE

DATE TESTED: _____
TIME TESTED: _____
LOCATION TESTED:_____

TESTED BY: _____

REAR END DEVICE

REAR END DEVICE #: _____
% OF BATTERY LEFT: _____
TIME 2-WAY TESTED: _____
DATE 2-WAY TESTED: _____

TESTED BY: _____

EXTENDED HAUL TRAIN (PER CFR 232.13) _____***YES*** _____***NO***

ORIGINAL—PLACE ON CONTROL STAND OF LEAD LOCOMOTIVE IN PLAIN VIEW OF ENGINEER. FEDERAL LAW REQUIRES THIS CERTIFICATE REMAIN ON LEAD LOCOMOTIVE UNTIL FINAL DESTINATION.

COPY—LOCAL COPY, MUST RETAIN FOR A MINIMUM OF 30 DAYS

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Visitor Sign-in Log

Date	Name (First, MI & Last)	Company/Agency Information			Purpose of Visit	Time		Identity Verification	SFTY Briefing	EMPL Initials
		Employer	Address	Phone #		Arrival	Departure			
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	
						AM PM	AM PM	☐ Yes ☐ N/A	☐ Yes ☐ N/A	

Visitor Sign-in Log

Date	Name (First, MI & Last)	Company/Agency Information			Purpose of Visit	Time			Identity Verification		SFTY Briefing		EMPL Initials
		Employer	Address	Phone #		Arrival	Departure						
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
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						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
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						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	
						AM PM	AM PM		☐ Yes	☐ N/A	☐ Yes	☐ N/A	

14. Waste Management and Disposal

14.1 Waste Definitions and Characteristics

A facility is legally responsible for properly identifying ALL of its waste. Any person who generates a solid waste must determine if a waste is hazardous using the following:

- Determine if it is excluded, or
- Determine if it is a listed hazardous waste, or
- Determine, through analysis, if the waste is hazardous due to a hazardous characteristic.

14.1.1 Waste Definition

The initial step in waste management occurs when a waste is first generated. A waste is any solid, semisolid, liquid, sludge, or contained gas that is discarded and not excluded in the regulations. It can be a product or raw material that has been used to the extent it is no longer fit for its purpose. Discarded materials include those which are disposed of, burned, incinerated, accumulated/stored/treated prior to disposal, applied to the land, burned for energy recovery, reclaimed, or accumulated speculatively.

14.1.2 Waste Types

Wastes can be classified as follows:

- Refuse
- Toxic Substances Control Act (TSCA)
- Industrial
- Recyclable
- Hazardous

14.1.3 Refuse

Refuse, or garbage, includes things like milk cartons, coffee grounds, wall board, and empty containers. Office and lunchroom trash are considered refuse.

14.1.4 Industrial Wastes

Industrial wastes are wastes which pose a potential for environmental contamination, have potential long term cleanup liability, but do not qualify for regulation as hazardous waste. These wastes include oily debris and soil, carbon zinc and alkaline batteries, sand blast materials, used antifreeze treated wood (e.g. poles, crossarms, railroad ties), etc. They may be accepted by sanitary landfills, but require advance notification and special disposal arrangements.

14.1.5 Recyclables

Recyclables are items that are recycled or reused. Many of these items would be classified as hazardous waste if they were not recycled. Examples of recyclables are wet cell batteries, scrap metals, and used and waste oil/off spec fuels. Waste oil and off-spec fuel can be recycled by an approved oil recycler.

14.1.6 Hazardous Waste

Hazardous waste displays a hazard characteristic(s) or is specifically listed. These wastes include spent solvents, mercury, and oils/oily debris contaminated with halogenated solvents. This type of waste is the most stringently regulated and must be recycled, treated and/or disposed of only at specially permitted facilities. The SHE&Q manager is responsible for proper classification of wastes.

As a generator, Vancouver Energy is liable for environmental contamination that may be caused by waste shipped off-site and retains responsibility should the transporter or off-site handlers be unable to

pay the costs of cleanup. For this reason, special care is needed to ensure that wastes are properly managed during transport and at the point of off-site recycling, treatment, storage, or disposal.

The SHE&Q Manager will be directly responsible for the following shipping activities:

- Packaging
- Receiving Shipping Manifest and Labels
- Loading
- Return Manifest

15. Lockout/Tagout Procedures

15.1 Policy

All employees who may be exposed to energized or potentially energized equipment shall be properly protected from the unexpected energy or start-up of that equipment.

15.2 Purpose and Scope

The purpose of this procedure is to establish minimum guidelines to ensure the safety and health of personnel who may be required to work on any type of equipment capable of being energized or harboring stored energy.

This procedure applies to all employees and subcontractors engaged in operations covered by the Company Health and Safety Program and who may be required to work on this type of equipment or otherwise be exposed to the unexpected energy of this equipment.

Additionally, the purpose of this lock and tag out procedure is to prevent injury and/or death to personnel by requiring that certain precautions be taken before servicing or repairing equipment. This includes shutting "off" and "locking out" the electrical power source of the equipment.

On pneumatic and hydraulic systems, the pressure must be released and lines either disconnected or double blocked (with bleed) or blinded, and locked out; if possible. In addition, a DANGER, "Do Not Use", "Do Not Open", or "Do Not Operate" tag is to be placed at the power sources and valves of all equipment being serviced.

15.3 References

- OSHA 29 CFR 1910.147; Control of Hazardous Energy; Lockout/Tagout
- OSHA 29 CFR 1926.417; Lockout and Tagging of circuits

15.4 Attachments

- Attachment 1: Lockout/Tagout Training Record
- Attachment 2: Lockout/Tagout Inspection Report
- Attachment 3: Examples of Lockout/Tagout Devices
- Attachment 4: Test

15.5 Definitions

1. Affected Employee. An employee whose job requires him/her to operate or use a machine or equipment on which servicing is being performed under the lockout/tagout program, or whose job requires him/her to work in an area where such servicing is performed.
2. Authorized Employee. A person who locks or tags out machines or equipment in order to perform work on that machine or equipment.
3. Caution Tags. May be used to inform personnel of special precautions or instructions relative to safe and proper operation of equipment. This tag is not to be used to prevent equipment and systems from being operated.
4. Danger Tag-Electrical. The tag is attached to a switch, circuit breaker, and other electrical controlling devices to warn others that the equipment and/or system has been isolated from its power source (de-energized) and that employees are working on the equipment or system. The Danger Tag-Electrical placed on equipment or system is not to be removed by anyone other than the person whose signature is on the tag and the equipment and system is not to be operated with the tags in place.

5. Danger Tag-Mechanical. The tag is attached to valve handles, all applicable circuit breaker switches, and other operating mechanisms to prevent manipulation or operation of mechanical equipment and pressurized systems when work is being performed on same. It shall also be used to secure valves between operational and non-operational sections of a system. All Danger Tags-Mechanical shall be numbered in sequential order, and the letter M shall identify that the danger tag is to be used for MECHANICAL tagging only.
6. Danger Tag Log. Is a form that is completed by the Tagging Coordinator from the information supplied to him by users of danger tags.
7. Energy. Electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other source.
8. Energy Isolating Device. A mechanical device that physically prevents the transmission or release of energy.
9. Lockout. The placement of a lock out device (usually a lock) on an energy isolating device to ensure that the energy isolating device and the equipment being controlled may not be operated until the lockout device is removed.
10. Tagout. The placement of a tagout device (usually a tag) on an energy isolating device to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

15.6 Responsibilities

1. Safety Support Team
   a. The Safety Support Team will prepare and maintain a companywide safety air policy.
   b. Provide assistance to the various locations, as requested, in the implementation of this policy.
   c. Conduct regularly scheduled reviews of the policy to ensure compliance with the S7 operating system and any applicable regulatory agencies.
2. Operations Managers and Supervisors
   a. Operations Managers and Supervisors are responsible for assuring the overall implementation of and compliance with the Company's compressed air procedure.
3. Lead Safety Specialist and Safety Specialist: It is the responsibility of each Lead Safety Specialists and Safety Specialists to assist the management to
   a. Continuously monitor the work to assure compliance with this procedure.
   b. Confirm each job has been properly evaluated for hazards and that these hazards have been properly eliminated or controlled.
   c. Ensure employees are aware of any hazards associated with their work.
   d. Ensure employees have received proper training.
   e. Ensure an adequate supply of energy isolating devices (i.e., locks, tags, etc.) are readily available.
   f. Confirm each job is properly prepared by operations/customer personnel prior to Company employees implementing lockout/tagout procedures.
   g. Ensure employees adhere to all requirements of this procedure.
4. Employees: Employees performing work tasks covered by this procedure must
   a. Be knowledgeable of the any hazards or requirements associated with their work.
   b. Wear the appropriate equipment according to training received and knows the uses, limitations and care of this equipment.
   c. Inspect equipment prior to each use and remove any defective equipment from service.
   d. Maintain assigned equipment in a clean and operable condition, and store/dispose of it according to training received.
   e. Report any problems or questions to Supervision promptly.

15.7 General Procedures

1. Energy Isolating Devices (Locks and Tags)
   a. Locks
      1) Multi-lock devices and locks (hereafter "lockout devices") used for the purpose of isolating an energy source shall not be used for any other purpose. Lockout devices for energy source isolation must have a means of identification that distinguishes them from any other locking device on the project. A particular color, shape, or size may be used as the means of identification. Lockout locks must be

individually keyed, and while in use, the key shall remain in the possession of the individual who placed the lock. Master keys for lockout locks must be placed in a lock box in the possession of the uppermost Company Supervisor assigned to the Site or his/her Designee.

2) A lockout roster should be used to identify the location of a lockout lock while it is in use. Lockout devices must be durable and able to withstand the environment to which they are exposed for long periods of time.

3) All devices must include the identity of the employee applying the device.

2. Tags
   a. Tags used in conjunction with lockout devices for the purpose of isolating an energy source shall be standardized in such a way to serve as a prominent warning, i.e., DANGER - DO NOT OPERATE. The tag must have informational spaces available for date, identification of energy source, and name of individual placing tag. The construction, markings, and written information on the tag shall be of such to ensure deterioration will not occur when exposed to weather and/or corrosive environment.
   b. The means of attachment shall be of a non-reusable type, attachable by hand, self-locking with a strength to withstand at least 50 lbs of pull and have the basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.

3. Isolation
   a. Prior to isolating (hereafter locking out) or taking equipment out of service, approval must be obtained by the Customer Operations Department. If the equipment to be locked out is not under the control of the customer or other third parties, Company Supervision must make certain the requirements of this procedure are followed.
   b. There are two methods of locking out, dependent upon the complexity of the system and/or equipment involved. The uppermost Company Supervisor assigned to the site shall determine which method is appropriate.
      1) Individual Lockout Method
         The individual lockout method may be used for routine tasks that require locking out an energy source for a short period of time and such work will affect only a minimum number of employees. In this instance, each employee working on, or who could possibly be exposed to a hazard by the unexpected energization or release of energy shall:
         a) Place a lockout device on each appropriate energy isolating device.
         b) Place a completed tag onto each lockout device.
         c) Remove individual lockout devices and tags after verification that all work is completed.
      2) Complex Lockout Method
         The complex lockout method may be used, at the discretion of the uppermost Company Supervisor assigned to the project, when many isolation devices must be locked out such as a unit or system shutdown. In this instance, each uppermost Department Supervisor of the workers affected by the lockout must:
         a) Place a single lockout device on each energy isolating device.
         b) Place a single completed tag on each lockout device.
         c) Ensure that all work of employees under his/her supervision is completed and that his/her employees will no longer be affected by the lockout prior to removal of lockout devices and tags.

4. Electrical Lockout
   a. Whenever electrical work is scheduled to be performed on electrical equipment or services, the power source (disconnects, circuit breakers, switches) controlling the electrical powered equipment or systems shall be de-energized. A completed Danger Tag-Electrical shall be attached to the controlling device by the person responsible for de-energizing the system. The Project Supervisor shall then place his completed Danger Tag-Electrical on the controlling device after it has been placed in an open position (de-energized).
   b. Technicians required to work on the de-energized equipment or systems shall ascertain that the Project Supervisor and/or their supervisor's completed Danger Tag-Electrical is attached to the controlling device or devices before they commence work.
   c. In those instances where the controlling devices permit, a lock and tag shall be placed on the device by each employee to ensure that the controlling device is not inadvertently energized while the work is being done.

d. The de-energized equipment or system shall be tested by using a voltmeter on the downstream side of the tagged-out controlling device. If the equipment is wired directly to a power panel box and is energized by turning on the push-button or butterfly switch on the equipment, the power panel box on the downstream side must be tested by using a voltmeter.

e. Lockout of Electrically Powered Shop Equipment- to provide maximum employee safety, a power disconnect switch shall be installed between the main power supply panel and each piece of electrically driven equipment, which is directly connected to the power panel box. (This does not apply to equipment that is equipped with a plug connection, including welding equipment.) This disconnect switch should be located in close proximity to the equipment and properly identified. Push-buttons or butterfly controls of equipment should not be locked out. A short circuit can occur between a locked out push-button and relay resulting in rendering the equipment energized with full power. Some equipment is wired with dual controls and the locking out of one push-button would not render that equipment as being inoperable. After tag and lockout, try the "start" button to be certain the disconnection is complete.

f. Whenever maintenance of shop equipment is required, such as changing the blade of a radial arm saw, the craft operator shall ascertain that the controlling device (power disconnect) has been tagged and locked out before the maintenance work commences.

g. Following the application of the lockout or tag out devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe. If there is a possibility of re-accumulation of stored energy level, verification of isolation will be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

5. Mechanical Lockout

a. Whenever work, is scheduled to be performed on mechanical equipment or pressurized systems, the controlling devices, such as circuit breakers, switches, valve handles, and other operating mechanisms, shall be locked and tagged out to prevent the manipulation or operation of such equipment or systems.

b. Those craft workers required to work on equipment or a pressurized system shall ascertain the Project Supervisor and their supervisor's completed Danger Tag-Mechanical is attached to the controlling device or devices before they commence work.

c. In instances where the controlling devices permit, a lock shall be placed on the device by each employee to ensure that the controlling device is not inadvertently energized.

d. The de-energized equipment or system must be checked out or tested to ascertain that the equipment is inoperable or the pressurized system has been drained of its contents on the downstream side. Pressurized systems must then be flushed out with water if liquids are involved or with inert air if compressed gases are involved to prevent harmful exposure.

e. Appropriate air tests shall be conducted whenever pressurized systems have previously contained hazardous gases or liquids; especially should welding and burning operations be involved when the system has been shut down. When valuing of a pressurized system, blanks are preferred with an open drain cock between valves.

6. Use of Danger Tags

a. Danger tags are not to be considered as a positive means of securing equipment, but are to be used in conjunction with locks. Tags will be used only to identify that work is being done on a valve, switch, or piece of equipment when injury or property damage could result from the operation. No work is to be done on any operable equipment until the operation of it is prevented by the use of this procedure.

b. Danger tags should be used as outlined below:

1) Only the standard construction DANGER tags will be used. These may also include either the words "DO NOT USE" or "DO NOT OPEN" depending on the operations at hand.

2) All tags are to be securely attached, dated, and signed by the person performing the work.

3) Tags should be destroyed immediately on removal except those that are designed to be reused. However, no alterations are permitted.

4) No piece of equipment or device should be operated when there is a tag or lock attached, regardless of circumstances.

5) No person should ever remove worker's tag or lock. Only the worker who placed the lock and tag on the equipment should remove it.

6) It is the responsibility of the Project Supervisor or supervisor to see that no work is performed beyond the protection of locks and tags that have been installed.
7) Workers may place "multi-lock" devices on the equipment if other employees or trades are involved. All persons working on the equipment must have their own lock and tag in place.

c. Unauthorized Use of Danger Tag
1) The standard Danger Tag, Electrical or Mechanical, shall be used only for the purpose of identifying a de-energized piece of equipment or system. It is not to be used as a substitute for a defective tag or a caution tag.
2) The unauthorized operation of a controlling device of a de-energized system or piece of equipment that has been tagged-out with a Danger Tag shall be grounds for immediate termination of the involved employee(s).

7. Lockout/Tagout Sequence
a. Prior to an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the methods or means to control the energy.
b. The machine or equipment shall be turned off or shutdown using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazards to employees as a result of the equipment stoppage.
c. All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source.
d. The worker places the tag on all controls to warn others that the equipment is not to be operated. The worker writes the reason on the tag(s), identifies the equipment and dates and signs each tag.
e. Lockout or tag out devices shall be affixed to each energy isolation device by authorized employees. Lockout devices shall be affixed in a manner that will hold the energy isolating devices in a safe or off position. Tag out devices shall be affixed in such a manner that will clearly indicate that the operation or movement of energy isolating devices from the safe or off position. Where tag out devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached. Where a gat cannot be affixed directly to the energy isolating device, the tag shall be located as close as safety possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.
f. The worker will pull power switches and/or circuit breakers and place a lockout clip(s) and a lock(s) on the controls to make them inoperative. Other power sources such as air, steam, tension, or hydraulic may require blinding, disconnection, or valve locking.
g. After the worker has tagged and locked the equipment, the equipment should then be tried to assure that it will not operate.
h. All Company locks and tags should be installed first and removed last, if possible.
i. When other crafts are required to work on the same equipment, they must place their personal locks and tags on each piece of equipment.
j. All crafts must "try" equipment after installing their personal locks to assure, once again that it will not start.
k. Locks and tags must remain on controls until work has been completed and it is safe to statt the equipment. If maintenance or electrical work is to continue into the next shift, persons going off shift shall remove their "personal" lock and leave their tag on the equipment. Persons coming on shift must install their own personal lock(s) and tag(s) if they will be working on the equipment.
l. Upon completion of work, all other crafts will remove their locks and tags first. Company locks and tags are to be removed last after it is determined that the equipment is safe to operate.
m. No equipment should be started by anyone (including bumping to check rotation) without permission from the Company Project Supervisor or supervisor responsible for the equipment.
n. Following the application of lockout or tag out devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained and otherwise rendered safe. If there is a possibility of re-accumulation of stored energy level, verification of isolation shall be continued until the servicing or maintenance is completed or until the possibility of such accumulation no longer exists.
o. Prior to starting work on machines or equipment that have been locked or tagged out, the authorized employee will verify that isolation and energization of the machine or equipment have been accomplished.

p. When the lockout/tagout devices must be temporarily removed, the following will take place: tools will be cleared away; employees will be removed from the area; the lockout/tag out device is removed; the equipment will be energized and testing will proceed; the equipment will be de-energized and control measures will be reapplied. This procedure will be documented by a qualified person.

8. Group Lockout/Tagout
   An authorized employee who has primary responsibility for a set number of employees working under the protection of a group lockout or tagout will ascertain the exposure status of individual group members. Each employee shall attach a personal lockout or tag out device to the group's device while he/she is working and then removes it when finished. During shift change or personnel changes, specific procedures are reviewed to ensure the continuity of the lockout or tagout procedures.

9. Shop Equipment
   a. The qualified operator of shop equipment may lock out his equipment to change tools, chucks, blades, and perform similar tasks.
   b. A power disconnect switch must be provided for this purpose at or near the equipment unless the equipment can be unplugged.
   c. Push-button or butterfly controls may not be used for purposes of lockout.
   d. A lock with a tag may be used for this purpose.
   e. The above does not apply to any maintenance or repair work that is done by other than the authorized operator.

10. Locks
    a. Only individual keyed locks will be used. The key will remain in the possession of the person placing the locks.
    b. A master series of locks to be used specifically for lockout may be provided to each department that requires them. Master keys for the department will remain in the possession of the Safety Specialist.

11. Records
    A log book is to be maintained in a controlled central location. Each Tag number will be listed in the Log Book. After completion of the job task, the tags will be removed and turned into the customer.

12. Warning
    Due to the serious consequences of not following this procedure:
    a. Any person who operates an energy source isolation device to which lockout devices and tags are attached, or removes a lockout device or tag without authorization will be subject to immediate discharge.
    b. Any person who works on an energy source without following this procedure will be subject to immediate discharge.
    c. Prior written approval from uppermost Company Manager must be obtained in order to deviate from this procedure.

15.8 Training

1. All employees who are responsible for following this procedure must receive training in the procedure. This includes all employees who perform the following duties: maintenance, repair, or construction personnel, janitorial or clean-up personnel.
2. Following initial training in lockout/tagout principals, each employee will receive an annual follow-up training session. Each training session shall include at minimum the following.
   a. Recognition of the hazardous energy source, type and magnitude of energy available, methods and means necessary for energy isolation and control.
   b. The purpose and use of the energy control procedure.
   c. Provisions for when any other employee whose work operations are or may be in an area where energy control procedures may be utilized.
   d. When tagout systems are used, including the limitations of a tag.
   e. A tag is not to be removed without authorization.
   f. The tag is never to be ignored or defeated in any way.

3. Employee Retraining
    a. Retraining shall be provided for all authorized and affected employees whenever there is a change in their job responsibilities, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.
    b. Additional retraining shall also be conducted whenever a periodic inspection reveals that the procedure and the requirements of the standard are not being followed, or whenever the employer has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures. Retraining will re-establish the employee's proficiency and introduce new or revised control methods and procedures. The retraining shall be documented, containing each employee's name and dates of retraining.
4. Training documentation, including copies of all quizzes and training rosters, will be maintained at the site on the Lockout/Tagout Training Record Forms (Attachment 1).

15.9 Inspection and Storage

1. Periodic Inspection
    a. A periodic inspection of the lockout/tag out procedure shall be performed at least annually and also after any incident involving implementation of the lockout/tagout procedure to ensure the requirements of the procedure are being followed.
    b. The periodic inspections shall be performed by an Authorized Employee other than the one(s) utilizing the lockout/tagout procedure.
    c. The periodic inspection shall be conducted to correct any deviations or inadequacies identified.
    d. Where lockout/tagout is used for energy control, the periodic inspection between the inspector and each authorized and affected employee shall include a review of that employee's responsibilities while using the Lockout/Tagout Procedure.
    e. The site shall certify that the periodic inspections have been performed. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.
    f. See Lockout/Tagout Inspection Report Form (Attachment 2).

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Attachment 1
Training Record

My signature below acknowledges that I have received training on the Lockout/Tagout procedure, and that I fully understand the requirements of this procedure. I further agree to abide by these requirements and understand that violation is subject to disciplinary action up to and including discharge.

Name (Print)	Signature	SSN	Date of Training

Attachment 2
Inspection Report

Project Number: _____ Location: _____

Project/Site Manager: _____

Date of Inspection: _____

Machine/Equipment Used: _____

_____

_____

_____

Employees included in Inspection: _____

_____

_____

_____

Inspection Results: _____

_____

_____

_____

Review of Incidents (involving lockout/tagout): _____

_____

_____

_____

Conclusion and Findings: _____

_____

_____

_____

Annual Training Completed and Documented: Yes _____ No _____

Inspector: _____ Signature: _____

Site Manager: _____ Signature: _____

Attachment 3
Examples of Lockout/Tagout Devices

Typical Lockout Locks

Typical Tagout

Typical Multiple Lockout HASP

Attachment 4
Lockout/Tagout Test

Name: _____ Date: _____

1. Lockout is the preferred method over tagout for isolating machines or equipment from energy sources.

   TRUE _____ FALSE _____

2. All devices must be durable and able to withstand weather and corrosive environments and standardized within the facility either by color, shape, or size and must contain standardized print.

   TRUE _____ FALSE _____

3. A system of one lock and one key will be used.

   TRUE _____ FALSE _____

4. Tagout device attachments must be of the non-reusable type and have the basic strength characteristics of a one-piece all-weather nylon cable tie.

   TRUE _____ FALSE _____

5. Tags should provide warnings, such as

   a. DO NOT OPERATE
   b. DO NOT OPEN/CLOSE
   c. DO NOT START
   d. DO NOT TOUCH
   e. All of the above

6. The sequence of lockout or tagout system procedure is as follows:

   a. Notify all affected employees that a lockout or tagout system is going to be utilized.
   b. If the machine is operating, shut it down by the normal stopping procedure.
   c. Operate the switch, valve, or other energy isolating device(s) to isolate the equipment from its energy source.
   d. Lockout and/or tagout the energy isolating device(s) with assigned individual lock(s) and/or tag(s).
   e. After ensuring that no personnel are exposed, try to operate the push-button or other normal operating controls to make certain the equipment will not operate.
   f. All of the above.

_____ _____

Employee's Signature Date

_____ _____

Trainer's Signature Date

Vancouver Energy

16.0 - Fire Protection Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

Poole Fire Protection
19910 West 161st Street
Olathe, Kansas 66062

Revision Summary

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Vancouver Energy
Fire Protection Plan (Section 16.0)

Table of Contents

Section

1. Introduction 3
2. Facility and Area Overview 3
2.1 Facility Overview 3
2.2 Area 200 – Unloading and Office 3
2.3 Area 300 – Storage 4
2.4 Area 400 – Marine Terminal 4
2.5 Area 500 – Transfer Pipelines 4
2.6 Area 600 – West Boiler 4
3. Applicable Design Criteria 4
4. Site Water Supply 5
4.1 Water Supply Overview 5
4.2 Adequacy 6
4.3 Arrangement of Fire Hydrants and Water Supply 6
4.3.1 Area 200 – Unloading and Office 6
4.3.2 Area 300 – Storage 6
4.3.3 Area 400 – Marine Terminal 7
4.4 Cross-Connection Control 7
5. Fire Pumps 8
5.1 General Overview 8
6. Fire Suppression Systems 8
6.1 Sprinkler Systems, Monitors, and Foam Suppression Systems 8
6.1.1 Use of Foam Fire Suppression Agents 8
6.1.2 Area 200 – Unloading and Office 9
6.1.3 Area 300 – Storage Area 9
6.1.4 Area 400 – Marine Terminal Area 11
7. Fire Alarm System 11
7.1 Fire Alarm System Overview 11
7.2 Fire Alarm Panel Reporting Capability 12
7.3 Initiating Devices 12
7.3.1 Linear Heat Detection 12
7.3.2 Foam System Manual Release Stations 13
7.3.3 Waterflow Switches 13
7.3.4 Manual Pull Stations 13
7.3.5 Smoke Detectors 14
7.3.6 Gas Detection 14
7.3.7 Valve Tamper Switches 14

7.4 Fire Alarm Notification Appliances 14
8. Conclusion 14

1. Introduction

This document has been developed at the request of Tesoro Savage Petroleum Terminal LLC (the Applicant) to provide a high level overview of the Fire Protection (FP) and Fire Alarm (FA) systems and equipment proposed for Vancouver Energy (Facility). This document describes: the conditions which activate or trip the respective fire safety systems; what alarms or signals are transmitted; the anticipated result of the system; and site water supply.

2. Facility and Area Overview

2.1 Facility Overview

The Facility is located at the Port of Vancouver in the City of Vancouver, Washington. This Facility will unload crude oil from railcars, pump the crude oil to storage tanks and then pump the crude oil from the storage tanks to the transport vessels at the Marine Terminal Area. The Facility has been broken down into five separate and distinct areas: 1) Area 200 – Unloading and Office; 2) Area 300 – Storage; 3) Area 400 – Marine Terminal; 4) Area 500 – Transfer Pipelines; and 5) Area 600 – West Boiler. Below is a brief description of each area.

2.2 Area 200 – Unloading and Office

The rail unloading facilities will include three tracks and associated equipment for unloading of crude oil. The unloading tracks will be located inside a structure. Each unloading track will accommodate 30 cars for a total length of approximately 1,800 feet. The structure will be approximately 1,850 feet long and 90 feet wide to accommodate the length of these unloading tracks and the unloading operations.

The structure has a complete metal roof, while the walls will only consist of seven metal wall panels spaced along the south side of the structure. These seven metal wall panels will be spaced at locations corresponding with E-houses, the fire pump/foam skid building, and other appurtenances that are to be located on the south side of the structure. The remainder of the wall area on the structure will be open. Within the structure there will be two elevated walkways running the length of the structure used in the unloading process, and five crossover egress walkways providing access to the north and south sides of the structure spaced approximately every 357 feet. There will be three rail tracks running east to west, two trenches (approximately 7- 9 foot wide by 5 foot deep) accommodating the piping system that is used to transport the crude oil to the pump basins (located between the tracks), and 10 pump basins (5 per trench), which will be spaced approximately every 355 feet that house the transfer pumps. These transfer pumps will be used to pump the crude oil from Area 200 to the storage tanks in Area 300. The structure will be completely protected by a fire detection and sprinkler system.

Access stairs will be provided between the railcars which will enable workers performing any unloading operations at the track level to exit up the stairs to the elevated crossovers and over the railcars to reach an exterior exit from the structure.

Other structures located in the Area 200 include control room/E-houses and the fire pump/foam skid building.

The Facility will require three approximately 3,400-square-foot office buildings to house administrative functions, lockers, restrooms, and other employee support facilities. These buildings will be located approximately 225 feet to the North of the rail unloading structure. These buildings consist of modular office trailers that are pre-built off site and placed at their specific location on the job site. The Office Building and change rooms will not be provided with an automatic suppression system.

2.3 Area 300 – Storage

Six above ground storage tanks will be constructed in Area 300. The storage tanks will have a nominal storage capacity of 380,000 barrels (15,960,000 gallons) each and they will be approximately 50 feet tall with a diameter of 240 feet. All tanks will be located inside a perimeter dike capable to contain 110% of the volume of the largest tank plus the anticipated precipitation from a 24 hour, 100 year storm. The tanks will be positioned so that the distance between each tank is 120 feet in any direction. The distance from the tank to the dike varies from a minimum distance of approximately 33 feet to a maximum of 150 feet.

Other structures located in the Area 300 will include a Pump Basin for the pumps that will be used to transfer the crude from the tank storage area to the vessels at Berth 13. A Storage Building, a control room/E-house, and a Fire Pump and Foam Building will also be located in Area 300.

2.4 Area 400 – Marine Terminal

The Marine Terminal Area will consist of berths 13 and 14. Crude oil will be pumped from the Storage Area in a 36-inch pipe to Berth 13. The berth will be able to accommodate vessels with varying capacities, with loading rates of up to 32,000 barrels per hour. Safety measures include automatic shutoff valves, a return and stripping line for the crude to return back to the storage tanks, a marine vapor combustion unit, floating booms and manual fire protection features.

Berth 14 will be used for storage of and access to a skiff that will be used to deploy a fence boom in the water around the ship. There are no crude loading operations planned for Berth 14. Safety measures include manual fire protection features.

Other structures located at the Marine Terminal Area will include a control room/E-house, vapor blower staging unit, Fire Pump and Foam Building, and a dock safety unit.

2.5 Area 500 – Transfer Pipelines

The transfer pipelines consist of the pipeline runs between Area 200 Unloading and Office and Area 300 Storage and between Area 300 and Area 400 Marine Terminal. The transfer pipelines will be mainly constructed aboveground and on supports. Where road or rail crossings occur and in other areas of limited space, the piping would be located underground or raised above the ground in accordance with standard American Railway Engineering and Maintenance-of-Way Association (AREMA) clearances.

2.6 Area 600 – West Boiler

The West Boiler area contains a boiler building that will house equipment utilized to generate steam to heat heavier crudes to assist with unloading operations inside the unloading structure at Area 200. Other than the E-house, no other buildings will be located on the Area 600 site. The west boiler building will not include an automatic fire suppression system.

3. Applicable Design Criteria

Below is a list of codes and standards are applicable for this Facility and have been used or referenced as it relates to the fire protection and safety features related to this Facility. There may be other Codes and Standards referenced or utilized, but these are the ones that have been used or referenced for the fire protection aspects of the Facility:

- ANSI Z358.1, Standard for Emergency Eyewashes and Shower Equipment, 2009
- API 2021 – Management of Atmospheric Storage Tank Fires
- API 2030 – Application of Fixed Water Spray Systems for Fire protection in the Petroleum Industry
- API STD 2610 - Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities

- Factory Mutual Data Sheet 2-0, Installation Guidelines for Automatic Sprinklers, April 2011
- Factory Mutual Data Sheet 3-0, Hydraulic of Fire Protection Systems, March 2010
- Factory Mutual Data Sheet 3-26, Fire Protection Water Demand for Nonstorage Sprinklered Properties, July 2011
- FMDS 4-0, Special Protection Systems, April 2012
- FMDS 4-7N, Low Expansion Foam Systems, September 2010, (Interim Revision January 2013)
- Factory Mutual Data Sheet 4-12, Foam-Water Sprinkler Systems, October 2011
- Factory Mutual Data Sheet 5-40, Fire Alarm Systems, September 2007
- Factory Mutual Data Sheet 5-48, Automatic Fire Detection, January 2011
- Factory Mutual Data Sheet 7-32, Ignitable Liquid Operations, April 2012
- Factory Mutual Data Sheet 7-88, Flammable Liquid Storage Tanks, October 2011
- International Building Code, 2012
- International Fire Code, 2012
- International Safety Guide for Oil Tankers and Terminals (ISGOTT), Fifth Edition
- NFPA 10, Standard for Portable Fire Extinguishers, 2010
- NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam, 2010
- NFPA 13, Standard for the Installation of Sprinkler Systems, 2010
- NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection, 2012
- NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems, 2011
- NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, 2010 Edition
- NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 2010
- NFPA 30, Flammable and Combustible Liquids Code, 2012 Edition
- NFPA 70, National Electrical Code, 2011
- NFPA 72, National Fire Alarm and Signaling Code, 2010
- NFPA 307, Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves, 2011 Edition

4. Site Water Supply

4.1 Water Supply Overview

Currently the site has existing water mains provided from both the City of Vancouver and the Port of Vancouver. Two tests were performed on May 30, 2013 on fire hydrants at Area 300 - Storage and Area 400 - Marine Terminal on the City of Vancouver water distribution system. They yielded the following flow test results:

Area 300 - Storage:

Static Pressure = 84 psi

Residual Pressure = 63 psi

Flow = 2,005 gpm

Area 400 - Marine Terminal:

Static Pressure = 81 psi

Residual Pressure = 62 psi

Flow = 2,127 gpm

Based on the information provided by the City of Vancouver, below is the available water supply for the Area 200 rail unloading structure:

Static Pressure = 50 psi

Residual Pressure = 20 psi

Flow = 2,500 gpm

The City of Vancouver water distribution system will supply water to the fire hydrants on the South side of the rail unloading structure as well as the fire pump that feeds the suppression systems inside the Rail unloading structure.

Additionally, the City of Vancouver water distribution system will supply water to the fire pump, which in return will supply water to the suppression systems on the tanks, and the fire hydrants around the dike at the Storage Area.

The City of Vancouver water supply at the Marine Terminal Area will supply the fire pump that feeds the elevator monitor nozzles equipment to the dock.

4.2 Adequacy

The current available water supply will be supplied from the on-site dedicated fire water gridded distribution system. It is been discussed and confirmed that the on-site system water supply available from the City of Vancouver to the Facility is more than adequate to meet the demand of the manual fire operations and the automatic fire suppression system. The City of Vancouver system is accessible at all Facility site locations and has been deemed reliable; therefore, the City of Vancouver water supply will be the water service used in the design of this Facility, not the Port of Vancouver water supply.

4.3 Arrangement of Fire Hydrants and Water Supply

4.3.1 Area 200 – Unloading and Office

Fire hydrants will be provided on the south side of the Rail unloading structure spaced at every 300 feet accessible fire department apparatus. The fire hydrants will be supplied by the City of Vancouver water distribution system.

The hydrants will be located on the south side of the track that is located south of the Rail unloading structure. Procedures will be in place for cooperation with those companies using the tracks to the south of the unloading building to allow access to the unloading building from the hydrants

The fire pump supplying water to the automatic fire suppression systems in the Rail unloading structure is supplied from the City of Vancouver water distribution system. The fire pump is located in the Fire Pump/Foam Building immediately adjacent to the Rail unloading structure.

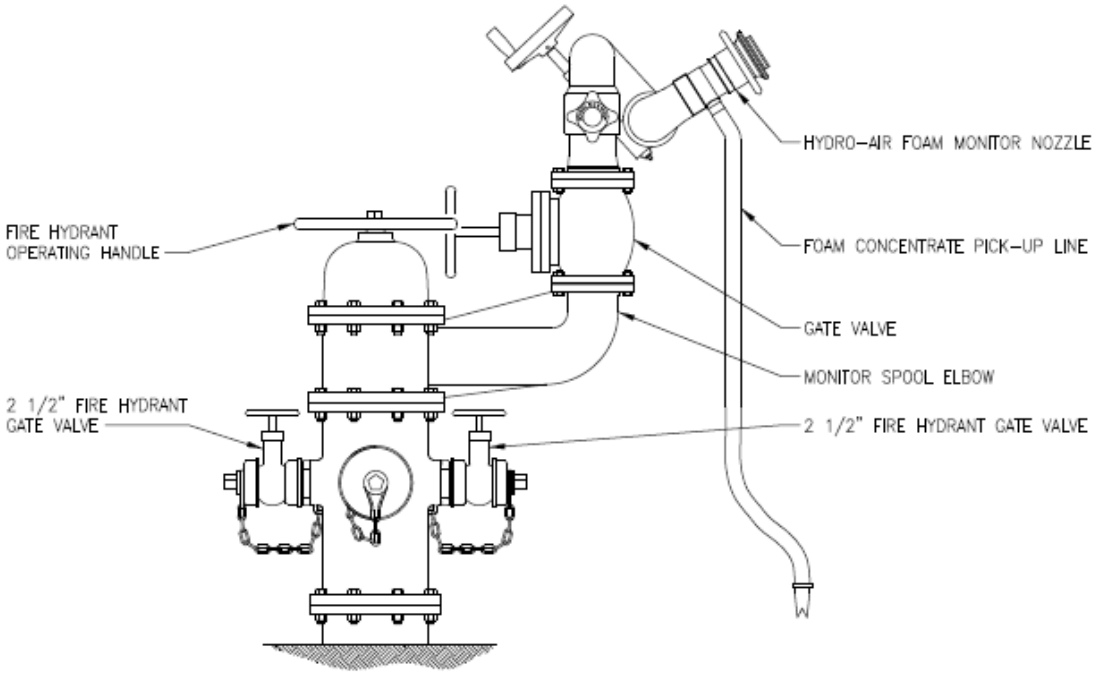
4.3.2 Area 300 – Storage

Fire hydrants will be provided for fire department use around the perimeter of Area 300 - Storage accessible by fire department apparatus. The fire hydrants will be located on the dike spaced every 300 feet, with two fire hydrants located inside the dike area near the intersection of the intermediate dikes. These fire hydrants will be supplied from the fire pump for the storage area and will include a monitor nozzle that can be used to cool the tanks, reduce fire exposure and also be used to apply the self-healing biodegradable foam.

Each hydrant will be equipped with a monitor nozzle and foam eductor and pick-up line that can be placed in a bucket, pail or other portable device of foam concentrate, which through a venture effect, will draw foam concentrate from the pail/container to generate a foam solution (see figure below).

The flow of water from these monitor nozzles are provided to create a cooling effect on the tank wall. The foam educator provided on each monitor nozzles will allow the hydrant to spray a foam water solution and control a small pool fire within the dike area. A predetermined size of foam concentrate stored in bucket, pail or other portable device will be kept in the Fire Pump / Foam Building. When the need arises for its use, such as a small spill or rubbish fire, the foam concentrate will be taken to the appropriate fire hydrant and the hose placed in the bucket, pail or other portable device. The nozzle will draw the foam in at the manufacturer determined proportioning rate to achieve the desired concentration of foam/water solution.

Additionally, an elevated monitor nozzle supplied with foam-water from the Fire Pump / Foam Building will be located near the crude oil pump basin with the primary purpose of providing manual fire suppression to the pump basin. This monitor nozzle for the crude oil pump basin will be capable of providing a 3% foam application to the pump basin area. Utilizing a flow rate of 750 gpm will provide coverage of the crude oil pump basin.



The City of Vancouver water distribution system will supply water to the fire pump being provided to supply water to the automatic fire suppression systems for the storage tanks and to the fire hydrant/monitor system around the perimeter of the storage area. The fire pump is located in the Fire Pump/Foam Building immediately west of the storage tanks along the edge of the dike.

4.3.3 Area 400 – Marine Terminal

A fire hydrant will be provided for fire department use near Area 400 - Marine Terminal. The on-site City of Vancouver water distribution system will supply water to the fire hydrant and the fire pump for this area to support the fire protection systems at the Marine Terminal area. The fire pump will be located in the Fire Pump/Foam Building immediately adjacent to the Marine Terminal area.

4.4 Cross-Connection Control

A backflow prevention assembly will be on the water supply for each of the above described areas upstream of the fire pump to protect the potable water distribution system. Due to the design including foam, reduced pressure backflow prevention assemblies will be utilized.

5. Fire Pumps

5.1 General Overview

Fire pumps will be required to supplement the city water supply at all locations; the rail unloading structure, the Area 300 - Storage, and Area 400 - Marine Terminal. The fire pumps will be diesel driven, as power is not considered to be reliable per the definition in NFPA 20, and there are no plans for the Facility to have backup power. The fire pumps will be located in a skid enclosure that will also contain the fire suppression system risers as well as fire alarm equipment. The Fire Pump / Foam Buildings will be completely sprinklered and separated from any other occupancies/structures as required by NFPA 20 to help ensure the reliability of the fire protection systems and fire pumps.

The fire pumps will be set up to automatically start upon a drop in pressure downstream of the fire pump system. The pressure drop will be monitored to a pressure switch in each fire pump controller. Once the pressure switch reaches the predetermine setting, a signal will be sent from the fire pump controller to the diesel engine to automatically start the engine/pump. The fire pump will boost the pressure and flow rate in the respective system to provide the required flow rate and pressure to the respective fire suppression system.

Upon the opening of a fire hydrant around Area 300 - Storage, or the tripping of one of the fire suppression systems (sprinkler or foam system) the pressure would reduce requiring the respective fire pump at the respective area to activate increasing the pressure in the fire protection system to provide adequate fire flow (pressure and flow rate) to meet the demand of the respective system.

The Area 300 - Storage Fire Pump and Foam Building will also include a jockey pump to maintain pressure of the underground piping around the dike. The jockey pump is only meant to maintain pressure to account for thermal expansion, minor leaking in the underground piping and small fluctuations in pressure, having a flow rate of 5 – 10 gpm.

Below are the sizes of the fire pumps to be provided for each respective area:

- Area 200 Unloading and Office– 2000 gpm at 125 psi
- Area 300 Storage– 2500 gpm at 125 psi
- Area 400 Marine Terminal– 2000 gpm at 125 psi

6. Fire Suppression Systems

6.1 Sprinkler Systems, Monitors, and Foam Suppression Systems

6.1.1 Use of Foam Fire Suppression Agents

The best method of controlling a flammable or combustible liquid fire is through the use of foam fire extinguishing agents. The current plan is to use a self-healing biodegradable foam manufactured by Solberg which is an environmentally friendly product. Further discussion regarding environmental impact can be found in NFPA 11, Annex F.

The Harmonized Offshore Chemical Notification Format (HOCNF) applies to all chemicals used in connection with offshore exploration and production activities in the OSPAR maritime area. OSPAR is the mechanism by which fifteen Governments of the western coasts and catchments of Europe, together with the European Union, cooperate to protect the marine environment of the North-East Atlantic. This program includes any chemical that can be discharged into a river and ultimately find its way into the North Sea.

The raw materials used in the Solberg self-healing biodegradable foam have been evaluated to the HCNOF and is the only foam to date that has gone through this evaluation. This evaluation, which determines the impact of products discharged into marine and freshwater environments, concluded that the Solberg self-healing biodegradable foam is acceptable for use in the North Sea and in areas that discharge into the North Sea. As well, the German Institute of Hygiene has found the Solberg self-healing biodegradable foam to be of low impact upon discharge to the environment. It should be noted that fluorinated foam products will not achieve those listings because of the persistence of the fluorine molecule. For example, Solberg self-healing biodegradable foam is permitted by the Norwegian Government to allow runoff directly into the Fiords of the North Sea. This is not permitted with fluorinated surfactant based foam products.

Foam application will be limited to the minimum amount needed to control and extinguish a flammable or combustible liquid fire and to avoid to the extent practicable releases of foam to surface water.

6.1.2 Area 200 – Unloading and Office

A closed-head foam-water pre-action sprinkler system will be installed inside the rail unloading structure at the roof level, under walkways (as required by code) and in the pump basin areas. The structure will be divided in to five zones, each zone will be activated either manually from the foam manual release stations or automatically from the linear heat detection that will be installed at the roof level and at the pump basin level for that associated zone. The pump basins are located in the center of each zone respectively between the tracks. Note that this system is a closed-head pre-action foam-water system; therefore, foam-water solution will only be discharged once the fire is large enough to activate the linear heat detection, trip the valve and then activate the sprinklers above the fire. Foam will be used to control and extinguish the crude oil pool fire and will also provide cooling to the railcars and any adjacent equipment or building elements.

A closed-head wet-pipe sprinkler system (water only, no foam) will be provided for the Fire Pump / Foam Building in accordance with NFPA 20, Section 4.12.1.1.2. The wet-pipe system contains water under pressure, therefore, when a fire starts and grows large enough to trip a sprinkler at the ceiling/room a sprinkler or sprinklers are expected to control the fire.

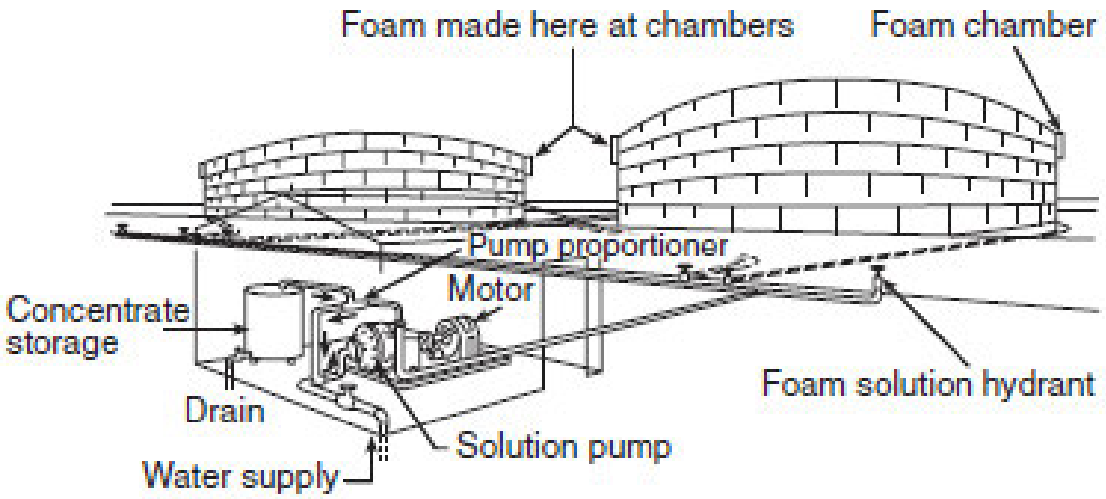
The closed-head foam-water pre-action sprinkler system and the closed-head wet-pipe sprinkler system will be pressurized by the City of Vancouver water distribution system and fire pump; therefore, when either system activates, and pressure drops on the downstream side of the fire pump, the fire pump will start and supplying adequate pressure to the system to control or extinguish the fire.

6.1.3 Area 300 – Storage Area

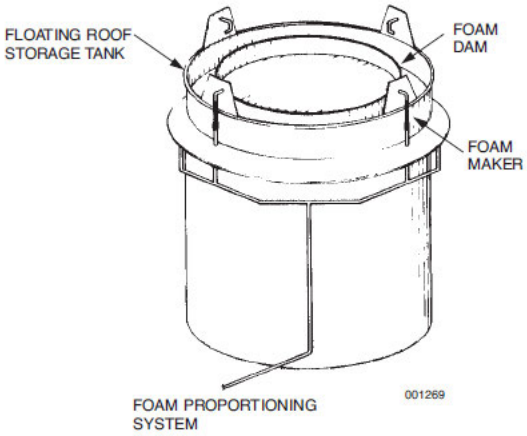
An automatic fixed foam system will be provided for each storage tank to protect the seal area of the internal floating roof. This system will be a Pre-Action Foam System activated by the linear heat detection system installed at the foam dam of the floating roof or by the manual foam release stations associated with each respective tank. See the figures below to reflect the typical configuration and installation of the foam maker on the tank. The linear heat detection cable located around the foam dam will be connected to the fire alarm system (see Chapter 7 for details on the fire alarm and linear detection system). The pre-action valve and foam concentrate tank will be located in the Fire Pump / Foam Building.

The internal floating roof tank will be protected by a Type II Discharge Outlet (i.e. foam chamber) which delivers foam onto the burning liquid at the seal area of the foam dam. The foam makers will be supplied from piping that loops the exterior of the tank at the top which in turn will have one supply from the fire pump. These will be single interlocked pre-action systems with automatic activation provided through linear heat detection and manual activation through the foam release stations. The floating roofs will have a 12- to 18-inch tall foam dam approximately 12 inches from the shell wall.

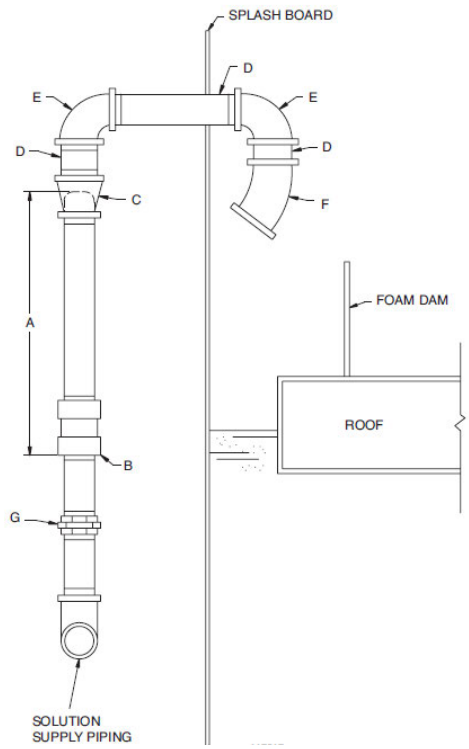
These automatic fixed foam systems are specifically designed to control a fire inside the tank. The Solberg self-healing biodegradable foam will be discharged inside the tank at the seal/foam dam area and provide a blanket of foam on top of the liquid at the floating roof. This blanket of foam is expected to limit the oxygen and extinguish the fire.



Typical Storage Tank Protection



Typical Floating Roof Tank Foam Maker Installation



A closed-head wet-pipe sprinkler system (water only, no foam) will be provided for the Fire Pump / Foam Building in accordance with NFPA 20, Section 4.12.1.1.2. The wet-pipe system contain water under pressure, therefore, when a fire starts and grows large enough to trip a sprinkler at the ceiling/room a sprinkler or sprinklers are expected to control the fire.

6.1.4 Area 400 – Marine Terminal Area

Two remote controlled elevated monitor nozzles will be provided on the dock for firefighting purposes. The monitor nozzles will be supplied from a Pre-Action Foam System located in the Fire Pump / Foam Building. Activation of the foam-water monitor nozzles will be by manual foam release stations located in the E-house and throughout Area 400 - Marine Terminal. The controller for the nozzles will be located in the E-house, located shore side.

A closed-head wet-pipe sprinkler system (water only, no foam) will be provided for the Fire Pump / Foam Building in accordance with NFPA 20, Section 4.12.1.1.2. The wet-pipe system contain water under pressure, therefore, when a fire starts and grows large enough to trip a sprinkler at the ceiling/room a sprinkler or sprinklers are expected to control the fire.

7. Fire Alarm System

7.1 Fire Alarm System Overview

Each area will receive its own fire alarm system control panel that will independently transmit back to a supervising station. The control panel and user interface will be located in the control room/E-house

facility at each site (E-house 3 for Area 200). The fire alarm panel in the fire pump/skid enclosure will be connected to the main fire alarm panel in the E-house at each location.

H2S and LEL detection will be provided in the pump basins at both the rail unloading structure and the pump basin at Area 300 - Storage. In addition, O2 monitoring is being provided for the pump basins located in the rail unloading structure. This monitoring will detect when oxygen levels are below the allowable limits for exposure and provide notification that entrance to the pump basins is not allowed without the appropriate personal protective equipment.

H2S and LEL detection is also provided strategically in the rail unloading structure near every unloading station.

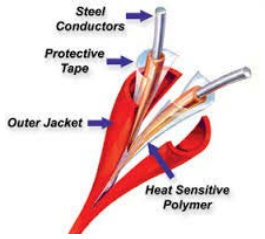
7.2 Fire Alarm Panel Reporting Capability

Each fire alarm panel will be FM Approved and will be provided with a way to directly communicate to the control operations HMI (human-machine interface); the panel will also be provided with a method to transmit/communicate all alarm signals to a supervising station. The rail unloading structure area, Area 300 - Storage, and Area 400 - Marine Terminal will each independently transmit their panel signals to the supervising station.

7.3 Initiating Devices

A fire alarm signal will be initiated by the following devices as explained in this section. Each of the initiating devices will be connected to the respective area fire alarm system control panel. The fire alarm panel will then acknowledge the alarm signal and initiate the sequence of operation commensurate for the respective alarm signal. The linear heat detection and manual release stations will activate the respective fire suppression system. All alarm signals will also initiate the audible and visual alarm, transmit the alarm signal to the supervising station and shut down the transfer operation, with all crude oil transfer valves closing in 30 seconds.

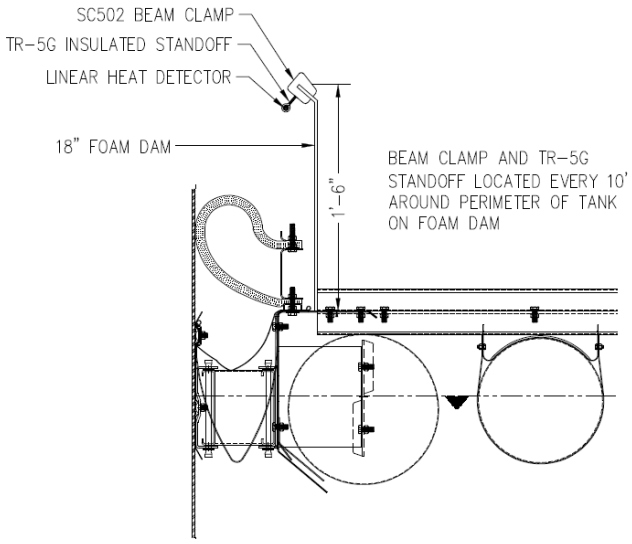
7.3.1 Linear Heat Detection



Linear Heat Detection is a line-type form of fixed temperature heat detection that will detect the heat from the fire anywhere along its entire length of cable. This proprietary cable is available in a range of temperature ratings in order to accommodate varying types of conditions or environments.

The outer jacket of the cable is specifically chosen for the environment and conditions where it will be installed. The linear detection cable is a combination of advanced polymer and digital technologies that can detect heat conditions anywhere along the length of the cable. The cable is comprised of two tri-metallic conductors individually insulated with a heat sensitive polymer outer layer/tape and engineered to break down at specific fixed temperatures. This allows the twisted conductors to make contact and initiate a fire alarm condition at the control panel without any calibration for changes in the ambient temperature. Nor is it required that a specific length be heated in order to initiate a fire alarm, adding to the versatility of this unique product.

The linear detection to be used for this Facility will have a 190°F temperature rating. The linear detection cable will be located at the top of the rail unloading structure (on or near the sprinkler pipe), at a lower elevation near the pumps themselves, and on the foam dam of the crude oil storage tanks. The linear detection is intended to activate/trip the pre-action foam systems which in return will discharge foam solution to control or extinguish the fire.



7.3.2 Foam System Manual Release Stations

The manual foam release stations will be located at the base and at the top of the stairs of the rail unloading structure, at every egress point of the rail unloading structure, at the base of the stairs on the tanks at Area 300 - Storage, at the top of the dike near the closest hydrant for each tank, and on a bank of release stations located at the foam/pump house.

These manual release stations when manually activated will send an alarm signal to the fire alarm panel, which in return will activate the respective foam fire suppression system, activate the audible and visual alarms and transmit the alarm signal to the supervising station.

7.3.3 Waterflow Switches

The wet-pipe sprinkler systems will be provided with a vane-type waterflow switch and the pre-action systems will be provided with a pressure-type waterflow switch. Each of these switches is designed to alarm upon the flow of water in the respective system.

If the vane-type waterflow switch, installed in the wet-pipe sprinkler system, is activated from the flow of water in the sprinkler system then an alarm signal will be sent to the fire alarm panel, which in return will activate the audible and visual alarms and transmit the alarm signal to the supervising station. Activation of the wet-pipe sprinkler system is caused by the heat from the fire activating one of the sprinklers on the system.

If the pressure-type waterflow switch, installed in the pre-action system, is activated from the flow of water in the foam system then an alarm signal will be sent to the fire alarm panel, which in return will activate the audible and visual alarms and transmit the alarm signal to the supervising station. Activation of the pre-action foam system is caused by the activation of either the linear heat detection system or the manual foam release station on the system.

7.3.4 Manual Pull Stations

The manual pull stations will be surface mounted, and typically located within 5 feet of every egress point and near the fire alarm control panel in the rail unloading structure, and be provided at every exit from the

Fire Pump / Foam Buildings and E-Houses for Area 200 Unloading and Office, Area 300 Storage and Area 400 Marine Terminal.

These manual pull stations, when manually activated, will send an alarm signal to the fire alarm panel, activate the audible and visual alarms and transmit the alarm signal to the supervising station.

7.3.5 Smoke Detectors

Smoke detection for this Facility is only provided above the fire alarm panels as required by NFPA 72, Section 10.4.4. The smoke detector above the fire alarm panel is intended to provide protection for the control unit/panel.

These smoke detectors, when activated by smoke, will send an alarm signal to the fire alarm panel, activate the audible and visual alarms and transmit the alarm signal to the supervising station.

7.3.6 Gas Detection

H2S, LEL, and O2 gas detection will be provided in the pump basins of the rail unloading structure. H2S and LEL detection will be provided near each unloading station in the rail unloading structure near grade. H2S and LEL detection will be provided in the pump basin at Area 300 - Storage. These gas detectors will be connected to the fire alarm system so they can be monitored.

Upon activation of any gas detector a signal will be sent to the fire alarm panel, which will then activate the gas detection alarm, which will be a different signal from the fire alarm audible and visual signals, and then transmit a signal to the supervising station.

7.3.7 Valve Tamper Switches

All water supply control valves that provide water to the fire suppression systems or foam concentrate to the fire suppression systems will be provided with an electronic tamper switch.

These electronic tamper switches will be connected to the building fire alarm system. Whenever one of the valves with an electronic tamper switch is moved from its off-normal position, a supervisory signal will be sent to the supervising station and an audible signal will also sound at the fire alarm panel to notify personnel.

7.4 Fire Alarm Notification Appliances

An audible and visual device will be located on the exterior of the foam/pump houses, exterior rail unloading structure, on the exterior of the control room/E-house facility and along the unloading rack area (the 1,800 feet long work area) for the rail unloading structure. The exterior fire alarm audible devices will be weatherproof devices and will be provided at each unloading work station.

The tone of the gas audible device will be different from that of the fire alarm tone which will be a three-pulse temporal pattern as required by NFPA 72. In addition, all gas notification devices will be equipped with a strobe that, upon detection of high gas, will activate the strobes in the zone that it was detected in only. This serves as a warning notification to avoid this area due to a detection of high gas.

8. Conclusion

This Fire System Operation Description has been prepared by John W. Poole, III a Washington licensed Fire Protection Engineer. Mr. Poole will also be serving as the Fire Protection Engineer of Record for the Facility.

Appendix D.13

Construction Safety and Health Manual

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VANCOUVER ENERGY

ENERGY INDEPENDENCE | ECONOMY | SAFETY | ENVIRONMENT | COMMUNITY

Vancouver Energy
Construction Safety and Health Manual

Plan No. C.07 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 30 April 2015

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Vancouver Energy
Construction Safety and Health Manual

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	30 April 2015	Submittal for Application Review

Vancouver Energy
Construction Safety and Health Manual

Table of Contents

Section

1. Introduction and Background 5
2. Management of Construction HSSE Activities 7
3. List of Acronyms and Abbreviations 12
4. Incident Investigation 15
5. Accident Reporting and Documentation 19
6. Asbestos Removal 27
7. Blasting and Use of Explosives 29
8. Bloodborne Pathogens 31
9. Code of Safe Practices 33
10. Cold Environment 35
11. Communication 39
12. Confined Space Entry 43
13. Crane Operations 57
14. Critical Lift Procedure 59
15. Discipline 67
16. Education and Training 69
17. Environmental Protection 73
18. Equipment 81
19. Fire Protection 87
20. Drug Testing (Fitness for Duty) 91
21. Flammable and Combustible Liquids 93
22. Fugitive and Silica Dust Control 97
23. Hazard Communication 103
24. Hazardous Material/Waste Handling and Disposal 113
25. Hearing Conservation 117
26. Hot Environments 123
27. Housekeeping Practices 129
28. Impalement Protection 133
29. Job Hazard Analysis 135
30. Ladders – Use, Handling, and Storage 143
31. Lead Abatement 145
32. Lock and Tag Program 149
33. Microbial Remediation Program 153
34. Inspections by the Washington Department of Labor and Industries 155
35. Outdoor Heat Exposure 161
36. Personnel Hoisting 165

37. Personal Protective Equipment 169
38. Portable Electrical Equipment 173
39. Respiratory Protection 179
40. Safety and Health Audit 185
41. Safety Orientation 189
42. Scaffold Use, Assembly, and Dismantling 195
43. Severe Weather 207
44. Emergency Procedures 210
45. Trenching and Excavation 216
46. Trucking Compliance 222
47. Work at Elevated Locations (Fall Protection) 226
48. Proximity to Active Rail Lines 234
49. Work Near or Over Water 236
50. Off-Site Monitoring Activities (Fieldwork) 240

List of Attachments

Attachment 1. Accident/Incident Investigation Report Form 17
Attachment 2. Employee Observation Form 18
Attachment 3. Addendum: Incident Notification Policy 23
Attachment 4. OSHA Form 300 Log 24
Attachment 5. Accident Expediter Report Form 25
Attachment 6. OSHA Cold Stress Card 37
Attachment 7. Confined Space Entry Permit 55
Attachment 8. Crane Lift Work Sheet 62
Attachment 9. Critical Lift Checklist 63
Attachment 10. Tandem Pick Lifting Parameters Work Sheet 64
Attachment 11. Crane Hoisted Personnel Platform Permit 65
Attachment 12. Employee Information and Training Checklist 71
Attachment 13. U.S. Department of Labor MSDS, OSHA Form 174 111
Attachment 14. Hazardous Material Inventory List 112
Attachment 15. Hearing Protection Training Record 122
Attachment 16. Physiological Monitoring Record for Heat Stress 128
Attachment 17. JHA Worksheet 140
Attachment 18. JHA Sample Worksheet and Procedure 141
Attachment 19. OSHA Checklist 160
Attachment 20. Crane Hoisted Personnel Platform Permit 168
Attachment 21. Respirator Medical Evaluation Questionnaire 183
Attachment 22. Safety and Health Audit 187
Attachment 23. Safety and Health Summary Report 192
Attachment 24. Safety Orientation Attendance Record 193
Attachment 25. Scaffold Release Form 206
Attachment 26. Sample Evacuation Plan 213
Attachment 27. Master Chemical and Substance Inventory List 214
Attachment 28. Barricade Tag 215

Attachment 29. Soils Analysis Checklist 219
Attachment 30. Excavation Checklist 220
Attachment 31. OSHA Trench Inspection Report 221
Attachment 32. Fall Protection Training Record 231
Attachment 33. Fall Protection Training Update 232
Attachment 34. Standard Form for Release of Floor or Stairs 233

List of Exhibits

Exhibit A. Procedures for Atmospheric Testing 53
Exhibit B. Sewer System Entry 54
Exhibit C. Environmental Checklist 77
Exhibit D. Monthly Fire Protection Checklist 90
Exhibit E. Hazardous Materials Identification System (HMIS) 109
Exhibit F. Permissible Noise Exposure (per 29 CFR 1910.95) 121
Exhibit G. Measurement Schedule 127
Exhibit H. JHA Phase List 138
Exhibit I. Lock and Tag Log 152
Exhibit J. Sample Job Safety Analysis 172
Exhibit K. Sample Electrical Equipment Inspection Program 176
Exhibit L. Safe Trucking Standard 224
Exhibit M. Wire Rope Rail Safety Requirements 230

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1. Introduction and Background

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located in locations between areas 200, 300, and 400
- Area 600 – West Boiler – located at Terminal 5 of the Port
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility operates 24 hours per day, 7 days per week.

Tesoro Savage Petroleum Terminal LLC (the Certificate Holder) is contracting with Savage Companies to manage construction and commissioning of the Facility. Construction of the Facility is being conducted in accordance with the requirements of approved permits and applicable state and federal regulations.

1.1 Purpose of Plan

This construction safety plan establishes a framework for the compliance of Facility construction activities with requirements of the SCA applicable to health, safety, security, and the general monitoring of construction activities relative to environmental protection ("HSSE").

1.2 Regulatory Requirements

This plan is implemented so that construction activities are in compliance with the following regulatory requirements.

- Washington Industrial Safety and Health Act (WISHA) Washington Administrative Code (WAC) 296 and Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910
- Maritime Transportation Security Act (MTSA) 33 CFR 191-107

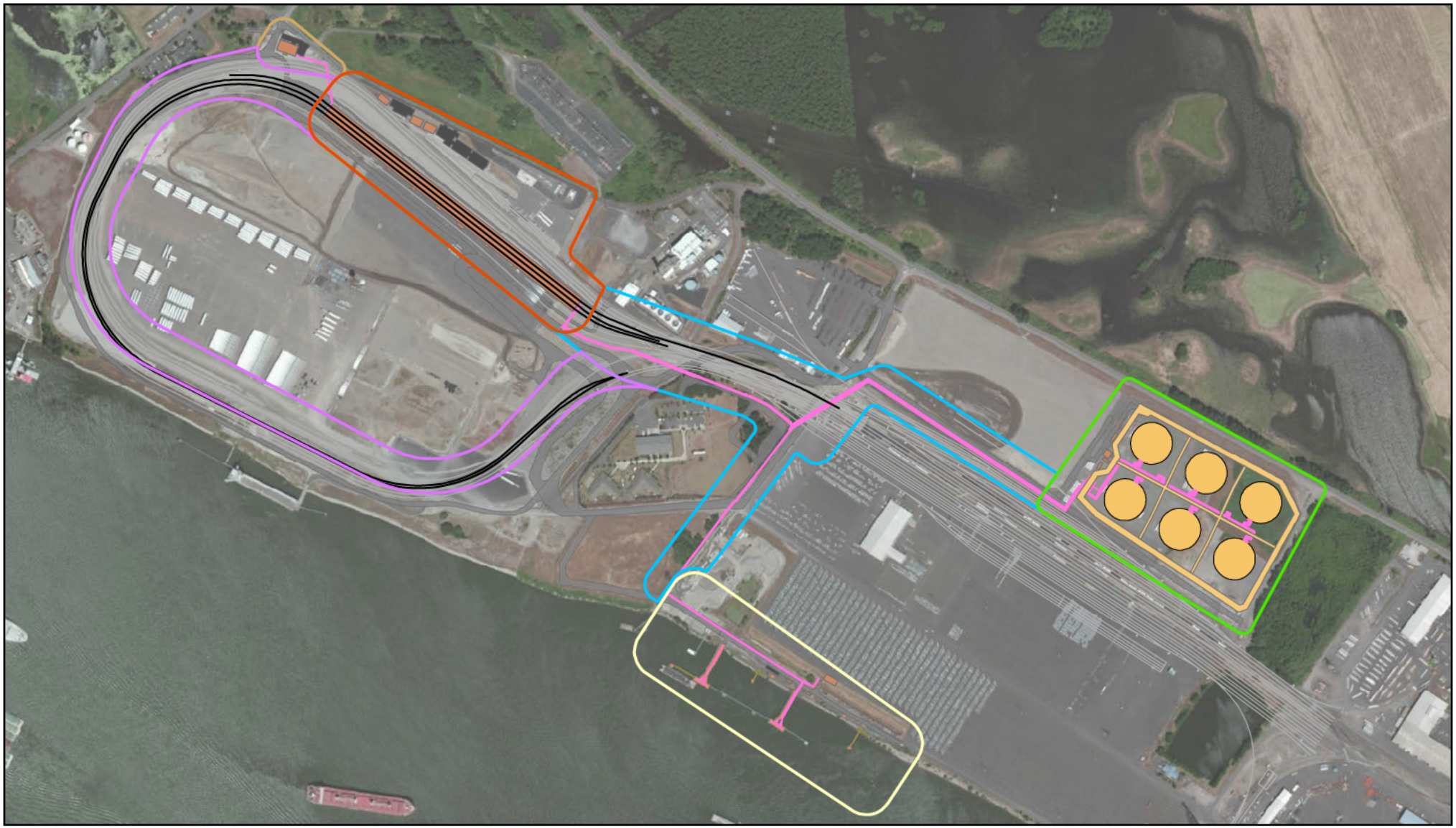


Figure 1 - Site Plan

Proposed Project Facilities

- Containment Berm
- Storage Tank
- Rail
- Roads
- Parking
- Marine Terminal
- Building
- Pipeline

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000
Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

1.3 Related Documents

The following documents and plans implement detailed environmental protective measures and procedures in addition to the general environmental monitoring procedures presented in this Plan, along with emergency response procedures and coordination.

- Construction Stormwater Pollution Prevention Plan (CSWPPP) – the construction SWPPP describes the site conditions and proposed construction activities in detail and enumerates the mitigation measures and best management practices (BMPs) that apply to each activity. Part of the construction SWPPP deals with managing materials that are or could be hazardous that are used and/or stored on site—paint, petroleum, solvents, etc. In contrast, the contaminated media management plan (CMMP) addresses contaminated media already at the site and how to manage it if encountered (or excavated, etc.).
- Construction Spill Prevention, Control, and Countermeasures Plan (CSPCCP) – the construction SPCCP outlines BMPs, response actions in the event of a release, and notification and reporting procedures. The construction SPCCP also outlines management elements, such as personnel responsibilities, construction site security, site inspections, and training. Finally the construction SPCCP lists spill response equipment and where such equipment is maintained on site.
- Contaminated Media Management Plan (CMMP) – this plan describes measures implemented when construction activity occurs in areas of known soil and groundwater contamination, as well as procedures in the event construction activities discover previously undocumented soil or groundwater contamination.
- Marine Mammal Monitoring and Construction Wildlife Montioring Plans – these plans describe measures implemented to monitor potential impacts to aquatic and terrestrial wildlife resulting from construction activities.
- Operations Facility Safety Program – Section 3.1, Emergency Response Plan.

Finally, because operation of the Facility will occur while portions of the Facility are under construction, the following documents and plans implement measures and procedures relative to operations activities and should be followed by all construction personnel, starting with the commencement of operations startup activities.

- Operations Facility Safety Program – Section 3.1, Emergency Response Plan
- Operations Health and Safety Plan (including site security and emergency response procedures)
- Operations SPCCP
- Operations Oil Spill Contingency Plan
- Oil Facility Handling Manual
- Operations Storm Water Pollution Prevention Plan (OSWPPP)

2. Management of Construction HSSE Activities

2.1 Principles and Goals

The following principles guide the collective Facility team in all Facility construction activities.

- There is no task so important that the time cannot be taken to do it safely.
- People are our most important asset.
- Communication is the key to injury prevention.
- All injuries, property damage, and environmental incidents are preventable.
- Everyone is expected to stop unsafe work.
- Near miss reports are a gift. Elimination of little things prevents larger things from occurring.
- Addressing safety in the planning phase of a job saves time and prevents incidents.
- Effective safety management and leadership are good business.

The Certificate Holder requires that all direct employees and contractors abide by applicable regulations as well as the guidelines described in this Plan.

Our goals are simple:
No accidents
No harm to people
No damage to the environment

2.2 HSSE Organization

The Certificate Holder is contracting with Savage Companies to manage construction and commissioning of the Facility. The Vancouver Energy Team relies upon corporate HSSE expertise, and employs its own Facility Security, Health, Environment, and Quality (SHE&Q) manager. The Facility SHE&Q manager, the, senior project manager, construction teams, and third-party contractor supervisory and safety personnel together form the overall Facility HSSE team. Figure 2 illustrates the construction management organizational chart for the Facility, including the relationship of primary and secondary HSSE functions to construction-site management personnel.

2.2.1 Vancouver Energy Roles and Responsibilities

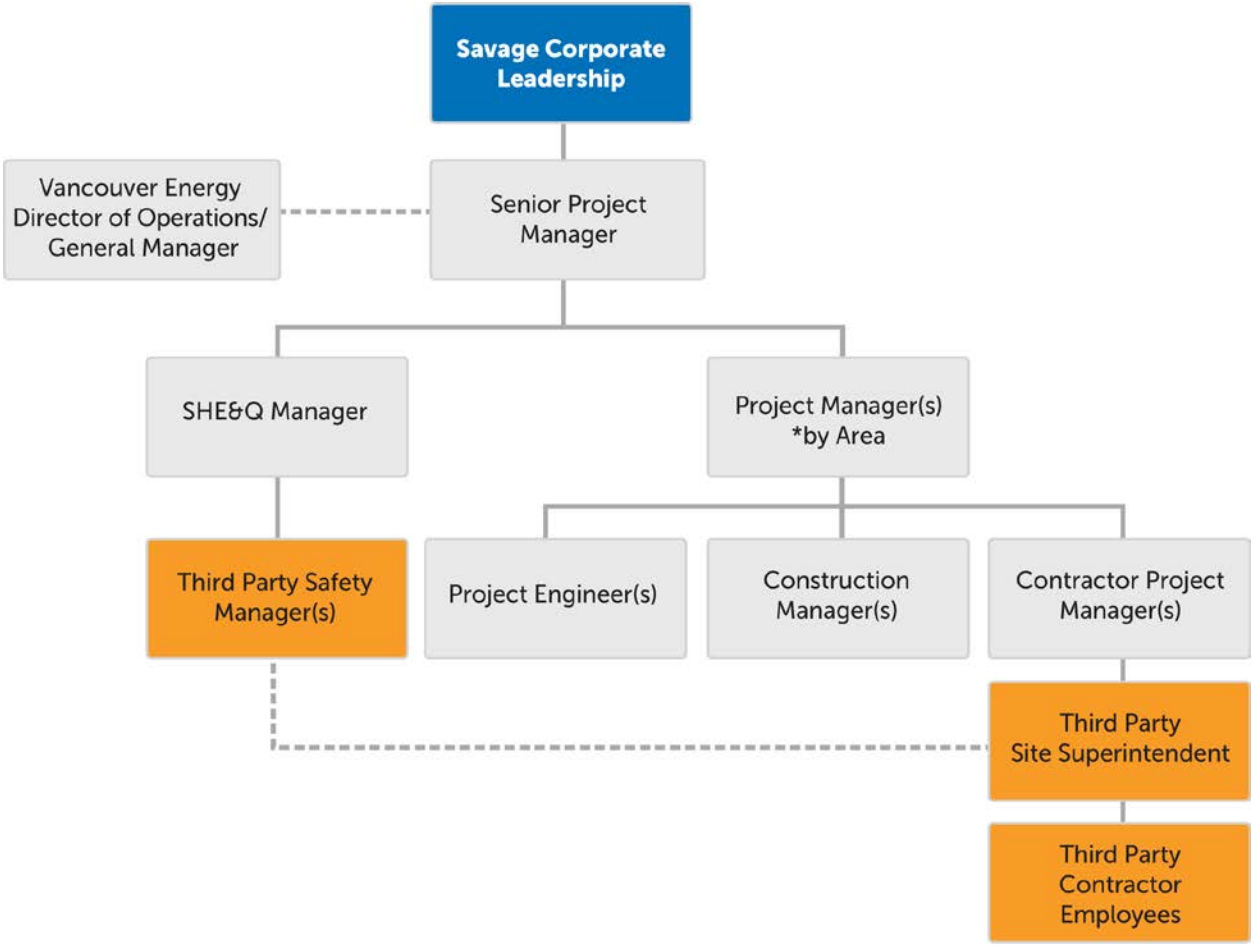
The Certificate Holder is committed to providing sufficient HSSE resources for the duration of the construction of the Facility. Field roles are filled by a combination of Vancouver Energy, Savage, and/or Savage trained contractor safety professionals. Minimum staffing levels are regularly reviewed and may be adjusted based on the quantity and risk of the work being performed. The Certificate Holder employs a dedicated Facility SHE&Q manager whose focus is to lead the development and delivery of construction HSSE requirements in a consistent and effective manner to achieve outstanding HSSE performance. The construction management team (CMT), including the SHE&Q manager, works closely with the contractors to help them interpret the Facility-specific safety requirements.

2.2.1 Contractor Roles and Responsibilities

Each contractor is required to develop a detailed Construction Execution Plan (CEP), with emphasis on safe execution of the work. The CEP is required to include safety staffing levels and address the requirements of this manual, the SCA, permits issued for this Facility, and other applicable Facility plans and regulatory requirements. The CEP is reviewed and agreed during a premobilization review with the contractor's leadership team and the Facility's leadership team.

A contractor safety representative is on site at all times construction work is being performed by the contractor, regardless of the nature of work or crew size. Exceptions may only be approved by the Facility SHE&Q manager in writing in advance.

Figure 2. Construction Management Hierarchy



2.2.2 Team Member Roles and Responsibilities

It is expected that everyone employed at the Facility, regardless of their role, is actively engaged in safety. Personal commitment to uphold the safety values of the Facility is sought from each individual on the Facility team.

All Facility team members must

- Stop work that is unsafe.
- Demonstrate HSSE commitment through their actions.
- Actively participate in HSSE meetings and Risk Review meetings.
- Share lessons learned.
- Work in a manner which prevents accidents, eliminates harm to people, and does not damage the environment.
- Participate actively in the Facility Risk Identification meetings.
- Be aware of the potential environmental aspects and impacts of the construction, commissioning, and operation activities.
- Acquire training as outlined in this plan.

Document field observations.

All team members will

- Start each meeting with a relevant HSSE discussion topic.
- Share lessons learned to aid in raising HSSE awareness.
- Participate in all HSSE-related training.
- Actively report, investigate, and embed learning from safety opportunities and near misses.

Management level staff will

- Lead development of the HSSE Plan.
- Ensure that resources are in place to execute an effective HSSE program (i.e., HSSE organization, permitting, training, equipment, qualified personnel, finance, and time).
- Develop and assign personnel performance objectives for implementing the HSSE Execution Plan.
- Ensure that Facility contractors and suppliers are in alignment with the HSSE goals of the Facility.
- Evaluate and select contractors who adhere to the high HSSE expectations of the Facility.
- Engage contractor leadership to ensure their full participation in the HSSE management of their employees.
- Ensure compliance with Facility HSSE policies.
- Review all new and outstanding HSSE issues and risks, their status, and projected resolution date.
- Actively engage workers in conversations about the risks of the work they are performing and to solicit ideas for minimizing these risks, as well as ideas for improvements to the processes in place to control these risks.

The SHE&Q manager will

- Ensure personal and process safety elements of the Facility, from concept through design, construction and commissioning are given their due attention.
- Coordinate with the business unit on environmental permitting requirements.
- Maintain Facility HSSE records and documentation.
- Compile Facility HSSE scorecard data.
- Monitor and assign responsibility for completion of HSSE action items.
- Maintain relevant environmental documentation and records.
- Conduct HSSE management and technical oversight for Facility's contractors.
- Conduct Facility-specific safety orientations.
- Conduct daily validation of site conditions and review site safety conditions.
- Provide HSSE assurance through field and recordkeeping audits.
- Review risk assessments to ensure they accurately recognize the tasks, hazards, and controls.
- Conduct Industrial Hygiene Audits (HSSE team)
- Verify implementation and execution of this Plan.

2.3 HSSE Systems and Procedures

Multiple proactive safety activities occur through the duration of Facility construction. These include but are not limited to reporting and documentation, investigations, audits, personal protective equipment, training and orientation, communication, hazard communication and task specific procedures. HSSE systems and procedures are described in detail starting with Section 4 of this plan.

During later phases of construction, portions of the Facility will be commissioned and will become operational. As project elements transition from construction to the operations phase, the construction and operation teams coordinate on a regular basis to ensure that health, safety, security, and environmental protections are reevaluated and implemented appropriately for all activities occurring at the Facility site for optimal performance. Section 1.3 of this plan identifies operational plans, which may be implemented concurrently with construction activities depending on the operation activities that are conducted at a specific time.

2.4 Monitoring and Compliance Assurance

2.4.1 Compliance Assurance

A primary role of the SHE&Q manager is compliance assurance. Their regular field presence and intimate knowledge of both the Facility and site HSSE expectations allows for timely and constructive feedback to the workforce. As opportunities are identified, the SHE&Q manager provides coaching and guidance to help bridge any gaps between the Facility's expectations and the performance observed.

The Facility SHE&Q manager coordinates routine audits of key elements of the contractor's safety programs to assure they are being carried out as described. These audits are both formal and informal and include reviews of both field activities and supporting documentation. Safety metrics are tracked and reported, including but not limited to: hours worked, major incident or accident and HIPOs, injuries/illnesses, near misses, environmental incidents.

2.4.2 Stop Work Authority

All Facility team members have the authority to stop work at the location of an activity that is deviating from construction plans and designs in a manner that may be a permit or regulatory non-compliance issue, or that is deemed by the individual team member to be unsafe, an uncontrolled or unmitigated hazard, beyond the level of preparation, outside of training, or has the potential to cause injury or harm to any person or the environment. The activity subject to the stop work order is halted until such time that satisfactory measures are taken to resolve the non-compliance or potential for non-compliance. The following are examples of "stop work" criteria; however, it is noted that additional specific criteria may be documented in other construction-related plans or drawings.

- Failure of BMPs related to construction site stormwater management
- Practices that cause a work hazard or discovery of a unexpected work hazard
- Presence of unidentified hazardous materials as evidenced by significant soil staining, odor, or oil in groundwater
- Unanticipated discovery of archeological resources or human remains

In the event a work stoppage is initiated by a Facility team member, the Facility SHE&Q manager, project manager, and Site Superintendent overseeing the activity are immediately notified. The Facility SHE&Q manager and project manager monitor the implementation of corrective actions. The stop work order is lifted when the Facility SHE&Q manager has determined that compliance has been achieved.

In accordance with notification procedures under other related construction plans, the Facility SHE&Q manager or his/her designee will notify the Port and other local, state and federal agencies as applicable.

2.4.2.1 Safety Observations

Documentation of field safety observations is expected of construction management, third party site superintendents and SHE&Q manager. A schedule is created that pairs Savage and contractor representatives for joint safety tours. The results of these observations are reviewed and the data analyzed to identify trends or specific items needing attention. These results are discussed with the companies involved, as well as shared with the Facility safety team for Facility-wide impact.

2.4.3 Environmental Compliance

To assist construction site management in assessing compliance of ongoing site activities with the requirements of the SCA, associated permits and other applicable state and federal regulations, an environmental checklist has been created (see Section 17, Exhibit C, Environmental Checklist).

2.4.4 General Performance Monitoring of Contractors

HSSE performance and compliance is measured and reviewed on a regular basis during execution. Regular performance reviews of each contractor are conducted, with appropriate senior and line management attendance. Subcontractor performance and compliance should be visible and verified by the Contractors they report to. Contractors are accountable for reporting all incidents incurred by their subcontractors.

3. List of Acronyms and Abbreviations

ASAP: Abnormal Safety Assessment Plan

bbl: oil barrel and barrels

BMPs: best management practices

BNSF: BNSF Railway

Certificate Holder: Tesoro Savage Petroleum Terminal LLC

CFR: Code of Federal Regulations

CMMP: contaminated media management plan

CMT: construction management team

CEP: Construction Execution Plan

U.S. DOT: U.S. Department of Transportation

EFSEC: Energy Facility Site Evaluation Council

Facility: Vancouver Energy

FRA: Federal Railroad Administration

HSSE: health, safety, security, and environmental

HAZOP: hazard and operability

HIPO: high-potential incident

HSSE: health, safety, security, and environment

ISBL: inside battery limit

LOTO: Lock Out Tag Out

MOC: Management of Change

MSDSs: material safety data sheets

MTCA: Model Toxics Control Act

MTSA: Maritime Transportation Safety Act

OSBL: outside battery limit

OSHA: Occupational Safety and Health Administration

OTS: on track safety

Port: Port of Vancouver USA

PPE: personal protection equipment

PSM: process safety management

PSSR: pre-start-up safety review

PTA: pre-task assessment

RO: railroad operations

SCA: Site Certification Agreement

SHE&Q: security, health, environment, and quality

SIMOPS: Simultaneous Operations

SLA: Site Lift Authority

SWPPP: stormwater pollution prevention plan

SPCCP: spill prevention, control, and countermeasures plan

TSCA: Toxic Substances Control Act

TWIC: transportation workers identification credential

WAC: Washington Administrative Code

WISHA: Washington Industrial Safety and Health Act

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4. Incident Investigation

4.1 Purpose

To establish the minimum requirements for Contractors and their subcontractors for the effective investigation of all accidents. WISHA/OSHA do not establish requirements to investigate all accidents or near-misses. Serious incidents, however, must be investigated and reported in accordance with the provisions of 29 CFR 1904 and WAC 296-27 (see Section 5 below).

In addition, Vancouver Energy requires investigations at a minimum for the following circumstances.

1. All injuries or illnesses that are OSHA recordable.
2. Any injury that requires the attention of medical personnel.
3. All property damage accidents or incidents with a total dollar value greater than $1,000.
4. All accidents or incidents involving the public or another employer's employee.
5. All lost-time injuries or illnesses.
6. All accidents or incidents, without injury, which had the potential for serious injury or property damage.

(b) Subcontractors will establish the same procedures and submit any reports generated to the Contractor's Site Superintendent who monitors their work.

All safety events (accidents, injuries, incidents, property or equipment damage, and near misses) and regulatory violations should be promptly reported to supervision, including to the Facility SHE&Q manager and project manager. The Facility SHE&Q manager and project manager may require an investigation of any accident or near miss (including a series of accidents or near misses), no matter how apparently minor, based on their judgment.

4.2 Definitions

ACCIDENT – The National Safety Council defines an accident as an undesired event that results in personal injury or property damage.

INCIDENT – An incident is an unplanned, undesired event that adversely affects completion of a task.

NEAR MISS/CLOSE CALL –This describes incidents where no property was damaged and no personal injury sustained, but where, given a slight shift in time or position, damage and/or injury easily could have occurred.

4.3 Responsibilities

(a) Activity Supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

4.4 Implementation

(a) Accident/Incident Investigation Form. The form to be used can be found at the end of this section.

(b) Accident/Incident Investigation Review Team. The leader of the team is the Senior Project Manager, or his/her designee. The Contractor Site Superintendent and SHE&Q manager are also members. Additional team members may be appointed. The team leader will determine when to convene the investigation review team. At a minimum, the team will convene on all lost time accidents.

(c) The Investigation Process. The initial investigation is to be conducted by the Site Superintendent who monitors the work where the accident/incident occurred. The Site Superintendent may involve other supervisory personnel as appropriate. The investigation should begin as soon after the injured person is cared for. The initial investigation should be completed within 24 hours. The Job Hazard Analysis form (see Attachment 17) should be revised and employees retrained to the extent necessary to reflect the recommendations made by the Accident/Incident Investigation Report (see Attachment 1).

(d) Once the Accident/Incident Investigation Report form is completed, the Superintendent who prepared it is to present the findings to the Accident/Incident Investigation Review Team. The Team will decide if the investigation made is sufficient or if further action is required. The team will also decide what corrective action should be taken to prevent a reoccurrence. The entire process should be completed as quickly as possible to avoid the possibility of someone else being hurt.

(e) A copy of the report is to be retained by the SHE&Q manager. Photographs and other additional documents are also to be retained.

(f) All employees and visitors are encouraged to report hazards and near misses, without fear of retaliation (see Attachment 2).

4.5 Exhibits/Attachments

Accident/Incident Investigation Report Form, Attachment 1

Employee Observation Form, Attachment 2

Attachment 1. Accident/Incident Investigation Report Form

Accident/Incident Investigation Report
PLEASE FILL OUT ALL INFORMATION

Employee Information

Name_____ Empl. No. _____ Trade_____

Project Name_____ Project No._____

Drug Test Administered?
☐ Yes ☐ No

Length of service on project_____ Length of service with company_____

Supervisor Information: If subcontractor, indicate company name_____

Foreman_____ Empl. No._____

Superintendent_____ Empl. No._____

Accidental/Incident Information

Date of Injury_____ Time of Injury_____ (AM/PM) Date Injury Reported _____

Nature of Injury_____

CAUSE OF INJURY

☐ Fall from height	☐ Fall from same level	☐ Caught in	☐ Caught between
☐ Struck by	☐ Struck against	☐ Dust/debris	☐ Material handling
☐ Power/hand tools	☐ Chemical	☐ Electrical	Other_____

BODY PART(S) INJURED

☐ Head	☐ Face	☐ Neck	☐ Eye(s)	☐ Arm	☐ Leg	☐ Knee
☐ Back	☐ Chest	☐ Hand	☐ Foot	☐ Wrist	☐ Ankle	☐ Other_____

If applicable, indicate left or right:

CLASSIFICATION

☐ Sprain	☐ Strain	☐ Contusion	☐ Laceration
☐ Puncture	☐ Fracture	☐ Burn/Irritation	☐ Other_____

Accident/Incident Description (Who, What, When, Where, How)

Describe injury in detail (if additional space is needed, please use the back). _____

_____

_____

_____

_____

Signature_____ Date_____ Title_____

Attachment 2. Employee Observation Form

UNSAFE CONDITION, FIRST AID AND NEAR MISS INCIDENT REPORT

Workplace Observation

Description of what happened or of the unsafe condition:

Where:

When:

What could have resulted?

What do you think is the cause (direct and root cause)?

What actions did you take to correct the unsafe condition or hazard?

If no action was taken, what do you recommend should be done:

Reported by: _____ **Date:** _____

Reported to: _____ **Date:** _____

Signature: **Date:**

5. Accident Reporting and Documentation

5.1 Purpose

To establish the minimum requirements for the Contractor, and as applicable subcontractors, for effective reporting, recording, and documentation of workplace accidents.

Occupational injuries and illnesses will be reported in accordance with the provisions of 29 CFR 1904 and WAC 296-27).

5.2 Definitions

(a) Work Related. An injury or illness may be work related if it occurs in the work environment. The work environment surrounds the employee wherever he or she may go in official travel, in dispersed operations or along regular routes while on Company business. Work-relatedness is determined in accordance with WAC 296-27-011.

(b) First Aid Injuries. These include any one-time treatment and any follow-up visits for the purpose of minor scratches, cuts, burns, splinters, etc., if the nature of the injury does not require a licensed physician. Personnel trained in first aid may administer such treatment. A doctor can also provide first aid treatment, such as for a scratch or cut; however, if a doctor does provide treatment for a minor injury, it is still classified as “first aid.” It is not reported on the OSHA 300 log.

(c) Recordable Injuries. These are injuries that, because of their severity, require a physician for their treatment such as broken bones, stitches, foreign objects imbedded in the eye, prescription medication, etc. These injuries are recorded on the OSHA 300 log. Such things as negative X-rays and tetanus shots are not recordable.

(d) Lost Time Injuries. These are injuries in which a doctor has determined that the employee is unable to return to work on the next workday. When counting lost workdays, the day of the injury and the day the employee returns are not counted. An injury that involves lost-time is, by definition, recordable and must go on the OSHA 300 log.

5.3 Responsibilities

(a) Activity Supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity Supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

5.4 General Requirements

(a) As per Section 4, all injuries are to be reported and, if necessary, investigated. The form and the procedures are in the Accident Investigation section of this manual.

(b) As soon as possible after the end of each month, the each Contractor Site Superintendent or the person responsible for the injury record keeping must send a formal report of the total hours worked, the recordable injuries, regulatory violations, and all other safety events to the SHE&Q manager.

(c) OSHA 300 Log. All Lost Time, Restricted Duty and Recordable injuries must be “recorded” on the OSHA 300 log (see Attachment 4 or www. osha.gov.). Ann updated log must be maintained on the premises at all times.

(d) The following list includes, but is not limited to, activities that will be documented:

1. New Hire Safety Orientation
2. Hazard communication
3. Fall protection
4. Accidents or near misses resulting in personal injury, property damage, and product or material damage
5. Subcontractor Safe Start
6. OSHA inspections/variances
7. Medical and first aid training
8. Medical and first aid treatment
9. Diving operations
10. Fires and extinguisher use
11. Fire extinguisher training
12. Personnel lifting platforms - (man baskets, aerial lifts, etc.)
13. Air quality testing
14. Confined space entry
15. Hearing tests/noise surveys
16. Safety and health training
17. Safety meetings
18. Job hazard analyses
19. Safety inspections and audits
20. Emergency drills and critiques
21. Hazardous substance monitoring and training
22. Special hazard permits
23. Crane/derrick inspections/certifications
24. Respirator training and use
25. Emergency action plans
26. Fire protection plan
27. GFCI tests
28. Trench and excavation inspections

5.5 Implementation

(a) Treating the Injured Person. The injured person must be cared for first. If it is serious, follow the procedures in the Emergency Response Plan. If it is less serious, notify the designated Contractor’s first aid person or the SHE&Q manager. If the person needs to be seen by a doctor, a company employee should transport him or her. The person should not be allowed to drive.

(b) In accordance with corporate procedures and regulatory requirements the Contractor will develop, provide and use forms including but not limited to:

An Accident Expediter/Physician’s Release Form which is filled out by the Site Superintendent and given to the employee or the driver to take to the doctor. It should be completed by the doctor and returned with the employee after treatment. An example form is provided in Attachment 5.

An Employer’s First Report of Injury Form. This form will be furnished by Contractor’s corporate insure or may be the form used by Washington State’s worker’s compensation fund which insures the project. The

form will be timely forwarded to appropriate corporate offices and filed with the state in accordance with regulatory requirements.

(c) The Contractor will establish appropriate protocols to ensure forms are circulated to corporate insurance and health and safety departments, the injured worker, and applicable state regulatory agencies.

5.6 Additional Reporting for Serious Injuries

(a) A serious accident is one that involves, has the potential for, loss of life or major property damage.

(b) The Site Superintended will provide the following notifications:

1. Immediately: the Contractor Project Manager
2. Immediately: the Project Manager
3. Immediately: the SHE&Q Manager
4. In accordance with Contractor's corporate procedures: Contractors corporate and Safety managers

The project manager or SHE&Q manager will in turn contact the senior project manager and other corporate management in accordance with corporate procedures. The project manager or SHE&Q manager will contact the Vancouver Police Department in the event of a workplace death, as well as the Port.

(c) In accordance with WAC 296-800-32005, you must report to Washington Department of Labor and Industries (L&I) within 8 hours of an incident:

- Causes a fatal or possibly fatal injury
- Causes injury requiring in-patient hospitalization of any employee

To report, contact your nearest labor and industries office by phone or in person, or call the OSHA toll-free hotline, 1-800-321-6742.

Exception: If any employer does not learn of a reportable incident at the time it occurs and the incident would otherwise be reportable under this subsection, the employer will make a report within 8 hours of the time the incident is reported to any agent or employee of the employer.

1. Establishment name
2. Location of the incident
3. Time of the incident
4. Number of fatalities or hospitalized employees
5. Contact person
6. Phone number
7. A brief description of the incident.

Fatalities or hospitalizations of any employees that occur within thirty (30) days of an incident must also be reported.

(d) In accordance with WAC 296-800-32010, equipment involved in a work or work related accident or incident must not be moved if any of the following results: a death, a probable death, or an employee's hospitalization. The equipment must not be moved until a representative of the L&I investigates the incident and releases the equipment unless: moving the equipment is necessary to remove any victims or prevent further incidents and injuries.

(e) In accordance with WAC 296-800-32015 witnesses and other employees must be assigned to assist L&I personnel who arrive at the scene to investigate the incident involving a death, a probable death or an employee's hospitalization.

(f) A preliminary investigation for all serious injuries must be conducted in accordance with WAC 296-800-32020 and document the preliminary investigation findings in accordance with WAC 296-800-32025.

5.7 Exhibits/Attachments

(a) ADDENDUM: Incident Notification Policy, Attachment 3

(b) OSHA Form 300 Log, Attachment 4

(c) Accident Expediter Report Form, Attachment 5

Attachment 3. Addendum: Incident Notification Policy

ADDENDUM

Incident Notification Policy

Effective immediately, all incidents are to be reported to supervisors and managers in accordance with the following directives. These requirements are IN ADDITION to any requirements contained within the Incident Investigation and Reporting procedures as outlined in Section/Chapter 2 of the Safety and Health Manual. Please refer to the Safety and Health Manual for formal incident investigation and report filing procedures. The Contractor requires that all employee injuries, regardless of how minor, are to be reported to the employee′s supervisor immediately. Every employee has an obligation to seek out their supervisor and report ANY injury immediately after the incident occurs. NO EXCEPTIONS! Once an injury has been reported to the employee′s supervisor, the supervisor MUST take the following actions immediately.

Severe or Life Threatening Injury

1. Call 911 immediately and assist medical professionals in the care of the employee.
2. Secure the site and make sure ANY immediate dangers or hazards are corrected or isolated to keep others from being injured.
3. Contact the Superintendent or Senior Manager on site and notify them of the incident. This must be done within the first few minutes of employee reporting injury.
4. Provide any support necessary to assist in managing the incident.
5. The Superintendent or Senior Manager on site is to notify the Safety Department as soon as the injured worker is cared for and the site is secured against all immediately dangerous hazards.
6. Follow-up with the Incident Investigation and Reporting procedures as outlined in the Safety and Health Manual.

Injury Requiring Medical Aid or Clinical Visit – Non-911 Emergency

1. Provide injured worker with First Aid Care and prepare to transport the employee to the designated clinic. DO NOT allow the employee to transport themselves to the clinic.
2. Contact the Superintendent or Senior Manager on site and notify them of the incident. This must be done within the first few minutes of employee reporting injury.
3. The Superintendent or Senior Manager on site is to notify the Safety Department as soon as the injured worker is cared for and the site is secured against all immediately dangerous hazards. Every effort shall be made to contact the safety department prior to taking the employee to the clinic or for any medical treatment.
4. DO NOT allow the employee to refuse proper medical care. ANY employee that chooses to refuse medical care must first obtain approval of Management and/or the Safety Department.
5. Follow-up with the Incident Investigation and Reporting procedures as outlined in the Safety and Health Manual.

First Aid Only Injuries – Injuries Not Requiring Clinical Medical Attention.

1. Provide the injured worker with First Aid Care using project first aid supplies.
2. Contact the Superintendent or Senior Manager on site and notify them of the incident. This must be done within the first few minutes of employee reporting injury.
3. The Superintendent or Senior Manager on site is to notify the Safety Department as soon as the injured worker is cared for IF the injury involves any of the following.
   - Back strain
   - Foreign body or debris in the eye
   - Strained knee (popping, pain, swelling, etc.)
   - Any injury that has the potential to require medical treatment in the future.

All other injuries that are treated using only project first aid supplies do not require immediate notification to the Safety Department and may be submitted to the Safety Department by filling out and faxing or e-mailing the Contractor′s Incident Investigation report form within 24 hours of the injury. Any employee that does not follow the incident notification procedure as outlined above, may be subject to disciplinary action as outlined below.

1. 1st Offense: Written warning to be placed in the employees file.
2. 2nd Offense: Written warning and suspension for up to three days.
3. 3rd Offense: Termination of employment.

Attachment 4. OSHA Form 300 Log

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Note: You can type input into this form and save it. Because the forms in this recordkeeping package are "fillable/writable" PDF documents, you can type into the input form fields and then save your inputs using the free Adobe PDF Reader. In addition, the forms are programmed to auto-calculate as appropriate.

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20 ___

U.S. Department of Labor
Occupational Safety and Health Administration

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0176

Establishment name _____

City _____ State _____

Identify the person			Describe the case			Classify the case (SELECT ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Select the "Injury" column or choose one type of illness:					
							Remained at Work					(M)					
(A) Case no.	(B) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness (e.g., 2/10)	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., Second degree burns on right forearm from acetylene torch)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
Reset			___/___ month / day			○	○	○	○	___ days	___ days	○	○	○	○	○	○
					Page totals ▶	___	___	___	___	___	___	___ Injury	___ Skin disorder	___ Respiratory condition	___ Poisoning	___ Hearing loss	___ All other illnesses
												(1)	(2)	(3)	(4)	(5)	(6)

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Save Input | Add a Form Page

Page 1 of 1

Attachment 5. Accident Expediter Report Form

ACCIDENT EXPEDITER REPORT FORM

Please render medical service to who is employed by the Contractor and is presumed to have sustained an injury or illness in the course of employment. If hospitalization and/or medical treatment is required in excess of the limit provided by the Workers' Compensation Law of the state in which the injury occurred, the Company will not be liable for the excess unless written authority for such treatment is first obtained from the Company, or its designated representative.

The Contractor requires all employees with work-related injuries or illnesses to submit to a drug/alcohol screen. Call number listed below for details.

Date: _____ BY: _____

Phone Number: _____ TITLE: _____

==========

PHYSICIAN'S RELEASE

(To be completed by physician and given to employee.)

_____, whom I have treated for an injury/illness is hereby released to:

_____Full duty work with care not to aggravate the injury.

_____No additional treatment is required.

_____A follow-up appointment has been scheduled on_____
(date)

_____Other: _____

_____ _____
Attending Physician (date)

Employee must present this form to supervisor immediately after each physician's visit.

==========

(Supervisor will fill in below and return to Project Safety Manager or Field Office Manager)

The above named employee returned to work on and has been assigned to duties in accordance with the physician's release.

Job No. _____ Signed _____

Job Name _____ Title _____ Date _____

6. Asbestos Removal

6.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for the safe removal of asbestos. Although demolition of asbestos containing structures is not anticipated for construction of the Facility, asbestos may be present in debris or abandoned or to-be relocated utilities.

When suspect asbestos-containing material is discovered, activity in the area must be suspended and the material not disturbed.

6.2 Definitions

Not applicable.

6.3 Responsibilities

(a) Activity Supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure. The Contractor may hire a certified third party abatement contractor to conduct the activities described below.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

6.4 Procedures

(a) Bulk Sampling of Suspect Asbestos-Containing Materials

Bulk sampling must be completed of suspect asbestos-containing material(s) as soon as possible after discovery. An inspector certified pursuant to the Asbestos Hazard Emergency Response Act (AHERA) will collect the bulk samples. Bulk sample analysis must be completed using polarized light microscopy (PLM) with dispersion staining (EPA Method 600/M4-82-020) on analytical turn-around of not less than 24 hours.

(b) Abatement of Asbestos-Containing Material

Asbestos-containing material (ACM) is defined as material containing 1% or more of any form of asbestos by PLM analysis. A State of Washington-licensed asbestos abatement contractor must abate identified ACM. The contractor must follow the abatement methods and personal protective procedures mandated by Chapters 296-62 and 296-65 WAC as overseen by L&I. Activities will be conducted in accordance with regulations of the Southwest Clean Air Agency (SWCAA) found at SWCAA 476, provided that EFSEC is the agency with final jurisdiction.

6.5 Post-Abatement Submittal

Within 30 days after completing abatement of ACM, the abatement contractor will provide a post-abatement submittal to the site superintendent and the SHE&Q manager. The SHE&Q manager will

forward the submittal to EFSEC and other regulatory agencies as appropriate. The post-abatement submittal will include the following.

- A complete listing of each asbestos worker and asbestos supervisor that worked on the project each day, including copies of their certifications.
- Documentation including name and address of landfill, name of landfill employee authorized to accept asbestos waste, quantity removed from work site, and quantity disposed of at landfill.
- A copy of all regulatory notifications and revisions to notifications.
- A copy of all manometer strip chart readings.
- A copy of all air monitoring results

Failure to provide this submittal within 30 days of project completion could result in withholding of all or partial payment on the contract.

6.6 Removal and Environmental Contractor(s)

(a) A Washington-state licensed asbestos abatement contractor must conduct the asbestos removal.

(b) Safety, health, and industrial hygiene oversight must be provided to the contractor by an independent Environmental/Industrial Hygiene consultant contractor (referred to as Environmental Contractor).

6.7 Exhibits/Attachments

Not applicable.

7. Blasting and Use of Explosives

7.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for conducting blasting activities. Blasting, and the use of explosives for blasting activities are not anticipated to be needed for construction of the Facility.

7.2 Definitions

Not applicable.

7.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

7.4 Implementation

Should a contractor determine that blasting is necessary at the construction site, the contractor will perform the following.

1. The Contractor will notify the SHE&Q manager, project manager, and senior project manager in advance. The Contractor will not conduct blasting activities without prior written approval by Vancouver Energy management.
2. If blasting activities are required the Contractor will develop a blasting plan to demonstrate compliance with state and federal requirements. The plan will be submitted to the SHE&Q manager, project manager, and senior project manager for review and approval. Vancouver Energy management may be required to receive approval of the plan from applicable state and federal agencies. Vancouver Energy management may be required to coordinate with the Port and notify nearby Port tenants in advance.
3. The plan will include, but not be limited to:
    a. A demonstration of blasting activities compliance with the provisions of WAC 296-52
    b. Demonstration of appropriate certification or qualifications for employees involved in handling explosives
    c. Measures for safe transportation, handling, storage and use of explosives
    d. All clears
    e. After-blast inspections

4. Unless used for approved blasting activities at the site, explosives will not be brought to or stored at the construction site.

7.5 Exhibits/Attachments

Not applicable.

8. Bloodborne Pathogens

8.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to perform activities associated with Bloodborne Pathogens.

People in roles such as “Safety Professional”, “Emergency Medical Technician”, and those who have been trained in first aid and/or CPR may, in the course of their duties, come into contact with the body fluids of another person. Exposure would not be anticipated for these people unless they are in the process of providing medical assistance to an injured employee or cleaning the area after an injury has occurred. For the purpose of this procedure, we will refer to those employees as “medical assistance providers”.

8.2 Definitions

Not applicable.

8.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

8.4 Requirements

Any Contractor who has employees who as part of their regular duties could be exposed (medical assistance providers) to blood borne pathogens will be informed about bloodborne diseases and trained in accordance with the provisions of WAC 296-823. The Contractor will develop and implement a written exposure control plan. The plan will address, but not be limited to

(a) An explanation of the symptoms of bloodborne diseases and how they are transmitted.

(b) How to recognize tasks and activities that may involve exposure to blood or other potentially infectious materials.

(c) The types, proper use, location, removal, handling, decontamination and disposal of personal protective equipment.

(d) The signs, labels, and color codes in use to designate contaminated or infectious materials.

(e) The procedure to follow if an exposure incident occurs, including the method of reporting the incident and the evaluation and medical follow-up that will be made available.

(f) Training and recordkeeping requirements.

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9. Code of Safe Practices

1. Contractors and their employees will observe and obey the safety and health requirements of the Project Safety Program, the Code of Safe Practices, WISHA and OSHA Standards, and all other established safety and health standards and regulations as are necessary to the safe and healthful performance of their work.
2. All Facility construction employees will be subject to fair and consistent disciplinary action for policy noncompliance.
3. The possession or sale of illegal drugs, alcohol or weapons at the Facility construction site is strictly prohibited.
4. Employees must be fit for duty and dressed in attire suitable for construction work, including shirts with sleeves, long trousers and proper work shoes.
5. Personal Protective Equipment must be supplied, selected and used for all activities at the construction site, in accordance with WAC 296-155-200 At a minimum, personal protective equipment consisting of HARD HATS AND ANSI APPROVED SAFETY GLASSES WITH SIDE SHIELDS ARE TO BE WORN BY EVERYONE AT ALL TIMES WHILE ON the Facility construction site.
6. Persons not directly involved with the on-site construction will and visitors to the site will comply with site induction requirements, including but not limited to safety and security orientation. Visitors will not be allowed onto the site unless they have received the necessary site induction training.
7. All accidents, incidents and injuries must be reported to a supervisor immediately. Hazardous conditions and unsafe activities observed should also be reported to a supervisor so that corrective action can be taken. Additional reporting requirements are provided in Sections 1 and 2 above.
8. Employees must attend scheduled Safety Meetings and sign an attendance list.
9. Blood may contain communicable diseases. Spilled blood and exposures to blood must be reported to a supervisor.
10. Authorization from a supervisor or competent person is required for entry into confined spaces, trenches or enclosed areas that may contain a hazardous atmosphere.
11. Labels on tools, materials and chemical containers must be read before use, and the instructions for the proper use, handling and personal protective equipment required must be followed.
12. Materials, trash or other objects must not be thrown from buildings or structures. Anyone caught throwing material from upper levels may be subject to immediate dismissal.
13. Materials must not be stored within six (6) feet of floor openings or within ten feet of open floor edges.
14. Materials on roofs and open floors must be secured to prevent them from being windblown.
15. Objects must not be stacked or leaned in such a way that they could fall or be blown over.
16. Protruding nails must be bent over or pulled as the work proceeds. Nails in job built guardrails, ladders or handrails must be pounded flush with the surface of the wood.
17. The large muscles of the legs should be used instead of the smaller muscles of the back when lifting heavy objects. Help should be obtained when an object to be lifted may be too heavy or awkward to be handled safely by one person.
18. Crane operations will be conducted in accordance with the provisions of Section 10 below. Only trained and qualified employees may rig loads and signal cranes. Employees must be warned before loads are lifted overhead, and employees should stay out from under crane loads when it is avoidable. A crane load should not be approached for landing until it has been lowered to chest level. The use of tag lines to help control loads is required, especially for steel erection and during windy conditions.
19. Employees must not stand between crane loads and other objects, and hands must be kept clear of rigging and pinch points as loads are lifted and moved.
20. Employees should be aware of the locations of the fire extinguishers that have been provided throughout the Project and know how to select and use them.
21. An ABC rated fire extinguisher must be readily available when welding or burning and when using flammable liquids and gases.
22. Smoking is prohibited inside the fence line and on Facility property except for specially marked areas located in the parking lots. The purpose of this prohibition is to control ignition sources within the Facility as well as reduce exposure of personnel to harmful second hand smoke. Smoking is permitted only in specially marked areas, and smoking material must be left in vehicles or in the break facilities. Smokers are required to minimize the amount of time spent in smoking areas and are asked to keep the areas clean.
23. Smoking is not permitted around gasoline and other flammable liquids or gases. Equipment must be turned off before refueling and extreme caution must be used with fuel around a hot muffler.

24. Gasoline must be stored and transported only in approved safety containers and gasoline must not be used for cleaning purposes.
25. Only qualified and authorized employees may operate temporary heating devices. The use of temporary heating devices must be in accordance with the provisions of WAC 296-155-280. Open fires are not permitted.
26. Compressed gas cylinders must be kept secured and upright, and they must be capped and gases separated when not in use. Empties should be returned to the storage area for pick up.
27. Hand and Power tools will be used, stored and maintained in accordance with WAC 296-155.
28. Tools and power cords must be inspected for damage or defects before each use. Any problem found must be reported to a supervisor and/or corrected before being put in service.
29. Guards and other safety devices on tools and equipment must be kept in place and working properly.
30. Specific training and certification cards are required for the operation of power-actuated tools, lasers, powered industrial trucks, and for flagger personnel.
31. The heads of striking tools must be kept properly dressed to prevent mushroom burrs from forming.
32. Working above or below other operations creates a hazard from falling objects. Conflicting activities must be reported to a supervisor so that the activities can be coordinated.
33. Overhead protection structures are to be used to enter or exit a building when they are provided.
34. Areas that are separated from the main work areas by warning lines, control lines or barricades must not be entered by unauthorized employees. These areas are blocked off for safety reasons, and they may contain hazards that are not obvious.
35. A full-body harness or other approved means must be used for fall protection at unguarded floor edges, floor openings and other fall hazards where the fall distance is six feet or more. When guardrails, control lines or warning lines are temporarily removed, provisions to prevent unprotected employees from entering the area must be provided.
36. Floor holes two inches and over must be covered, and the covers must be secured and marked.
37. Riding on trucks and heavy equipment is permitted only where a seat has been provided by the manufacturer, and seat belts must be used when they have been provided.
38. Employees must not attempt to cross the path of a truck or a piece of heavy equipment unless eye contact is made with the operator and a "go ahead" signal is given. Employees must stay alert and keep clear of moving equipment.
39. Scaffolds must be erected, altered, used and dismantled under the supervision of a competent person.
40. A proper ladder must be used for access to a scaffold, work platform or another level. Climbing scaffold brace/frame is not permitted.
41. Walkman, discmans, stereo radios and other types of personal radios may cause communication problems during an emergency and are prohibited.
42. Housekeeping is a prime concern and must be maintained at the highest level. Daily cleanup is mandatory, especially for food rubbish. Left over or scrap materials must be removed from the work area daily.
43. When ascending or descending a ladder, employees will use the three point system, e.g. one hand and two feet or two hands and one foot must be in contact with the ladder at all times.

10. Cold Environment

10.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to protect workers exposed to cold environments.

This is not an OSHA standard but OSHA recommends protecting employees in cold environments.

10.2 Definitions

(a) Hypothermia: A condition when a person's body loses heat faster than it can be produced. If body temperature drops to 95 F (98.6 F is normal), uncontrollable shivering occurs. If body temperature continues to cool, the following symptoms may also occur

- Vague, slow, slurred speech
- Forgetfulness, memory lapses
- Inability to use hands
- Frequent stumbling
- Drowsiness
- Impairment of judgment

(b) Frostbite: A condition in which part of the body is frozen. Some of the symptoms may include

- Lost sensation of touch, pressure, and pain, which may occur without awareness of any numbness or other sensation.
- Just before freezing, the skin becomes bright red.
- At freezing, small patches of white appear on skin.
- Skin becomes elastic.

10.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

10.4 General Requirements

(a) Cold, wet, windy conditions make prime hypothermia weather. Precautions will be taken to keep warm.

(b) In cold environments employees should test for symptoms of hypothermia and frostbite often. Wear loose fitting clothing that will not restrict blood flow to the limbs.

(c) If an employee suspects a co-worker has experienced frostbite, they should seek medical attention immediately.

(d) Reference the OSHA cold stress card (Attachment 6).

10.5 Implementation

(a) Workers will wear warm clothing, such as mittens, heavy socks, etc., when the air temperature is below 40-45 degrees Fahrenheit (°F). Chemical protective clothing, if required by the project, may be used to partially protect the employee from the cold, but must always be the outermost layer.

(b) When the air temperature is below 30-40°F, depending upon employee comfort, clothing for warmth should be worn in addition to chemical protective clothing as needed. This may include: insulated suits; whole-body thermal underwear; wool or polypropylene socks to keep moisture off the feet when engaged in work activity which would cause sweating; insulated gloves when air temperatures are extremely low--less than 5-10°F; gloves with reflective surfaces which reflect body heat back to the hand, boots; and insulated head covering, such as knit (ski) caps.

(c) At air temperature below 35°F, the following work practices should be followed.

1. If the clothing of an employee could become wet on the job site, the outer layer of clothing should be impermeable to water.
2. If an employee's underclothing--socks, mittens, etc.--becomes wet in any way, the employee should immediately change into dry clothing. If the clothing becomes wet from sweating, the employee may finish the task causing the sweating before changing into dry clothing.
3. Employees should be provided a warm area to change from work clothing into street clothing.
4. Employees should be provided a warm break area. If appropriate, space heaters will be provided in the work area to warm the hands and feet, etc. Necessary fire and electrical safety practices must be observed when using space heaters. Space heaters should be shut off when the site is not occupied.
5. Hot liquids, such as soups and warm drinks, may be consumed in the break area. The intake of caffeinated beverages should be limited, however, due to adverse diuretic and circulatory effects.
6. The buddy system should be practiced at all times. Any employee observed with severe shivering must leave the cold area immediately.
7. Employees should layer their clothing. Thinner, lighter-weight clothing should be worn closest to the body, with heavier-weight clothing layered outside the lighter, layer.
8. Employees should avoid overdressing when going into warm areas or when performing activities which are strenuous. This could lead to a heat stress problem.
9. Auxiliary heated versions of handwear, footwear, etc., can be used instead of mittens and insulated socks, etc., if extremely cold conditions exist, and if such items do not create hazards in the work area.
10. Employees handling volatile liquids--gasoline, hexane, alcohol, etc.--must take special precautions to avoid saturating clothing or gloves with these liquids. There is an added danger of injury from overexposure due to evaporative cooling.
11. Work will be arranged in such a way that sitting still or standing for long periods of time is minimized.
12. Employees face increased risks when they take certain medications, are in poor physical condition or suffer from such illnesses such as diabetes, hypertension, or cardiovascular disease.

(d) All employees who work in cold areas will be trained in the following subjects in accordance with Employee Safety Orientation and Training.

1. Proper first aid treatment
2. Proper clothing practices
3. Proper eating and drinking habits
4. Recognition of impending adverse health effects
5. Safe work practices

10.6 Exhibits/Attachments

OSHA Cold Stress Card, Attachment 6

Attachment 6. OSHA Cold Stress Card

OSHA® QUICK CARD™

Protecting Workers from Cold Stress

Cold temperatures and increased wind speed (wind chill) cause heat to leave the body more quickly, putting workers at risk of cold stress. Anyone working in the cold may be at risk, e.g., workers in freezers, outdoor agriculture and construction.

Common Types of Cold Stress

Hypothermia

- Normal body temperature (98.6°F) drops to 95°F or less.
- **Mild Symptoms**: alert but shivering.
- **Moderate to Severe Symptoms**: shivering stops; confusion; slurred speech; heart rate/breathing slow; loss of consciousness; death.

Frostbite

- Body tissues freeze, e.g., hands and feet. Can occur at temperatures above freezing, due to wind chill. May result in amputation.
- **Symptoms:** numbness, reddened skin develops gray/white patches, feels firm/hard, and may blister.

Trench Foot (also known as Immersion Foot)

- Non-freezing injury to the foot, caused by lengthy exposure to wet and cold environment. Can occur at air temperature as high as 60°F, if feet are constantly wet.
- **Symptoms:** redness, swelling, numbness, and blisters.

Risk Factors

- Dressing improperly, wet clothing/skin, and exhaustion.

For Prevention, Your Employer Should:

- Train you on cold stress hazards and prevention.
- Provide engineering controls, e.g., radiant heaters.
- Gradually introduce workers to the cold; monitor workers; schedule breaks in warm areas.

For more information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)

OSHA 3156-02R 2014

OSHA® QUICK CARD™

How to Protect Yourself and Others

- Know the symptoms; monitor yourself and co-workers.
- Drink warm, sweetened fluids (no alcohol).
- Dress properly:
  - Layers of loose-fitting, insulating clothes
  - Insulated jacket, gloves, and a hat (waterproof, if necessary)
  - Insulated and waterproof boots

What to Do When a Worker Suffers from Cold Stress

For Hypothermia:

- Call 911 immediately in an emergency.
- To prevent further heat loss:
  - Move the worker to a warm place.
  - Change to dry clothes.
  - Cover the body (including the head and neck) with blankets, and with something to block the cold (e.g., tarp, garbage bag). Do **not** cover the face.
- If medical help is more than 30 minutes away:
  - Give warm, sweetened drinks if alert (no alcohol).
  - Apply heat packs to the armpits, sides of chest, neck, and groin. Call 911 for additional rewarming instructions.

For Frostbite:

- Follow the recommendations **"For Hypothermia"**.
- Do not rub the frostbitten area.
- Avoid walking on frostbitten feet.
- Do not apply snow/water. Do not break blisters.
- Loosely cover and protect the area from contact.
- Do not try to rewarm the area unless directed by medical personnel.

For Trench (Immersion) Foot:

- Remove wet shoes/socks; air dry (in warm area); keep affected feet elevated and avoid walking. Get medical attention.

For more information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)

11. Communication

11.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to provide effective communication between its employees.

This is not an OSHA standard but OSHA highly encourages safety communication with all Contractor's employees and subcontractors.

11.2 Definitions

Not applicable.

11.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

11.4 General Requirements

(a) Communication of safety related information will be made to site supervisory personnel by means of personal contact, bulletins, regular and special safety meetings, and training sessions. Personal contacts consist of sessions discussing specific problems, chronic problems, work planning, safety meetings, and hazard analyses, training philosophies and methods. Contacts may be documented as necessary and followed up with the appropriate levels of supervision. Meetings will be held with site supervisory personnel and employees on a regular basis, with documentation of the meeting content and attendees.

(b) Contractor Safety Lead Involvement

Each Contractor will appoint a Safety Lead. The Site Superintendent or the Contractor's Safety Management personnel may also be responsible for this function. The Safety Lead will be the focal point for communications on the project. The Safety Lead will ensure that employees on the project receive information required to perform their jobs safely. The Safety Lead will:

1. Coordinate health and safety related activities with the SHE&Q manager.
2. Explain communication procedures for receiving and responding to employee suggestions and/or complaints regarding safety.
3. Orient new employees to specific jobsite hazards and safe work procedures. (Other people may be trained to perform this function).
4. Conduct "Safe Start" conferences with subcontractor management/supervisor and any lower tiered subcontractor supervisors to explain the Contractor's safety procedures and review the "Safe Start" program with the subcontractor.
5. Set up and maintain bulletin boards for communication.
6. Conduct training as required.

7. Prepare toolbox safety meeting information for presentation by supervisory personnel.
8. Post appropriate warning and directional information.

11.5 Implementation

(a) Gap Analysis

Prior to mobilization in the field, each contractor must perform a gap analysis to identify discrepancies between their policies and the policies or expectations. The gaps are evaluated and the final decisions are agreed and documented prior to commencing work in the field.

(b) Safety Meetings

Regular safety meetings will be conducted with management, supervision and field personnel. Several avenues will be used to facilitate these meetings. Tool Box Safety Training Meetings will be held weekly (at a minimum) from prepared toolbox topics available from the Contractor. These toolbox safety meetings may be hosted by individual foremen or superintendents or held as a mass meeting by a member of project management. The meeting contents and attendees will be documented as part of the permanent project file. Safety meetings will be periodically monitored and evaluated by management and supervision to ensure their effectiveness and quality. Safety will also be the first agenda item at all scheduled weekly staff, scheduling or other pertinent project meetings.

A brief safety meeting or Job Hazards Analysis (JHA) meeting will be conducted by each Site Superintendent or their designee at the beginning of each work day/shift to jointly discuss and review the anticipated work for the day/shift. The entire Contractor crew participates in this planning, hazard awareness and hazard elimination exercise. The meeting is documented using a mini-JHA form and the daily time sheet.

Additional special safety meetings will be utilized as necessary for new or unusual work, new equipment, unusual or unexpected situations or conditions encountered, and as part of a JHA when the need is indicated. Each contractor will conduct a monthly safety meeting with their on-site employees to provide a forum for an extended conversation about a Facility-specific training topic. The SHE&Q manager may present some or all of the content from the all-hands meetings.

All personnel on site will be expected to comply with this Construction Health and Safety Manual as well as the Contractor's Safety and Health Program. The Site Superintendent will communicate this information to each subcontractor as they arrive on the project. The Site Superintendent will communicate subsequent changes as they occur.

(c) Safety Committee

Safety committees are a recognized way to increase the effectiveness of the overall safety program. The Facility recognizes the value of these committees and the empowerment they provide the contractors. The Facility maintains a cross functional safety team to provide a forum for addressing safety and health concerns related to field construction activities. The team consists of hourly/craft employees with staff support. All contractors performing field construction activities at the Facility must have representation on the Facility safety team. The safety committee is established and meetings conducted in accordance with WAC 296-800-130.

(d) Subcontractor Safety

A "Safe Start" meeting will be conducted with all subcontractors and any lower tiered subcontractors to ensure their active participation in the promotion of safety and accident prevention. They will be advised of any special requirements of the project and of the emergency procedures to be followed.

(e) All employees are encouraged to make suggestions or express their concerns in the daily JHA meetings or the weekly Tool Box meetings. They are told that if they are not comfortable in either of those forums, they may express their safety concerns to the SHE&Q manager, the Superintendent, or their supervisory personnel without fear of retribution. If there appears to be a need for one, a box for anonymous comments will be established.

11.6 Exhibits/Attachments

See Section 29, Job Hazard Analysis, for more information and attachments.

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12. Confined Space Entry

12.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to perform confined space entry, and to serve as the foundation of the mandatory written permit-required confined space entry program. Confined Space entry must be conducted in accordance with the provisions of WAC 296-809.

12.2 Definitions

(a) Acceptable entry conditions. The conditions that must exist in a permit space to allow entry, and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

(b) Attendant. An individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

(c) Authorized entrant. An employee who is authorized by the employer to enter a permit space.

(d) Confined space. A space that: (1) is large enough and so configured that an employee can bodily enter and perform assigned work; and (2) has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and (3) is not designed for continuous employee occupancy.

(e) Engulfment. The surrounding and effective capture of a person by liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

(f) Entry. The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

(g) Entry permit (permit). The written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in Section 12.7 of this procedure.

(h) Entry supervisor. The person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section. NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of an entry supervisor may be passed from one individual to another during the course of an entry operation.

(i) Hazardous atmosphere. An atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

1. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL); airborne combustible dust at a concentration that meets or exceeds its LFL; NOTE: This concentration may be approximated as a condition in which the dust obscures vision to a distance of 5 feet (1.52 m) or less.
2. Atmospheric oxygen concentration below 19.5 percent or above 22.5 percent;
3. Atmospheric concentration of any substance for which the permissible dose or exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances of 29 CFR 1926, Chapter 296-155 and 296-841 WAC, and which could result in employee exposure in excess of the permissible dose or exposure limit; NOTE: An atmospheric concentration of any substance that is not

capable of causing death, incapacitation, and impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

4. Any other atmospheric condition that is immediately dangerous to life or health. NOTE: For air contaminants for which OSHA has not determined a permissible dose or exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, 29 CFR 1926, Chapter 296-155 WAC, and 296-901-140 WAC, and published information and internal documents can provide guidance in establishing acceptable atmospheric conditions.

(j) Immediately dangerous to life or health (IDLH). Any condition that poses an immediate or delayed threat to life, or that would cause irreversible adverse health effects, or that would interfere with an individual's ability to escape unaided from a permit space. NOTE: Some materials (i.e., hydrogen fluoride gas and cadmium vapor) may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by a sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" after recovery from transient effects until the impending collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

(k) Inerting. The displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. NOTE: This procedure produces an IDLH oxygen-deficient atmosphere.

(l) Isolation. The process by which a permit space is removed from service and completely protected against the release of energy and introduction of material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; and blocking or disconnecting all mechanical linkages.

(m) Non-permit confined space. A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

(n) Oxygen deficient atmosphere. An atmosphere containing less than 19.5 percent oxygen by volume.

(o) Oxygen enriched atmosphere. An atmosphere containing more than 22.5 percent oxygen by volume.

(p) Permit-required confined space (permit space). A confined space that has one or more of the following characteristics: (1) contains or has a potential to contain a hazardous atmosphere; (2) contains a material that has the potential for engulfing an entrant; (3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or (4) contains any other recognized serious safety or health hazard.

(q) Prohibited condition. Any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

(r) Rescue service. The personnel designated to rescue employees from permit spaces.

(s) Retrieval system. The equipment (including a retrieval line and full body harness, wristlets if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

(t) Testing. The process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space. NOTE: Testing enables employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during entry.

12.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

12.4 General Requirements

(a) A competent person who represents the employee conducting the Confined Space work will evaluate the workplace to determine if any spaces are permit-required confined spaces.

(b) If the workplace contains permit spaces, the Site Superintendent will inform exposed employees (and subcontractors, if applicable) by posting danger signs, or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces. NOTE: A sign reading DANGER – PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER, or using other similar language, would satisfy the requirement for a sign.

(c) If permit spaces exist in the workplace, and employees will not be permitted to enter permit spaces, the Site Superintendent will take effective measures to prevent employee entry into permit spaces. If non-permit spaces are modified or experience any change that causes an increased hazard to entrants, the Site Superintendent will reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

(d) If any subcontract employee is to enter a permit space prior to the initial entry the Site Superintendent will: (1) inform the subcontract employer that the workplace contains permit spaces and that entry must comply with 29 CFR 1910.146, WAC 296-24, and WAC 296-809; (2) inform the subcontract employer of the elements, including known hazards and experiences from any previous entries into the space, that classify the space as a permit space; (3) inform the subcontract employer of any controls or procedures implemented to protect employees near the subcontractor's work area; (4) coordinate entry operations among client, contractor, and subcontractor personnel when necessary; and (5) debrief the subcontract employer at the conclusion of entry operations regarding the permit space entry program and any hazards or problems encountered during the entry operations.

12.5 Implementation

(a) Non-Permit Confined Spaces. Entry into non-permit confined spaces will be subject to the following controls:

1. The Site Superintendent and Third Party Safety lead will be informed in advance of the planned entry.
2. The entry will be coordinated with any work activities near the non-permit space so that hazardous conditions will not be created in or around the space.
3. The buddy system will be used for all entries.
4. Entrants will immediately withdraw upon recognition of any hazardous condition.
5. The Site Superintendent and Third Party Safety lead will be advised of any unanticipated incidents related to the non-permit space entry.

(b) Permit-Required Confined Spaces. Entry into permit-required confined spaces will be subject to the following controls:

1. Unauthorized entries will be prohibited, and measures will be implemented to prevent such entries. The Site Superintendent will develop additional written program controls that will specifically address the permit spaces and entries unique to the individual project scope of work and conditions.
2. Hazards will be identified and evaluated prior to entry. Hazards to be addressed include

    - Chemical exposure (via inhalation, ingestion, or dermal absorption) from the contents or residues of previous contents of the space, from chemicals introduced into the space as part of the entry operation, and from chemicals used near the space.
    - Oxygen deficiency or enrichment.
    - Discharge of steam, high-pressure air, water, or oil into the confined space, or against personnel working outside.
    - Structural failure of the space walls, roof, roof support members, swing line cables, or other structural members.
    - Tools, debris, or other objects dropping from overhead.
    - Falls through or from the roof or from scaffolds, stairs, or ladders.
    - Tripping over hoses, pipes, tools, or equipment.
    - Slipping on wet, oily surfaces, or colliding with objects in inadequately lighted interiors.
    - Insufficient or faulty personal protective equipment.
    - Insufficient or faulty operations, equipment, and tools. Noise in excess of acceptable levels.
    - Temperature extremes that may require additional protection or shorter work periods.

3. The Third-Party Safety Lead will, as part of the written material under 6.b.1 above, develop procedures and practices to ensure safe conduct of entry operations. The following points, at least, will be fully addressed:

    - Acceptable entry conditions will be specified (both chemical and physical conditions will be addressed, and conditions which could arise as a result of operations performed outside the space will be considered).
    - Procedures to fully isolate the space (this may not be feasible in sewers; see Exhibit B).

4. Isolation of a space will include the following steps, as applicable:

    - Depressurize the confined space.
    - Prevent accidental introduction into the confined space of hazardous materials through interconnecting equipment such as piping, ducts, vents, drains, or other means.
    - De-energize, lockout, and tagout machinery, mixers, agitators, or other equipment containing moving parts that are in the confined space.
    - Removing a valve, spool piece, or expansion joint in piping to, and as close as possible to, the confined space, and blanking or capping the open end of the pipe leading to the confined space.
    - Inserting a suitable full-pressure blank in piping between the flanges nearest to the confined space.
    - Closing, locking, and tagging at least two valves in the piping leading to the confined space, and locking or tagging open to atmosphere a drain valve between the two closed valves which will be checked to ensure that it is not plugged.

        – In all cases, blanks or caps will be of a material that is compatible with the liquid, vapor, or gas with which they are in contact.
        – The material will also have sufficient strength to withstand the maximum operating pressure, including surges, which can be built up in the piping.

5. In addition, all electrical and mechanical devices within or attached to the confined space will be disconnected or locked and tagged to prevent accidental movement or energizing of such systems.
6. All employees who will be working in the confined space will be informed of the isolation devices in use at the jobsite during safety meetings.
7. Purge, inert, flush, or ventilate the space as necessary to eliminate or control atmospheric hazards.
8. Provide barriers to protect entrants from external hazards.
9. Verify that conditions in the permit space are acceptable throughout the duration of the entry.
10. The following equipment will be provided, maintained, and utilized whenever necessary for safe entry operations.

    - Testing and monitoring equipment needed to perform specified atmospheric testing.
    - Ventilating equipment needed to create and maintain acceptable entry conditions.

- Ventilation of permit spaces will be performed as follows.
  - Prior to ventilating a confined space, a qualified person will take positive steps to ensure that no pyrophoric materials that will ignite in the presence of air are present in the confined space.
  - All confined spaces will be mechanically ventilated to remove and/or prevent the accumulation of hazardous atmospheres.
  - Air or steam driven air movers will be used to ventilate confined spaces. Use of electric powered ventilators is strictly limited to spaces that have not contained flammable or combustible materials.
  - Oxygen will not be used to power air-driven ventilators or to ventilate any confined space location.
  - The entry supervisor will check periodically to ensure that contaminated air from a confined space is exhausted to a location where it presents no hazard.
  - Whenever possible, air movers will be used with ducting to increase the efficiency of ventilation in the confined space and to prevent recirculation of contaminated air due to ventilation "short circuiting."
  - When two or more air movers are used for ventilation, all such units should be operated in the same flow direction to maximize efficiency, i.e., all in the exhaust mode or all in the supply mode.
- Communications equipment necessary to permit immediate, understandable communications between the entrant(s) and the attendant(s).
- Personal protective equipment necessary to supplement feasible engineering and work practice controls.
- Lighting equipment necessary for safe operations and emergency exit. Temporary lighting used in confined spaces will meet the following requirements:
  - All lighting will be approved for use in Class I, Division I, Groups A, B, C, and D atmospheres.
  - Extension cords used for temporary lighting will be equipped with connectors or switches approved for hazardous locations.
  - Temporary lighting will be equipped with adequate guards to prevent accidental contact with the bulb.
  - The lighting will not be suspended by the electric cords, unless they are designed for this method of suspension.
  - Electric cords will be kept clear of working spaces and walkways or other locations in which they may be exposed to damage.
  - Temporary lighting and electric cords will be inspected regularly for signs of damage to insulation and wiring.
  - Specified barriers and shields.
  - Equipment such as ladders needed for safe ingress and egress.
  - Rescue and emergency equipment, unless provided by local rescue services.
  - Any other equipment necessary for safe entry and rescue from permit spaces.

11. Prior to authorizing entry, tests will be conducted by a competent person to determine if acceptable entry conditions exist. When spaces are not fully isolated due to their size or design (sewers), pre-entry testing will be conducted to the extent feasible, and if entry is authorized, conditions will be continuously monitored in the work area. During the course of entry operations, test or monitor the permit space as necessary to determine if acceptable entry conditions are being maintained; and, When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors. NOTE: Atmospheric testing conducted in accordance with Exhibit A would be considered as satisfying these requirements. For permit space operations in sewers, atmospheric testing conducted in accordance with Exhibit A, as supplemented by Exhibit B, would be considered as satisfying these requirements.
12. At least one attendant will be stationed outside the permit space for the duration of the entry operations. NOTE: Attendants may be assigned to monitor more than one permit space provided the duties described in Section 12.9(b) of this procedure can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in Section 12.9(b) of this procedure can be effectively performed for each permit space that is monitored.
13. If multiple spaces are to be monitored by a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces being monitored without distraction from the attendant's responsibilities under Section 12.9(b) of this procedure.

14. The roles and duties of each person participating in an entry operation (i.e., authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) will be established and each person will receive training commensurate with the duties assigned.
15. Procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue will be developed and implemented.
16. Procedures to coordinate entry operations among multi-employer workforces will be developed and implemented.
17. The permit space will be secured and entry-related documentation will be completed and retained in project files for a period of at least one year.
18. The entry program will be reviewed and any deficiencies corrected whenever evidence exists that employee protection is inadequate. NOTE: Examples of circumstances requiring the review of the permit-required confined space program are: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.
19. The permit-required confined space program will be reviewed, using the canceled permits retained under Section 12.6(f) of this procedure, within 1 year after each entry and revised as necessary to ensure that employees participating in entry operations are protected from permit space hazards. NOTE: Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.

(c) Alternate Entry Procedure.

1. A simpler, alternate procedure may be followed for permit-required space entry if all of the following conditions are met:

    - The only hazard posed by the permit space is from an existing, or potentially hazardous atmosphere.
    - Continuous forced air ventilation alone is sufficient to maintain the space safe for entry.

2. Monitoring and inspection data supporting the above two conditions is collected and documented. Entries conducted to obtain this data must be conducted according to Section 12.5(b) above.
3. Supporting data must be made available to each employee who enters the permit space under this alternate procedure.
4. The alternate entry procedure will conform to the following:

    - Any conditions making it unsafe to remove an entrance cover will be eliminated before the cover is removed.
    - When entrance covers are removed, the opening will be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
    - Before an employee enters the space, the internal atmosphere will be tested with a calibrated direct-reading instrument for the following conditions, in the order given: (1) oxygen content, (2) flammable gases and vapors, and (3) potential toxic air contaminants.
    - There may be no hazardous atmosphere within the space whenever any employee is inside the space.
    - Continuous forced air ventilation will be used, as follows: (1) an employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere; (2) the forced air ventilation will be directed so as to ventilate the immediate areas where an employee is or will be present within the space and will continue until all employees have left the space; (3) The air supply for the forced air ventilation will be from a clean source and may not increase the hazards in the space.
    - The atmosphere within the space will be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.
    - If a hazardous atmosphere is detected during entry: (1) each employee will leave the space immediately; (2) the space will be evaluated to determine how the hazardous atmosphere developed; and, (3) measures will be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

- The employer will verify that the space is safe for entry and that the measures required by 6.c have been taken through a written certification that contains the date, the location of the space, and the signature of the person providing the certification.
- The certification will be made before entry and will be made available to each employee entering the space.

12.6 Entry Permit System

(a) Before authorization to enter is granted, the completion of hazard control measures specified in 12.5(b) and 12.5(c) above will be documented on an entry permit (Attachment 7).

(b) The entry supervisor will authorize the entry by signing the completed permit.

(c) The signed permit will be posted or otherwise made available to all authorized entrants so that they may confirm that all pre-entry preparations are in place.

(d) The duration of the permit may not exceed the time required to complete the assigned purpose of the entry.

(e) The entry supervisor will terminate the entry and cancel the permit when either of the following occurs:

1. The operations covered by the permit have been completed.
2. Any condition not allowed under the entry permit occurs in or near the permit space.

(f) Canceled entry permits will be retained for at least 1 year so that the program review required under 12.5(b).19 above may be performed. Any problems which occur during an entry will be noted on the permit.

12.7 Entry Permit

(a) The entry permit will contain the following information:

1. The permit space to be entered.
2. The purpose of the entry.
3. The date and the authorized duration of the entry permit.
4. The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems), as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space; NOTE: This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.
5. The personnel, by name, currently serving as attendants.
6. The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry.
7. The hazards of the permit space to be entered.
8. The measures used to isolate the permit space and to eliminate or control permit space hazards before entry. NOTE: Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.
9. The acceptable entry conditions.
10. The results of initial and periodic tests performed under section 12.5(b).11 of this procedure, accompanied by the names or initials of the testers, and by an indication of when the tests were performed.
11. The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services.
12. The communication procedures used by authorized entrants and attendants to maintain contact during the entry.
13. Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section.
14. Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety.
15. Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

12.8 Training

(a) The Competent Person for the Contractor entering any confined space will assure that all employees assigned to tasks under this procedure have been trained, and have the understanding, knowledge, and skills necessary for the safe performance of their duties.

(b) All training conducted will be documented on appropriate training forms, and copies will be submitted to the SHE&Q manager. Documentation may likewise we submitted to the Third Party Safety Lead and Corporate Safety Management.

(c) Training will be provided to each employee on the following occasions:

1. Before the employee is first assigned duties under this procedure.
2. Before there is a change in assigned duties.
3. Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained.
4. Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by 6(b) and 6(c) of this procedure, or that there are inadequacies in the employee's knowledge or use of these procedures.

(d) The training will establish employee proficiency in the duties required by this procedure and will introduce new or revised practices, as necessary, for compliance with this procedure.

(e) Training required by this section will be certified. The certification will contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification will be available for inspection by employees and their authorized representatives.

12.9 Assignment of Duties

(a) Authorized Entrants. The employer will ensure that all authorized entrants:

1. Know the hazards that may be faced during entry, including information on the mode, signs, or symptoms, and consequences of the exposure.
2. Properly use equipment as required by section 12.5(c) of this procedure.
3. Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by section 12.9(b).6 of this procedure.
4. Alert the attendant whenever
    - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
    - The entrant detects a prohibited condition.
5. Exit from the permit space as quickly as possible whenever:
    - An order to evacuate is given by the attendant or the entry supervisor;
    - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation;
    - The entrant detects a prohibited condition; or
    - An evacuation alarm is activated.

(b) Attendant. The employer will ensure that each attendant:

1. Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
2. Is aware of possible behavioral effects of hazard exposure in authorized entrants.
3. Continuously maintains an accurate count of authorized entrants in the permit space, and ensures that the means used to identify authorized entrants under Section 12.7(a) of this procedure accurately identifies who is in the permit space;
4. Remains outside the permit space during entry operations until relieved by another attendant.
   NOTE: When the employer's permit entry program allows attendant entry for rescue, attendants may enter a

permit space to attempt a rescue if they have been trained and equipped for rescue operations as required by Section 12.10(a) of this procedure and if they have been relieved as required by Section 12.9(b).4 of this procedure.

5. Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space under Section 12.9(b).6 of this procedure.
6. Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space, and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:

    - If the attendant detects a prohibited condition.
    - If the attendant detects the behavioral effects of hazard exposure in an authorized entrant.
    - If the attendant detects a situation outside the space that could endanger the authorized entrants.
    - If the attendant cannot effectively and safely perform all the duties required under this section.

7. Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
8. Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

    - Warn the unauthorized persons that they must stay away from the permit space.
    - Advise the unauthorized persons that they must exit immediately if they have entered the permit space.
    - Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
    - Performs non-entry rescues as specified by the employer's rescue procedure.
    - Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

(c) Entry supervisor. The employer will ensure that each entry supervisor:

1. Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
2. Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
3. Terminates the entry and cancels the permit.
4. Verifies that rescue services are available and that the means for summoning them are operable.
5. Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
6. Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

12.10 Rescue and Emergency Services

(a) The following requirements apply to employers who have employees enter permit spaces to perform rescue services.

1. The employer will ensure that each member of the rescue service is provided with, and is trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from permit spaces.
2. Each member of the rescue service will be trained to perform the assigned rescue duties.
3. Each member of the rescue service will also receive the training required of authorized entrants under Section 12.8 of this procedure.
4. Each member of the rescue service will practice making permit space rescues at least once every 12 months by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces will, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.
5. Each member of the rescue service will be trained in basic first-aid and in cardiopulmonary resuscitation (CPR). At least one member of the rescue service holding current certification in first aid and in CPR will be available.

6. When an employer (host employer) arranges to have persons other than the host employer's employees (outside rescuer) perform permit space rescue, the host employer will ensure that

   - The outside rescuer can effectively respond in a timely manner to a rescue summons.
   - The outside rescuer is equipped, trained and capable of functioning appropriately to perform permit space rescues at the host employer's facility
   - The outside rescuer is aware of the hazards they may confront when called on to perform rescue at the host employer's facility.
   - The outside rescuer is provided with access to all permit spaces from which rescue may be necessary so that the outside rescuer can develop appropriate rescue plans and practice rescue operations.

(c) To facilitate non-entry rescue, retrieval systems or methods will be used whenever an authorized entrant enters a permit space unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems will meet the following requirements.

1. Each authorized entrant will use a chest or full body harness with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or other point which the employer can establish will ensure that the entrant will present the smallest possible profile during removal.
2. The other end of the retrieval line will be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device will be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.
3. If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information will be made available to the medical facility treating the exposed entrant.

12.11 Exhibits/Attachments

(a) Procedures for Atmospheric Testing, Exhibit A

(b) Sewer System Entry, Exhibit B

(c) Confined Space Entry Permit, Attachment 7

The Confined Space Entry Permit is used for documenting activities associated with this procedure. The completed Permits will be maintained for a period of 1 year from the date of cancellation, in accord with Section 12.6(f) above.

Exhibit A. Procedures for Atmospheric Testing

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.

A.1. Evaluation testing. The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure should be done by, or reviewed by, a technically qualified professional (e.g., certified industrial hygienist, marine chemist, registered safety engineer, certified safety professional, etc.) based on evaluation of all serious hazards.

A.2. Verification testing. The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.

B.3. Duration of testing. Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.

C.4. Testing stratified atmospheres. When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

Exhibit B. Sewer System Entry

Sewer entry differs in three vital respects from other permit entries. First, there rarely exists any way to completely isolate the space (a section of a continuous system) to be entered; second, because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant or employer; and third, experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

B.1 Adherence to procedure. The employer should designate as entrants only employees who are thoroughly trained in the employer's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.

B.2 Atmospheric monitoring. Entrants should be trained in the use of, and be equipped with, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions is encountered: oxygen concentration less than 19.5 percent; flammable gas or vapor at 10 percent or more of the lower flammable limit (LFL); or hydrogen sulfide or carbon monoxide at or above their PEL (10 PPM or 50 PPM, respectively); or, if a broad range sensor device is used, at 100 PPM as characterized by its response to toluene. Normally, the oxygen sensor/broad range sensor instrument is best suited for sewer entry. However, substance specific devices should be used whenever actual contaminants have been identified. The instrument should be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrants' direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

B.3 Surge flow and flooding. Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.

B.4 Special Equipment. Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBA) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

Attachment 7. Confined Space Entry Permit

Confined Space Entry Permit

This permit is valid only on the date of issue and for only one shift. Return this permit to the safety department at the end of the shift.

Date_____ Shift_____ Location_____

Purpose for entry_____

Supervisor in charge_____ Contractor _____

Communications ☐ Yes ☐ No Rescue procedure appropriate ☐ Yes ☐ No

Emergency telephone no._____

A check* denotes minimum requirements to be completed and reviewed prior to entering.

REQUIREMENTS	DATE	TIME
☐ Lock out/de-energize and tested		
☐ Line(s) broken-capped-blanked		
☐ Purge-flush-vent		
☐ Ventilation		
☐ Secure area (post or flag)		
☐ SCBAs		
☐ Emergency/Rescue equipment		
☐ Emergency retrieval plan		
☐ Standby personnel		
☐ Full body harness or other		
☐ Lifelines		
☐ Fire extinguishers		
☐ Proper lighting		
☐ Personal protective equipment		
☐ Welding and/or cutting permit		

*For items that do not apply, enter N/A in the date column.

ATMOSPHERE TESTING

Time_____ Oxygen reading_____ LEL_____

Other tests _____

Sign In	Time In/Out	In/Out	In/Out

Standby person _____

Confined space entry authorized by and atmospheric survey by: _____

13. Crane Operations

13.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to evaluate the proficiency of crane operators, riggers, and inspectors, and to set the parameters for critical lifts in accordance with the requirements of WAC 296-155-529.

13.2 Definitions

Not applicable.

13.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

13.4 Implementation

1. Operators, riggers, and inspectors will meet the minimum requirements indicated within the paragraphs below prior to qualification in their related discipline.
    - To qualify as an operator, rigger, or inspector, a person must be at least 18 years old, able to communicate in written and spoken English, and meet required physical standards for the job assignment.
    - They must be free from any medical condition that would render the individual incapacitated from ambient conditions that will or might prevail in the work place.
    - They must be able to distinguish colors, have normal depth perception and field of vision as required for job operation.
    - They must have no medical condition that could constitute a hazard to themselves or to others.
2. Crane operators must be certified (CCO) by the North American Crane Rating Bureau for the type of crane that he/she will be operating.
3. Training, if provided, will be in accordance with WAC 296-155-53409.

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14. Critical Lift Procedure

14.1 Purpose

The following procedure identifies the minimum acceptable requirements to be followed by the Contractor when a critical lift operation is to be planned and executed.

14.2 Definitions

(a) Critical Lift. A hoisting operation in which a critical item or load will be hoisted or moved, or in which a non-critical item will be hoisted or moved in an area where critical items could be affected; any lift involving more than one crane (tandem lifts); or where the maximum anticipated dynamic load is at or above 75 percent of the crane's rated capacity for that particular lift. Tandem lifts will be allowed only when there is no other feasible means of placing the item or load.

(b) Critical item or Load. A part, component, assembly, or piece of equipment ("item") that dropping, upset, or collision could cause/result in any of the following:

- Personnel injury or significant adverse health impact, either onsite or offsite.
- Significant release of hazardous material to the environment or create an undesirable condition.
- Undetectable damage that would jeopardize future operations or safety of a facility. Damage that would result in unacceptable delay to schedule or other significant deleterious programmatic impact (such as loss of vital data).
- Damage that would result in serious economic consequences.

(c) Person-in-Charge (PIC)/Competent Person. The key designated contractor supervisor or manager (other than the equipment operator) responsible for the safe handling of critical lifts in, around, or above spaces at which critical lifts are located.

(d) Qualified. A person who by possession of a recognized degree, certificate, or professional standing, or by extensive knowledge, training, and experience has successfully demonstrated his/her ability to solve or resolve problems relating to the critical lift process.

(e) Qualified Engineer/Qualified Engineering Organization. An engineer or an engineering organization whose competence in equipment evaluation for critical lift operations is accepted by the Contractor and the Client.

(f) Qualified Inspector. An individual whose crane inspection competence is recognized by the state in which the critical lift is to be conducted, the U.S. Department of Labor, Occupational Safety and Health Administration, or another agency authorized to certify inspection personnel.

(g) Qualified Operator. An operator whose competence to operate equipment associated with a critical lift safely and effectively can be demonstrated to the Contractor. This demonstration may be by an operational test or by past first-hand knowledge of the operator's experience on similar lifts, or other means that allow the Contractor insight into the operator's competence.

(h) Qualified Rigger. A person whose rigging skill and competence is demonstrated either by satisfactory and extensive past experience or by successfully completing a demonstration rigging test.

(i) Critical Lift Checklist. A Contractor document (Attachment 9) that identifies pre-lift information requirements to be completed prior to making the actual critical lift. The documented Critical Lift Checklist will be completed by the subcontractor and submitted to the Contractor’s Safety Manager for file and retention.

(j) Crane Hoisted Personnel Platform. Work that involves lifting workers in a personnel platform that is suspended from a crane. When work must be performed that cannot be accomplished without the use of

a Crane Hoisted Personnel Platform, a Crane Hoisted Personnel Platform Permit (Attachment 11) must be completed.

14.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

14.4 Critical Lift Procedures

(a) Contractor Designated Representative. The contractor/subcontractor will identify and designate the individual responsible to direct critical lift operations or person-in-charge (PIC). This person will be qualified in critical lift operations. A resume of the contractor's PIC experience will be submitted to the Contractor for review and approval.

(b) PIC Qualifications. The PIC will be a qualified rigger or assisted by a qualified rigger. The PIC will be experienced with the hoisting and rigging equipment to be used in the planned critical lift.

(c) Critical Lift Plan.

1. The PIC will ensure that a critical lift plan is prepared and that the final plan addresses the entire critical lift operation. The completed plan will be submitted to the Contractor for review and approval a minimum of three (3) full working days prior to critical lift operations. Lift operations will not begin until the Contractor reviews the final plan.
2. At a minimum, the plan elements will include:

    - Identification of each piece of operating lift equipment by type and rated capacity. The serial or contractor's identification numbers will be provided as appropriate.
    - Identification of slings, lifting bars, shackles, and all other major rigging accessories or assemblies by serial number and rated safe work load (SWL) capacity.
    - The acceptable first certification of all critical lift lifting equipment required to be tested and certification that all tests were conducted and documented according to the U.S. Department of Labor OSHA, Washington Department of Labor and Industries, or other recognized certifying authority.
    - Identification of the critical item(s) or load(s) to be moved, its weight, dimensions, and center of gravity as determined by the method of SAE J874, or estimated from the drawings, engineering analysis, and the total hook load (including lift attachments).
    - Submittal of a rigging sketch(es) that identifies lift points, sling angles, accessory placement, method of attachment, boom angle, crane orientation, and any and all other factors that affect the equipment's capacity (e.g., special limits on any of the lift accessories).
    - Approximate and maximum hoist and winch speeds.
    - Special instruction given to the operator that might include: boom and swing angles at each step of the critical lift, sequences of moves, coordination of other equipment involved, translation speeds, direction and distance, load weight, center of gravity, and all other pertinent information (e.g., power line considerations, physical obstructions and other on-going Client operations) that could affect lift operations.
    - Requirements if specific tests are to be made before, during, and after the move or lift, including load test results for critical lift practice lifts.

- Any special surveillance procedures including checkpoints, instruments, and indicators used to assure the lift/move is conducted according to plan and speeds/capacities are not exceeded.

(d) Qualified Operator. The contractor will provide only qualified operators to conduct critical lift operations. Operator qualifications will be provided to the Contractor as part of the completed lift plan.

(e) Qualified Signaler(s). Signaler(s) for critical lift operations will be qualified for that operation. Qualifications for the signaler(s) will be provided to the Contractor as part of the completed lift plan.

(f) Considerations. The contractor will consider the crane's lifting history when completing the final lift plan. Additional considerations will include, but not be limited to, (a) the crane's inspection history; (b) sling angles and sizes; (c) inspection and test certification periods; (d) load configuration; (e) the presence of hazardous materials and/or operations; (f) lifting attachment (e.g., spreader bar) SWL rating; and (g) requirements for a load indication device.

(g) If Lift is within 10% of Capacity of Any Component. When the weight of the critical lift is within 10% of the rated capacity, and equipment of greater capacity is not available, the PIC will conduct an operator review. At a minimum, the review will include: the positioning and rigging of the load, the effect of ground conditions, wind and weather (if applicable) on equipment stability, and the effect of rotational and translational speeds on lift operations. A Crane Lift Work Sheet (Attachment 8) will be used to document the lift.

(h) Initial Lift Considerations. Hoisting will be stopped when the load is approximately two inches off the supports and a check made to determine any tendency to swing or sway, and any tendency of the slings to slip or change position. If needed, sling positions will be adjusted prior to continuing the lift. Procedural approval for changes to the sling position, support, and restraints will be obtained from the PIC.

(i) Field Changes. Field changes to the contractor's Critical Lift Plan/Procedures or equipment adjustments to the contractor's equipment may be made providing authorized Contractor project personnel concur with the changes prior to implementation.

14.5 General Planning Responsibility

This Critical Lift Procedure will not be considered as all-encompassing, but at a minimum, the Contractor’s requirement. Because of the many variables to be included when planning a critical operation and the varied types of associated lift equipment, it is the Contractor's/subcontractor’s responsibility to review the overall operation and provide a total lift plan.

Nothing in the procedure should be construed as relieving the Contractor/subcontractor from responsibility to provide a pre-lift/rigging plan. The Contractor's/subcontractor’s plan may include additional information not reviewed in this procedure; however, this procedure provides minimum acceptable guidelines.

14.6 Construction Critical Lift Checklist

The Critical Lift Work Sheet (Attachment 9) and the Tandem Lift Work Sheet (Attachment 10) will be completed before a critical lift or tandem lift procedure is performed.

14.7 Exhibits/Attachments

(a) Crane Lift Work Sheet, Attachment 8

(b) Critical Lift Checklist, Attachment 9

(c) Tandem Pick Lifting Parameters Work Sheet, Attachment 10

(d) Crane Hoisted Personnel Platform Permit, Attachment 11

Attachment 8. Crane Lift Work Sheet

CRANE LIFT WORK SHEET

Date _____

Crane _____

Description _____

_____

_____

WEIGHT

Item _____

Jib _____

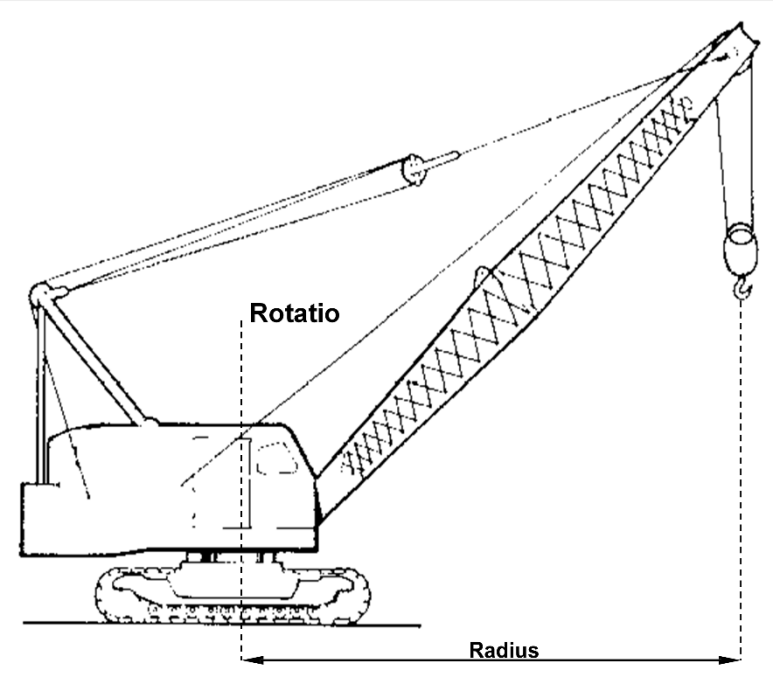
Bail and Hook _____

Load and Block _____

Wire Rope _____

Rigging _____

Total _____



OTHER SPECIFICATIONS

Max Radius to Be Used (ft) _____

Chart Capacity at _____ Radius = ___

Min Boom Angle _____

Percent of Capacity _____

70% to 90% Review by _____

Over 90% - Stamp by _____

SETUP INSPECTION

Ground Conditions _____

Levelness _____

Wind Conditions _____

REMARKS

_____

_____

_____

_____

_____

Attachment 9. Critical Lift Checklist

CRITICAL LIFT CHECKLIST

Contractor Name _____

Date of Planned Lift _____ Date of Planned Lift _____

Contractor Personnel

Designated person-in-charge (PIC) of lift _____

Designated operator(s) _____

_____

Critical Lift Load Information

1. Description of item to be lifted (load): _____
2. Weight of item being lifted: _____
3. Was the item weight estimated? ☐ Yes ☐ No

   If so, who estimated it? _____
4. Who verified the weight? _____
5. How was the item weight verified? _____

   _____
6. Weight of rigging accessories? _____
7. Total gross weight of lift: _____

Major Hoisting Equipment to Be Used

1. Lifting unit: _____
2. Gross lift capacity: _____
3. Rigging to be used: _____
4. Designated rigger: _____

Hoisting Equipment Inspection

1. Lift unit inspector: _____
2. Date inspected: _____
3. Rigging inspector: _____
4. Date inspected: _____

Operations

1. Date: _____
2. Time: _____
3. Place: _____
4. Is area clear of non-essential personnel? ☐ Yes ☐ No

   Who determined? _____
5. Equipment inspection status and operation reviewed? ☐ Yes ☐ No
6. Did the operator or the rigger note any discrepancies on the Pre-Lift Check? ☐ Yes ☐ No
   If discrepancies existed, what were they, and how were they addressed: _____

   _____

   _____
7. Is the critical lift item (the load) freely suspended and ready to move? ☐ Yes ☐ No
   If the load is not freely suspended and ready to move, complete the following information.
   Identify the retarding force, e.g. "Load is attached to mounting bolts" or identify the restriction:

   _____

   _____

   _____

   Have all of the eyebolts or similar lifting attachments to be used on the load verified to be adequate with respect to sufficient size and capacity to life the load safely? ☐ Yes ☐ No

   If so, identify the individual who provided verification: _____

8. Path of travel details

Diagram the path that the load is to follow:

Is there sufficient clearance for the load at every point along the path? ☐ Yes ☐ No

Identify the contractor person that checked: _____

Do obstructions exist that would require the load to be hoisted to an unsafe position (e.g., sling angles/boom angle would be excessive, etc.)? ☐ Yes ☐ No

Identify the contractor person that checked: _____

Has the contractor's representative been assigned the responsibilities to observe the load's path of travel and ensure personnel are clear? ☐ Yes ☐ No

Identify the contractor person responsible: _____

_____ _____

Signature of Contractor Date

Attachment 10. Tandem Pick Lifting Parameters Work Sheet

TANDEM PICK LIFTING PARAMETERS WORK SHEET

Project Name_____ Project No. _____ Date _____

Description of lift _____

_____

_____

Crane Data

Crane 1: Make and Model _____

Crane 2: Make and Model _____

Lattice Boom Model Type	Unit 1 _____	Unit 2 _____
Boom Length	Unit 1 _____	Unit 2 _____
Counterweight	Unit 1 _____lb.	Unit 2 _____
Capacity	Unit 1 _____lb.	Unit 2 _____

Load Data

Gross Load Weight _____ lb.

+ Rigging Weight	Unit 1 _____lb.	Unit 2 _____ lb.
+ Main Block	Unit 1 _____lb.	Unit 2 _____ lb.
+ Effective Jib Weight	Unit 1 _____lb.	Unit 2 _____ lb.
+ Cable Weight	Unit 1 _____lb.	Unit 2 _____ lb.
+ Headache Ball Weight	Unit 1 _____lb.	Unit 2 _____ lb.
+ Maximum Load Radius	Unit 1 _____ft.	Unit 2 _____ ft.
+ Minimum Load Angle	Unit 1 _____°	Unit 2 _____°
+ Maximum Boom Angle	Unit 1 _____°	Unit 2 _____°
+ Minimum Boom Angle	Unit 1 _____°	Unit 2 _____°
= Net Load Weight	Unit 1 _____lb.	Unit 2 _____ lb.

Rigging Data

Sling Construction

Diameter	Unit 1 _____in.	Unit 2 _____ in.
Core Type	Unit 1 _____	Unit 2 _____
Number of Legs	Unit 1 _____	Unit 2 _____
Sling Angle	Unit 1 _____°	Unit 2 _____°
Sling Capacity	Unit 1 _____	Unit 2 _____
Means of Fastening Slip or Hoist Hook to Load	Unit 1 _____	Unit 2 _____
Capacity of Fastener	Unit 1 _____lb.	Unit 2 _____ lb.

Pre-Lift Requirements (ALL requirements must be met)

_____ Load chart utilized is for exact crane model, boom type, length, tip and counterweight.

_____ Competent person in charge of lift: Name _____

_____ Competent signal person identified: Name _____

_____ Pre-pick meeting help with crew.

_____ Written crane inspection completed within 1 day of critical pick.

_____ Swing path not over personnel.

_____ Footing is sound and level (soil conditions/compaction, underground tunnel or utilities).

_____ Pre-planning for radio or hand signal communications.

_____ Minimum clearances from power lines can and will be maintained.

_____ The load radius has been measured with tape measure.

_____ Wind speed does not exceed 20 mph. Consider postponing lifts if speeds are more than 10 mph.

_____ Load will not touch boom at any time.

_____ Four dual crane lift diagrams have been prepared.

_____ If on barge, the regional manager has reviewed stability and potential lift conditions. Barge chart load provided.

_____ Tag lines are long enough, tied only to the load, and in good condition – loose end controlled by the designated person.

_____ Operating locations are far enough away from shorting, excavations, and trenches to eliminate risk of collapse.

_____ Application of hardwood mats has been carefully considered.

_____ Outriggers or crawler tacks are fully extended and wheels are clear of ground.

_____ Application of blocking under outrigger pads has been carefully considered.

_____ Adequate swing clearance (minimum 2″) between the counterweight and any obstacles.

_____ Boom composition is correct.

_____ No added counterweight.

_____ Machine is rigged with adequate type of cable and number of parts of hoist line.

_____ Regional manager and project superintendent have discussed lift.

_____ Load block is of adequate capacity and sheaves are of proper size for hoist cable.

_____ All rigging has been inspected for capacity and condition.

_____ Underground structures and conditions have been considered.

Approval Signatures

_____ Date _____
Regional Safety Manager

_____ Date _____
Project Superintendent

_____ Date _____
Crane Operator, Unit 1

_____ Date _____
Crane Operator, Unit 2

Attachment 11. Crane Hoisted Personnel Platform Permit

CRANE HOISTED PERSONNEL PLATFORM PERMIT

Date _____

1. This permit is required by _____ in compliance with 29 CFR, Section 1926.550(g), CCR 8 Section 5004, and EM 385-1-1 21.G and 21.F.

2. Prior to use of any personnel platforms suspended from cranes for the hoisting of personnel, the highest level or project management shall determine if the use of conventional means is more hazardous or not possible because of structural design or work site conditions. Reasons shall be stated on Line 3.

   Approval Signature:_____

3. Justification for use:

   _____

   _____

   Work description/location (include elevation):

   _____

   _____

_____ Crane inspected and approved
_____ Rigging inspected and approved
_____ Personnel platform inspected and approved
_____ Anti-two block device radius and capacity established
_____ Maximum operation radius and capacity established

_____ Test lift completed
_____ Proof lift completed
_____ Pre-lift safety meeting held with all personnel involved
_____ Communication methods established
_____ Signal person designated

Length of radius _____ Name _____

Crane capacity at above radius _____

The persons below acknowledge that they have participated in a pre-lift meeting and acknowledge the above activities were completed satisfactorily.

_____ General Superintendent

_____ Crane Operator

_____ Superintendent in Charge of Work

_____ Signal Person

_____ Safety Manager

_____ Employee(s) in Platform

15. Discipline

15.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to provide disciplinary procedures necessary to enforce project safety rules and ensure the protection and safety of all employees.

15.2 Definitions

Not applicable.

15.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

15.4 General Requirements

(a) Action

1. All employees are required to follow Contractor's corporate safety policies and operating procedures. When required, employees will be provided with additional training and information, or retraining to maintain their knowledge.
2. All employees are required to follow Facility-specific safety policies and operating procedures.
3. Employees found performing work in an unsafe manner that would endanger the employee or another employee will be subject to discipline that may include termination.
4. The SHE&Q manager and Site Superintendent will determine the disciplinary action to be taken which best suits the circumstances. The steps to be taken, at a minimum, will include the following:
    - Verbal Warning. As the first step in correcting an unacceptable behavior or minor infraction, a verbal warning will be issued to the employee. This warning will be documented.
    - Written Warning. If the unacceptable performance continues, or the severity of the infraction warrants, the next step will be a written warning. The written warning will clearly state the safety policy that was violated and steps the employee must take to correct it.
    - Suspension. If the unacceptable practice continues or the severity of the infraction warrants, the employee will be given time off without pay.
    - Termination. Employees may be terminated if they do not improve their safety performance.
    - Immediate Termination. Any employee who commits a serious safety violation may be subject to immediate termination without prior notice in lieu of any verbal and/or written warnings.
5. Fighting, possession or use of illegal drugs or weapons, or flagrant violations or disregard of project safety rules will result in immediate and permanent termination.

(b) Intent

The Contractor intends that these disciplinary procedures will reach those employees who do not keep safe work habits as a priority and turn them into safety conscious workers who will be able to return to their homes each day uninjured. The procedures are intended to be educational rather than punitive.

16. Education and Training

16.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to provide specific procedures or systems of controls, consistent with the Contractor's corporate policy, and Owner's requirements, that will effectively protect the safety and health of company personnel, subcontractor personnel, owner personnel, and the general public who may come in contact with or be affected by the work of the Contractor.

16.2 Definitions

Not applicable.

16.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

16.4 General Requirements

Not applicable.

16.5 Implementation

(a) Each contractor will develop a safety execution plan; the plan must include a safety training matrix that identifies the training provided to each employee, by role, trade, or other grouping.

(b) Prior to performing any work on site, new contractor employees must receive all required contactor-specific safety training required for their role. The orientation will cover basic safety, hazard communication, fall protection, drug awareness, unusual conditions, and site-specific safety concerns such as the Emergency Response Plan and the Fire Prevention Plan. Training documentation must be submitted to the Contractor's Safety Manager. In addition, the contractor-specific training must detail the Facility-specific risk assessment procedure. **NOTE*: Any employee **NOT** having completed documentation of his/her training must be under the direct and immediate supervision of a trained and qualified employee while performing the new job or task.

(c) Unescorted Access. Completion of a Facility-Specific Safety Orientation is required for unescorted access to the Facility site. The orientation is facilitated by the SHE&Q manager and the senior project manager, or their designees.

- Training for individuals who are making deliveries, but not performing other work on site, may be limited to the Driver's Site Safety Orientation video.

- Visitors are escorted by a Facility team member or by suitably qualified contractor personnel at all times. The Visitor Orientation program is provided by the SHE&Q manager or his designee.
- The use of the Escort Policy must not be used to circumvent training requirements.
- Authorization for escort training and the authority to escort Facility visitors is provided by the SHE&Q manager.

(d) Employees must complete the Port-specific training regarding On Track Safety (OTS) along with any additional Port-required training.

16.6 Exhibits/Attachments

Employee Information and Training Checklist, Attachment 12

Attachment 12. Employee Information and Training Checklist

EMPLOYEE INFORMATION AND TRAINING CHECKLIST – ENGLISH

NEW HIRE _____ RE-HIRE _____ TRANSFER _____

_____ I have received Hazard Communication Training as required by the OSHA Standard 29 CFR 1926.59 which is outlined in _____ Construction Hazard Communication Program. I know that the Company Program, Hazardous Chemical Inventory List and Material Safety Data Sheets (MSDSs) are kept in the Hazcom Manual in _____ Construction Project Field Office for my review.

_____ I have received Fall Protection Training as required by the OSHA Standard 29 CFR 1926.500 which is outlined in _____ Construction Safety and Health Manual.

_____ I have received Stairways and Ladders Training as required by the OSHA Standard 29 CFR 1926.1050 which is outlined in _____ Construction Safety and Health Manual. I have been trained to recognize hazards related to stairways and ladders and know the procedures to follow to minimize these hazards.

_____ I have received Scaffold Training as required by OSHA Standards Subpart L.

_____ I have received Fire Extinguisher Training (see pamphlet).

_____ I have received a copy of the Code of Safe Practices during orientation.

_____ I have received a copy of the project rules and regulations.

_____ I–9 Verification.

_____ Health and Life Insurance Applications.

_____ Parking Permit.

_____ _____
Print Name Title/Trade

_____ _____
Signature Social Security No./Employee No.

I hereby certify that the above named employee has been provided with:

Hazard Communication Training on _____(date)
Fall Protection Training on_____(date)
Stairways and Ladders Training on_____(date)
Scaffold Training on_____(date)
Fire Extinguisher Training on_____(date)
Code of Safe Practices on_____(date)

_____ _____
Trainer’s Signature Title

17. Environmental Protection

17.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for environmental protection while conducting Construction activities at the Facility-site.

17.2 Definitions

Not applicable.

17.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

17.4 General Requirements

Not applicable.

17.5 Implementation

(a) Compliance with Approval and Permit Conditions

The Contractor will comply with all Facility permits and approvals, and local, state and federal regulatory requirements. All work will be closely coordinated with Owner's supervisory personnel (including the contract project manager, the project manager, and the SHE&Q manager, and their designees) so that construction activities meet or exceed permit requirements.

(b) Quality Control

1. The Contractor will establish and maintain quality control for the environmental items and procedure described in this plan or otherwise required by Facility permits and approvals.
2. A record will be made on the daily reports of any problems as well as the corrective action taken to maintain environmental control as required by governing regulations, permits and approvals issued to the Vancouver Energy and Facility.

(c) Protection of Environmental Resources

1. The Contractor will protect environmental resources inside the project boundaries and those affected outside the limits of permanent work during the entire period of the contract.
2. Activities will be confined to areas defined by the specifications and drawings.

(d) Erosion and Sediment Control

Strict compliance with the approved Construction Stormwater Pollution Prevention Plan will be maintained. The Plan will be maintained at the site for use by Inspectors during their periodic inspections.

(e) Disposal of Hazardous Materials

1. All Subcontractors are required to immediately notify the Contractor of any spillage or leakage of hazardous materials, oils, substances, and waste, regardless of the quantity.
2. Example of hazardous items includes, but is not limited to, the following: gasoline, fuel, oil, kerosene, acetone, equipment oil (waste or fresh), certain paints and coatings, contaminated soil and water etc. Hazardous items, similar to those mentioned here, are never to be deposited directly on or into the soil or water but must be in a proper container for disposal. Please refer to the Hazardous Waste Disposal and Hazard Communication sections in this manual.

(f) Spill and Waste Disposal Procedures

Each Site Superintendent will prepare and implement a contractor-specific spill prevention and response plan. The plan will be tiered from the Facility-Specific Construction Spill Prevention, Control and Countermeasures Plan and will:

Implement necessary secondary containment measures

Provide for the presence of spill control and response equipment

Provide for spill clean-up and remediation measures, and disposal by licensed waste management professionals.

Implement notifications to regulatory agencies in coordination with the SHE&Q manager.

The contractor will provide containment in accordance with the Facility-Specific Construction Spill Prevention, Control and Countermeasures Plan. Containment will be affected in the following manner:

(g) Waste Control

1. Trash generated by eating, drinking, etc., will be required to be placed in strategically located trash cans or containers. Trash will be removed periodically in order to prevent vermin infestation.
2. Daily policing of areas will be performed to prevent accumulation of trash.
3. Construction wastes will be handled and removed in accordance with WAC 296-155-335.
4. All construction debris will be removed on a regular basis via a dumpster service and will be disposed of in the proper approved location. Dumpsters will be placed throughout the project and trash chutes will be utilized for removal of building debris once the building shell is complete.
5. Daily project clean-up will be performed. This includes trash collection, cleaning of on-site roadways and off-site roadways if required. All clean-up activities will be monitored by the Contractor's site foreman and enforced by the Contractor's Superintendent.
6. Hazardous waste, if generated, will be accumulated and stored in accordance with state and federal regulations. Hazardous wastes will only be removed and transported to appropriate disposal locations by waste removal contractors will with appropriate hazardous and solid waste licenses/permit(s) and landfill/disposal manifest(s), etc., Copies of all documentation relevant to spill response, clean up and disposal of materials will be retained by the Contractor.

(h) Protection of Water Resources

1. The Contractor will conduct all activities in accordance with the Facility-specific Construction Stormwater NPDES permit, and Facility Water Quality Monitoring and Protection Plan, as applicable to the Contractor activities being performed. The Contractor will implement necessary water pollution prevention measures which may include, but not be limited to: protection of surface and ground water from infiltration of waste materials, uncontrolled project water run-off, and deposit of sediment. Existing sewer and/or stormwater systems will be protected by covering inlets with filter cloth to prevent infiltration of sediment and spillage from the project and hay bales will be placed to control mud and sediment as required by the Project SWPPP.

(i) Protection of Air Resources

1. No burning will be allowed on the project.
2. Equipment, activities, and work operated or performed will be in strict accordance with the state and local air pollution statute and Federal emission performance laws and standards.

3. Industrial air quality at the construction site will be in compliance with applicable industrial hygiene standards.
4. All dust producing operations such as grinding, scaling, or chipping will utilize curtain shields, water spray, or other procedures of accepted good practice to minimize generation and/or migration of dust from the construction site.
5. Operations that could generate fumes, dust or mist will be coordinated with local weather conditions, especially wind direction, wind speed and inversions, so that the effect on personnel and/or property inside and outside the construction site will be kept to a minimum.
6. Paint spraying, coating, sealing or other spraying operations that could discharge mists on or off of the construction site will be performed so as to minimize migration of spray particles off-site. Objects on adjacent property that would be particularly susceptible to damage from airborne mists such as outdoor furnishings, plants, shrubbery, windows and walls, should be removed and/or protected by tarpaulins, plastic sheeting, or other suitable means. Any vehicle parked at the project will be at the vehicle owner's risk.
7. In coordination with the Project Manager the Contractor will monitor his/her construction activities for excessive dust generated due to vehicle movements, and will apply water to control airborne construction dust as needed.
8. Haul roads, parking areas, storage yards or any large bare areas which could contribute to wind born dust problems will be sprinkled with water, covered with suitable restraining barriers, or treated with wetting agent to reduce the generation of dust.
9. All sweeping operations, whether by hand brooms or power sweepers, will utilize water sprays or vacuum attachments to minimize dust generation.
10. Existing site access roads will be cleaned as necessary so as to prevent damage to existing asphalt surfaces and to prevent accidents caused by slippery mud, punctured tires caused by construction debris spills, and to maintain dust control.
11. To accomplish the foregoing, it is anticipated that the following performance procedures will be required:

    - Spot clean up performed by laborers with wheelbarrows and street brooms, especially in the vicinity of curb cut access to the construction site.
    - In specific areas where paving surfaces have been stained or striping obliterated due to accumulation of dirt, these surfaces will be scrubbed and hosed down as deemed necessary to keep lanes markings visible.

(j) Noise Control

1. The hours of construction permitted by Facility permits and approvals will be strictly followed. During construction, noise will be kept to the lowest possible levels. The Contractor will notify the project manager and the SHE&Q manager at least 48 hours in advance of construction activities with significant noise emissions (for example, but not limited to, pile driving).
2. If vehicles are required to queue in locations near other Port tenant activities or on public roads, idling will be minimized to the extent possible.

If noise complaints arise, the Contractor, in consultation with the project manager and SHE&Q manager, will consider implementation of noise control measures such as the following:

- Maintenance and servicing of machinery and equipment including noise control devices.
- Modification of the noise source (airborne and vibrating), i.e., providing mufflers for electric motors, air outlets of pneumatic valves, and intake of air compressors; vibration isolation of machine surfaces, and repair or replacement of vibrating parts, etc.
- Substitution of quieter equipment, processes, and materials, i.e., changing pump type in hydraulic systems changing location of material/personnel hoists and truck delivery areas, etc.
- Prevent impact and collision during manual and mechanical materials handling.
- Enclosure of noise producing sources if no engineering controls are available or engineering controls are inadequate.

(k) Post-Construction Cleanup and Restoration

1. Following completion of the project, all areas in and around the construction project will be cleaned and any damage caused by the construction process repaired/refurbished in accordance with the Owner's instructions and construction restoration plans.
2. The construction area will be left in a clean condition and will include off-site disposal of excess material, debris and rubbish.

17.6 Exhibits/Attachments

Environmental Checklist, Exhibit C

SAMPLE Environmental Checklist

Vancouver Energy **Environmental Checklist**	Distribution: (list) ☐ HSSE Files ☐ Name (TBD) ☐ Name (TBD)
Inspector Signature	Date of Inspection
Weather Conditions	Time Period of Inspection
Rainfall Previous 24 Hours	Days Since Last Rainfall

Activity	Acceptable	Deviation	Description
Erosion Control Inspection			
Area 200			
Erosion control item 1			
Erosion control item 2			
Area 300			
Erosion control item 1			
Erosion control item 2			
Area 400			
Erosion control item 1			
Erosion control item 2			
Area 500			
Erosion control item 1			
Erosion control item 2			
Rail Infrastructure			
Erosion control item 1			
Erosion control item 2			
Sanitary Wastes			
Portable facilities present and maintained			
Solid Waste (Non-Hazardous)			
Proper collection and storage of scrap			
Proper collection and storage of garbage			
Proper collection and storage of recyclables			
Contaminated Soils and Groundwater			
Proper storage and handling of contaminated soil stockpiles			
Proper storage and handling of contaminated ground or stormwater			
Dust Control			
Little to no dust generated or water used to control dust.			

Activity	Acceptable	Deviation	Description
Oil, Fuel, and Hazardous Material/Waste Handling			
No visible oil/fuel/hazardous materials into stormwater drainage			
Diked areas or sumps with equipment containing oil checked for sheens or spills			
Rainwater drained from dikes or sumps to meet capacity			
Field maintenance conducted away from stormwater drainage			
Note any spill observed (location, type, estimated quantity)			
All oils/fuels/hazardous materials within proper containment			
Compatible material			
Condition of containers			
Product labels applied and readable			
Hazards labeled and readable			
No spills or leaks			
Additional Remarks			

Vancouver Energy
Environmental Deviation Log

Item Description	Level	Date Observed	Deviation No.	Commitment Date on Correction	CommNet or Verification of Correction	Date Correction Verified

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18. Equipment

18.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for equipment safety, in Compliance with federal, state and local construction equipment standards. Only those employees qualified by training or experience will be permitted to operate, inspect, or maintain equipment and machinery.

18.2 Definitions

Not applicable.

18.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

18.4 General Requirements

(a) All equipment received by the project is to be inspected by a competent person prior to being placed in service. Any unsafe conditions will be corrected before operation.

(b) A binding contractual agreement, including insurance requirements, must be established when renting third party equipment.

(c) Equipment requiring an operator will be inspected upon receipt at the site, with a written record of the inspection kept on file.

(d) All operators of mobile equipment, including earthmoving equipment, elevated work platforms, forklift trucks, and lift cranes must be qualified through training and/or experience to operate the equipment.

(e) The Contractor will designate a qualified person(s) to ensure that operators are qualified to operate their assigned equipment.

(f) The equipment operator’s manual will be available and reviewed by the operator.

18.5 Crane Requirements

(a) The manufacturer’s specifications and limitations applicable to the operation of any and all cranes will be followed.

(b) A thorough annual inspection of the hoisting machinery will be made by a competent person or by a government or private agency recognized by the U.S. Department of Labor. The Contractor will have access to documentation regarding such inspections.

(c) A competent person will inspect all machinery and equipment prior to each use and during use to make sure it is in safe operating condition. All deficiencies will be repaired.

(d) The operator, in accordance with the manufacturer's operation manual, must make daily inspections. The date of the inspection and the signature of the inspector must be entered in a logbook.

(e) Good housekeeping must be maintained. All mud, oil, or grease spots must be wiped up to prevent falls.

(f) A five (5) BC rating or higher fire extinguisher must be accessible at the operator's station.

(g) Rated load capacities and recommended operating speeds, special hazard warning, or instructions will be conspicuously posted and visible while the operator is at the control station.

(h) Cranes and derricks with variable angle boom will be equipped with a boom angle indicator readily visible to the operator.

(i) An operable boom stop is required on any crane where the boom could fall over backwards.

(j) Personnel will not mount cranes unless the unit is stopped or the operator indicates that it is safe. Safe access (by steps and handholds) must be provided.

(k) All hooks must have a safety latch or be moused to prevent the load from becoming unhooked.

(l) Before starting work, the operator will operate each control to get the feel of the crane and to be sure clutches and brakes are dry.

(m) Accessible areas within the swing radius of the crane will be barricaded in such a manner as to prevent an employee from being struck or crushed by the crane.

(n) All cranes must be equipped with an operable warning device controlled by the operator.

(o) No crane will be operated with the wheels or tracks off the ground unless properly bearing on outriggers.

(p) No equipment or machinery will operate near electrical lines except where electrical distribution and transmission lines have been de-energized and visibly grounded or proper safety devices have been put in place. Minimum clearances will be observed.

(q) Side loading of booms will be limited to freely suspended loads, and booms will not be used for dragging loads sideways unless the boom is specifically designed and constructed to withstand such side loading.

(r) Only qualified persons will be permitted to give crane signals.

(s) No employee known to be colorblind or to have poor eyesight or hearing which cannot be corrected, or to be suffering from heart disease, epilepsy, or similar ailments which may suddenly incapacitate them will be permitted to operate a crane.

(t) Verification of valid crane operator's license must be completed when required by law and a copy kept on file.

(u) Crane registration must be done where required by law.

(v) A preventative maintenance program based on the crane manufacturers or certified agent's recommendation will be in place.

(w) A copy of ANSI B30.5 Chapter 5-3 Operation should be given to the operator at time of hire.

(x) Requirements for operation and safety may be found in Section 1926.550 Federal OSHA Standards for Construction; Chapter 296-155 WAC, Washington State Safety Standards for Construction Work; and ANSI B30.5 Safety Code for Crawlers, Locomotive and Truck Cranes.

18.6 Suspended Loads

(a) No employees are to work or pass under any suspended loads.

(b) Tag lines will be attached to suspended loads and will be used for guiding and landing loads.

(c) In the event a suspended load is to be swung over a work area, employees will leave the area at the warning sound, and then return to work when the load has passed and the swing path is clear.

18.7 Rigging

Material/load handling activities using slings, rigging hardware, below-the-hook lifting devices when performing construction activities will be conducted in accordance with the provisions of WAC 296-155-33600 through -34025.

18.8 Forklifts (Industrial Lift Trucks)

Forklifts and other powered industrial lift trucks used at the construction site must comply with the provisions of WAC 296-863.

(a) Only drivers authorized and trained in the safe operation of the industrial trucks or industrial tow tractors will be permitted to operate such vehicles.

(b) A set of operating rules must be posted where operators can see them.

(c) Stunt driving and horseplay is prohibited and may result in immediate termination.

(d) No riders will be permitted on vehicles unless provided with adequate riding facilities.

(e) Employees will not ride on the forks of lift trucks.

(f) Drivers will check the vehicle at least once each shift and, if found to be unsafe, have it repaired before continuing operations.

(g) Attention will be given to the proper functioning of tires, horn, lights, battery, controls, brakes, steering mechanism, and the lift system of the forklift (forks, chains, cable, and limit switches).

(h) Vehicles will not exceed the authorized or safe speed.

(i) The driver will slow down and sound the horn at cross aisles and other locations where vision is obstructed.

(j) Operators should always face their destination. If unable to see over the load, the forklift should be driven backwards.

(k) When leaving a vehicle unattended, the power will be shut off, brakes set, and the mast brought to the vertical position with the forks left in the down position. When left on an incline, the wheels will be blocked. NOTE: When the operator is over 25 feet from or out of site of the forklift, the vehicle is “unattended.”

(l) Do not attempt to exceed the capacity of the forklift or carry loads that are too heavy or unbalanced.

(m) A loaded forklift will not be moved until the load is safe and secure.

(n) Seat belt must be worn if forklift has a roll over protective structure.

(o) Where possible, avoid operating near ditches, embankments and holes.

(p) Reduce speed when turning, crossing slopes, and on rough, slick or muddy surfaces.

(q) When traveling watch out for overhead obstruction.

18.9 Aerial Work Platforms (Aerial Lifts)

(a) Only trained and authorized operators will be permitted to operate an aerial lift.

(b) A malfunctioning lift will be shut down until repaired.

(c) The controls will be plainly marked as to their function.

(d) The controls will be tested each day prior to use to determine that they are in a safe operating condition.

(e) All personnel in the platform will wear an approved full body harness and shock- absorbing lanyard attached to the platform attachment point.

(f) Load limits specified by the manufacturer will not be exceeded.

(g) Instruction and other placards must be legible.

(h) Aerial lifts will not be used near electrical power lines unless the lines have been de- energized or adequate clearance is maintained.

(i) Employees using aerial lifts will be instructed to recognize and avoid unsafe conditions and hazards.

(j) Ground controls will not be operated unless permission has been obtained from the personnel in the platform, except in case of an emergency.

(k) A competent person will perform regular inspection of the jobsite and aerial lift.

(l) Personnel will always stand on the floor of the platform, not on boxes, planks, railing or other devices for a work position.

(m) Always perform a walk-around inspection before using any machine. Special aerial lift concerns:

1. Inspect platform assembly for loose or missing parts, visible damage, lock pins and bolts in place, foot switch (safety shutoff) in place and working.
2. Tire and wheel assembly properly secured, no loose or missing lug nuts, no visible damage (no cuts on tires) and tires are properly inflated.
3. Ground and platform control switches are operable, no visible damage, and placards secure and legible.
4. Check emergency stop switch for proper operation.
5. Check manual descent control valves for proper operation in the event they may be needed due to total power failure.
6. Check to ensure that the operating manual is stored on the equipment and is readily accessible.

18.10 Material Handling Equipment

Material handling equipment will be designed, equipped and operated in accordance with WAC 296-155-615.

(a) Only operators qualified through training and/or experience will operate the equipment.

(b) Read and understand all safety precautions and warnings before operating the equipment. Perform a daily inspection at the beginning of each shift.

(c) In an open area check the operation of all controls while moving them slowly.

(d) Do not start the equipment or move controls if there is a warning tag hanging on the controls.

(e) Do not jump off equipment. Use grab rails.

(f) Do not smoke while fueling or when near batteries.

(g) Riding on loads, fenders, running boards or tailgates, or allowing legs or arms to dangle over the sides is not permitted.

(h) Do not ride on equipment not designed for passengers.

(i) The parking brake must be set whenever the equipment is parked. Equipment parked on an incline must have the wheels chocked. Lower all attachments to the ground before leaving the equipment.

(j) Do not back up any vehicle or equipment when the view to the rear is obstructed unless:

1. It is equipped with an operating back-up alarm which is audible above the surrounding noise for a distance of 200 feet; or
2. An observer signals that it is safe to back up.

(k) Know the traffic pattern of the jobsite road and obey flaggers, road signs and signals.

(l) Keep the equipment, especially the deck and steps, free of foreign material. Secure all loose items.

(m) Make sure all safety guards and covers are secured in place.

(n) When operating digging equipment, know the exact location of buried utility lines.

(o) When loading trucks never swing over the truck cab and make sure the driver remains out of the truck unless cab protection is provided.

(p) If necessary to work around power lines, make arrangements to have power disconnected or have sufficient spotters to avoid contact with power lines.

(q) Use caution when moving a piece of equipment with the truck bed in the raised position.

(r) If you hit a power line, stay inside the cab until the equipment is clear of the line or power is shut off.

18.11 Motor Vehicles (Automobiles and Pickups)

(a) Motor vehicles at the construction site will be equipped, operated and inspected in accordance with WAC 296-155-610.

(b) In addition:

- The operator of a motor vehicle must hold a valid driver's license for the class of vehicle to be operated.
- The operator must inspect the vehicle before placing it in operation. Any deficiencies found that might constitute a safety hazard will be repaired before operating.
- A competent person will explain any special controls or operating functions to the operator.
- Personal vehicles should not be brought into the construction site. If there is any means of transportation other than a personal vehicle that will allow you to do your job safely and effectively you are expected to use it.
- Contractors bringing company vehicles inside the Port and construction area fence require prior permission from the senior project manager or project manager. Drive-in access determinations are based on an assessment of role, need and primary work location and controlled through the individual's Facility ID badge.
- While driving on the Facility site all vehicle occupants must wear seat belts at all times. Additionally, the driver is not to use two-way radios or cell phones while driving. If the driver is to take a call or use a radio, he or she must pull over prior to doing so. Use of personal vehicles inside the fence is prohibited unless special permission is obtained from the senior Facility project manager.
- If the evacuation alarm sounds, pull over the vehicle immediately, turn off the engine, and walk to the safest evacuation area. Do not drive the vehicle until the all-clear has sounded.

18.12 Pile-Driving Equipment

Pile-driving equipment will be equipped and operated in accordance with WAC 296-155-620.

(a) Additional Measures for Pile-Driving Activities

- No pile-driving work will occur until verification that no underground utilities exists in those areas where piles will be driven or existing underground utility locations have been verified by hand or vacuum excavation.
- Fall protection will be required when personnel climb leads over 6 feet.
- Hose connections will be secured by at least 1/4-inch-diameter chain or equivalent wire rope to prevent whipping.
- Stirrups will be provided on sheet piling to aid in guiding the pile in place.
- For pile other than sheet piles, a driving head or bonnet is required to bell the head.
- Stop blocks are required for the leads to prevent the hammer from striking the head block.
- A designated signalman will be assigned to give direction to the winch-men.
- Equipment will meet the OSHA construction standards on cranes and derricks.
- Pits or excavations that piles are being driven into will be properly braced, sheet-piled or sloped and barricades will be provided.
- When pile tops are cut, operations will stop for a distance not less than the longest pile that is to be cut.
- When driving jacked piles, the pits will be provided with ladders and curbs to prevent material from falling into the pit.

(b) Pile driving will only be conducted within the vicinity of the Columbia River shoreline with the Marine Mammal Monitoring Plan implemented.

18.13 Exhibits/Attachments

Not applicable.

19. Fire Protection

19.1 Purpose

To establish the requirements for the Contractor and its subcontractors for the prevention of and protection from fire hazards, and to ensure compliance with WISHA WAC 296-155-260 and National Fire Protection Association (NFPA) requirements.

19.2 Definitions

Not applicable.

19.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

19.4 General Requirements

(a) The Site Superintendent will perform the following:

1. Establish and maintain a list of locations for which the Contractor has fire protection equipment and the type of equipment.
2. Have available engineering drawings or up-to-date descriptions of each fire protection system under the Contractor's control.
3. Develop procedures and schedules for implementing fire equipment inspection and testing requirements.
4. Promptly identify and report fire protection impairments as follows:

    - Inform the contractor project manager, the project manager, the SHE&Q manager, and the fire department in advance of planned tests inspections, and modification and/or maintenance operations that will result in impairment of fire protection systems. A Job Safety Analysis (JSA) will be used to complete an analysis process.
    - Immediately report unplanned or emergency fire protection system or equipment impairments to the SHE&Q manager or designee.
    - Institute interim precautions, such as a fire watch, during the impairment, if conditions warrant.
    - Return impaired fire protection systems to full service as quickly as possible.

(b) The Site Superintendent or the Contractor Safety Lead or designee will inspect fire extinguishers and conduct fire prevention inspections daily as part of the site safety review.

(c) Employees will immediately report all fires either by activating a fire alarm or calling 911 or by calling the fire department, as identified by the fire emergency posted numbers.

(d) Employees will notify their supervisors and the Site Superintendent whenever they use a fire extinguisher. The Site Superintendent will notify the SHE&Q manager of all such occurrences.

(e) Extinguishers will be replaced with a fully charged unit after use.

(f) The SHE&Q manager and Site Superintendent will conduct investigation and follow- up on fires and involved equipment.

(g) The Site Superintendent will perform the following functions:

1. Ensure that the Contractor's facilities receive fire protection evaluations/ surveys as required by the appropriate regulation.
2. Conduct fire investigations and complete an incident report.

19.5 Implementation

(a) A pre-fire plan will be prepared for each the Contractor's activities at the Facility Construction site. The pre-fire plan will be provided to the SHE&Q manager.

(b) Portable fire extinguishers will be located throughout facilities in accordance with NFPA requirements and WAC 296-155-260. These will be always charged and the first response devices, designed for use on small fires.

(c) Fire prevention inspections will be conducted monthly and documented on the Monthly Fire Protection Checklist. A copy of the checklist will be provided to the SHE&Q manager.

(d) Monthly Fire Protection Checklist (Exhibit D). If an item on the inspection checklist is less than adequate, immediate corrective action will be taken. Project site inspections will follow the daily inspection checklist included in procedure - Fire Protection/Prevention.

(e) Special extinguishing systems, if needed, may only be installed with advance written Vancouver Energy approval. Special extinguishing systems (if any) will be installed, inspected, tested, and maintained according to manufacturer, OSHA and NFPA requirements.

(f) When applicable, a means of controlling liquid run-off from a credible fire will be provided so that contaminated or polluted liquids will not escape the site. The run-off control means will be included in the pre-fire plan.

(g) Fire Prevention.

1. The Contractor will prepare a fire prevention plan in consideration of the requirements of WAC 296-155-265. A copy of the plan will be provided to the SHE&Q manager.
2. A fire prevention program will be maintained and at least address the following areas:
    - Ignition hazards
    - Temporary Buildings
    - Open Yard and Indoor Storage
    - Housekeeping.
    - Electrical components.
    - Flammable liquids use.
3. Certain operations that require special emphasis will include safety inspections and walkthroughs to ensure compliance with applicable requirements. The Site Superintendent will consult with the SHE&Q manager to identify any work areas/operations requiring special emphasis.

(h) Life safety provisions will be provided for all facilities in accordance with NFPA 101, Life Safety Code. Facilities occupied by the Contractor's personnel are to be provided with an adequate means of safe exit for both normal and emergency conditions as identified in NFPA 101.

(i) Special Fire Protection Requirements.

1. Adequate fire lanes will be maintained to permit fire department access to buildings or equipment.
2. Flammable Vapors.
    - In work areas where the potential exists for accumulation of flammable vapors, engineering and/or administrative controls will be provided to ensure that the concentration of such vapors does not exceed 10% of the lower explosion limit (LEL).
    - Flammable and combustible liquids will be stored and used in accordance with NFPA Requirements 8 S&H-206.
3. Control of Flammable/Combustible Materials.
    - The Contractor will comply with Vancouver Energy and Port requirements for combustible materials.
    - Empty crates and containers will be disposed of as soon as possible in order to maintain site housekeeping at a high level.
    - Stockpiles of combustible construction materials stored inside will be kept to a minimum to minimize the fire hazard potential.
    - Approved containers will be provided for flammable or combustible liquid soaked cloths, rags, or waste.
    - Trash and rag containers will be emptied daily.
    - A designated fire watch will be required during and for 30 minutes following welding, cutting, and heating operations.
    - Flammable liquids will be stored, used and dispensed in accordance with WAC 296-155-270.

Exception: A fire watch will not be required when welding, cutting, or heating is being conducted in fabrication/maintenance shop areas designated for that purpose.

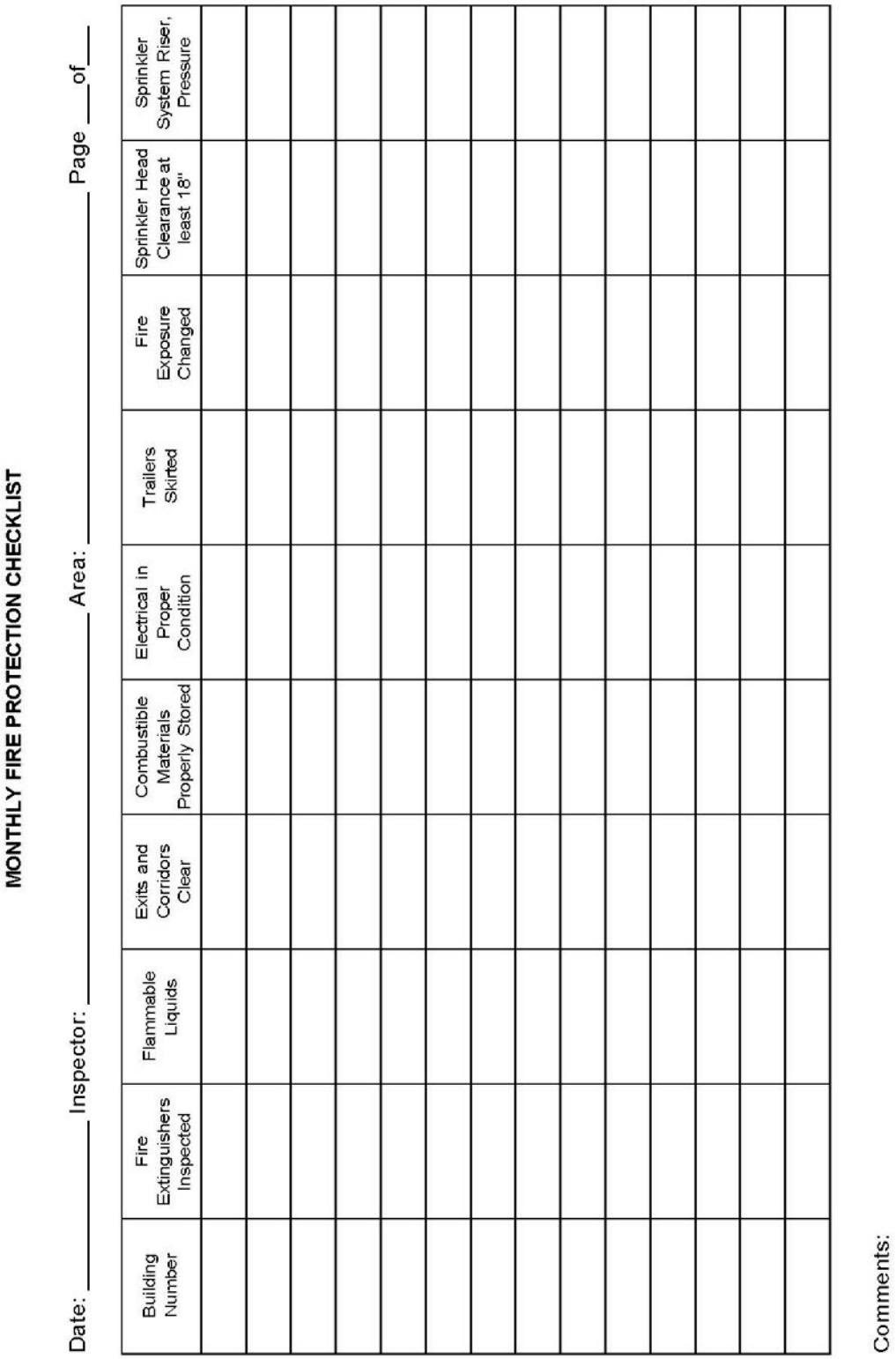
(j) Training.

1. Annual fire extinguisher training will be required for all employees.
2. Training will include:
    - Types of fire hazards.
    - The correct type of fire extinguisher to use.
    - Proper use of fire extinguishers.
    - Location of fire extinguishing equipment.
3. The Third Party Safety Lead or designee will provide this training.
4. Fire extinguisher training will be provided in the scheduled "toolbox" safety meetings.

19.6 Exhibits/Attachments

Monthly Fire Protection Checklist, Exhibit D

Exhibit D. Monthly Fire Protection Checklist



MONTHLY FIRE PROTECTION CHECKLIST

Date: _____ Inspector: _____ Area: _____ Page ___ of ___

Building Number	Fire Extinguishers Inspected	Flammable Liquids	Exits and Corridors Clear	Combustible Materials Properly Stored	Electrical in Proper Condition	Trailers Skirted	Fire Exposure Changed	Sprinkler Head Clearance at least 18"	Sprinkler System Riser, Pressure

Comments:

20. Drug Testing (Fitness for Duty)

20.1 Purpose

WAC 296-800-11025 requires that employers prohibit alcohol and narcotics from the workplace. In compliance with this requirement Vancouver Energy maintains a work environment that promotes the health, welfare, and safety of its employees and those with whom the Contractor's employees are in contact. Employees are expected to be fit for duty at all times. Being under the influence of drugs or intoxicants poses unnecessary and unacceptable safety and health risks, not only to the user but to all those who work with him or her.

Each Contractor and Subcontractor will enact and carry out reasonable measures it deems appropriate for ensuring a drug and alcohol free and safe workplace. This is not an OSHA or WISHA standard, but OSHA/WISHA strongly support comprehensive drug-free workforce programs, especially within certain workplace environments, such as those involving safety-sensitive duties, such as operating machinery.

The possession, transfer, manufacture, dispensation, distribution, sale, or use of drugs (including cannabis and cannabis derivatives) and/or alcoholic beverages at Vancouver Energy is not tolerated. No Employee, Contractor employee, Subcontractor, or visitor will report to work or to Vancouver Energy's property under the influence of intoxicants.

Vancouver Energy's policy with respect to the use or possession of drugs or intoxicants on the Contractor's Property, and with respect to reporting for work under the influence of any intoxicant, is one of "zero tolerance." If an Employee violates this policy, or if he or she is subjected to one of the testing procedures set forth in the policy and has a positive test result, or if an Employee refuses testing or inspections, as detailed in the policy, the Employee will be permanently banned from working on site at Vancouver Energy or be terminated. If an Employee believes that he or she cannot perform safely or effectively, the Employee should inform his or her supervisor. To encourage voluntary disclosure, Employees who give notice in this fashion may be referred to the Employee Assistance Program and reassigned or placed on a leave of absence, rather than terminated, if the employer deems such action appropriate.

TO BE CLEAR: Vancouver Energy has a "zero tolerance" policy with respect to reporting for work or visiting the Facility under the influence of intoxicants, including but not limited to drugs, alcoholic beverages, or other medically restricted substances that could impair the judgment and safety performance of an Employee, Contractor employee, Subcontractor, or visitor.

All searches, inspections, and testing will be performed with appropriate concern for personal privacy, dignity, and confidentiality. The results of Fitness for Duty testing will be considered a confidential record disseminated on a need-to-know basis or as may be legally required or permitted. Fitness for Duty test records will not be maintained in personnel files. The discovery of illegal substances, drugs, stolen property, and other illegal acts may result in notification of proper law enforcement agencies.

20.2 Definitions

Not applicable.

20.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

20.4 Implementation

Each Contractor and subcontractor will demonstrate to Vancouver Energy that Fitness for Duty Policy and Program have been implemented for all employees working at the construction site. This Policy/Program will include but not be limited to the following elements:

(a) Applicants. All offers of employment are contingent upon an applicant receiving a negative result from a Fitness For Duty Test.

(b) Employees. Employees are required to take a Fitness for Duty Test under the following circumstances:

- Incident Testing
- Sensitive Job Testing
- Reasonable Suspicion Testing
- Random Testing
- Periodic Site Testing
- Regular Rehire Testing
- Verification
- Evidence of Medication/Prescription Drugs/Physician's Care

(c) Disciplinary rules

(d) Establishment of an Employee Assistance Program

(e) Policies for Company Sponsored Events where alcohol is served.

20.5 Exhibits/Attachments

Not applicable.

21. Flammable and Combustible Liquids

21.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to perform activities associated with flammable and combustible liquids. The requirements of WAC 296-155-270 also apply.

21.2 Definitions

(a) Approved Container. A container listed by Underwriters Laboratory (UL) or tested and approved by Factory Mutual (FM) for storing flammable and combustible liquids; more commonly known as a "safety can."

(b) Bonded. Use of a wire conductor that ensures electrical conductivity between metal parts (containers).

(c) Combustible Liquid. A liquid having a flash point at or above 100°F (37.8°C).

1. Class II Liquids: having a flash point at or above 100°F (37.8°C) and below 140°F (60°C).
2. Class IIIA Liquids: having a flash point at or above 140°F (60°C) and below 200°F (93°C).
3. Class IIIB Liquids: having a flash point at or above 200°F (93°C).

(d) Flammable Liquid. A liquid having a flash point below 100°F (37.8°C) and having a vapor pressure not exceeding 40 pounds per square inch (absolute) (2068 mm hg) at 100°F (37.8°C).

1. Class IA Liquids: having a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C).
2. Class IB Liquids: having a flash point below 73°F (22.8°C) and a boiling point at or above100°F (37.8°C).
3. Class IC Liquids: having a flash point at or above 73°F (22.8°C) and below 100°F (37.8°C).

(e) Flammable Liquid Storage Cabinets. A cabinet built solely for flammable or combustible liquid storage in accordance with the requirements of the National Fire Protection Association (NFPA).

(f) Open Storage. Storage not using flammable or combustible liquid storage cabinets, or approved containers (safety cans).

21.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

21.4 General Requirements

(a) Organic solvents and fuels with the lowest fire hazard and toxic properties will be used.

(b) Users of flammable liquids will be trained in the safe practices outlined in this procedure, which will include the hazardous characteristics of the specific flammable liquids they are using. Material Safety Data Sheets (MSDS) will assist with the specific training of the hazardous characteristics.

(c) The "No Smoking or Open Flames" posting will be strictly enforced where flammable liquids are being transported, used, or stored. Smoking will be allowed only in a limited, designated area or areas. Additional restrictions may be implemented with the commencement of start-up operations and regular operations.

(d) The use of flammable liquids will be constantly monitored during welding/cutting operations to ensure there are no flammable or combustible hazards in the area.

(e) Work efforts (e.g., painting, solvent cleaning of parts, etc.) and work areas where the potential exists for vapor accumulation will incorporate fire prevention provisions including engineering and/or administrative controls. These controls are intended to prevent the concentration of any flammable or combustible material from exceeding 10% of the applicable lower explosive limit.

(f) Empty flammable liquid containers will be kept away from ignition sources. They generally contain flammable vapor-air mixtures.

(g) Flammable and combustible liquids will be stored at least 10 feet away from stairways, elevators, and exits.

(h) Personnel working with or around flammable or combustible liquids will be trained to this procedure.

21.5 Implementation

(a) Receiving and Storage.

1. Flammable and combustible liquids will be received and stored in approved open storage areas, approved facilities, or in flammable liquid storage cabinets.
2. Storage areas will be designed to prevent the spread of fire to other areas and will have adequate separation distance.
3. The storage areas will be posted "Danger Flammable Liquids" and "No Smoking or Open Flames."
4. Contingency plans will be included in the building emergency procedures when storing flammable and combustible liquids.
5. Flammable liquid storage cabinets will be UL listed, FM approved, or acceptable to the Field Safety and Health Staff.
6. Flammable liquid storage cabinets will be limited to a maximum of three (3) cabinets in any one-fire area.
7. Flammables and combustibles stored in flammable liquid storage cabinets will not exceed a cumulative capacity of 120 gallons.
8. Maximum container sizes for storing flammable and combustible liquids will be in accordance with the sizes listed in the following table. Flammable and combustible liquids will be stored in the original manufacturer's can unless transferred to an approved container.

Container Type	Flammable Liquids			Combustible Liquids	
	Class IA	Class IB	Class IC	Class II	Class III
Glass	1 pt	1 qt	1 gal	1 gal	5 gal
Methal (other than DOT/UN drums) or plastic	1 gal	5 gal	5 gal	5 gal	5 gal
Safety cans	2 gal	5 gal	5 gal	5 gal	6 gal
DOT/UN spec (metal drum)	60 gal	60 gal	60 gal	60 gal	60 gal

(b) Transfer and Use of Flammable Liquids.

1. Flammable liquids transferred from the original manufacturer's container after being opened will only be transferred into an approved container.
2. When not in use containers will be kept closed except when transfers are being made.
3. When transferring flammable liquids between conductive containers, the containers must be effectively bonded and grounded.

4. A maximum of one-day supply of flammable liquids will be kept in a work area at one time.
5. The one-day supply will be returned to the designated storage area at the end of each work shift.
6. Secondary containers of flammable and combustible liquids will be labeled with the name and hazards of the contents in accordance with the Hazard Communication Program.

21.6 Exhibits/Attachments

Not applicable.

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22. Fugitive and Silica Dust Control

22.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to provide appropriate protection to the general public, project workers, and other authorized project personnel from illnesses that may result from exposure to fugitive and silica dust.

22.2 Definitions

Not applicable.

22.3 Responsibilities

22.4 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations. (d) The Contractor and/or its subcontractors will furnish all labor, materials, facilities, equipment, services, employee training and testing, and agreements necessary to perform the work required for fugitive dust and potential silica-generating construction dust control activities. In accordance with these specifications, the Contractor's policies and procedures and the latest regulations from the State of Washington Department of Labor and Industries (WISHA),

(e) In all cases where potential silica dust exposures may occur, the Contractor will use appropriate engineering and work practice controls to reduce and maintain employee exposure levels at or below the Washington State Permissible Exposure Level. It will be assumed that the workers generating the silica dust are exposed above the Permissible Exposure Level until air monitoring demonstrates levels are below the Permissible Exposure Level.

(f) A competent person trained, knowledgeable and qualified in both fugitive and silica dust evaluation and control methods will monitor and oversee work related to this policy and procedure.

(g) If visible fugitive dust emissions or respirable crystalline silica dust concentrations exceed 0.05 mg/m3 beyond the perimeter of the work area, work will be suspended. The Contractor or its subcontractor will perform necessary corrective actions to eliminate visible dust and reduce respirable crystalline silica concentrations to less than 0.05 mg/m3 before resuming work.

22.5 General Requirements

(a) Scope of Work.

1. Construction site work that requires control of silica may include chipping, sanding, grinding, sawing and/or jackhammering on concrete building materials associated with this project.

2. Work activities will include the following, as applicable:

- Provision of site security to assure that no member of the public is able to gain access to the construction work area at any time. The Contractor will maintain access and egress routes at all times.
- In the case of concrete and demolition work, the Contractor or its subcontractors will provide worker training, respiratory protection, and medical examinations, as necessary, to meet applicable silica regulations and regulatory guidance regarding silica exposures.
- Provisions of good work practices to prevent the release of fugitive and silica dust outside of the work area, as described in the Execution portion of this policy and procedure (Part 3).
- Provisions for worker and equipment decontamination where appropriate. Worker decontamination and equipment areas will be cleaned daily or, as required, more frequently to prevent dust emissions.
- Protection of security, life safety, and energy management systems, including associated wiring, which will remain operational throughout the work activities.
- Decontamination of work area(s). Concrete dust will be cleaned from the work area using wet methods and HEPA vacuuming equipment at the completion of concrete demolition activities, before barriers are removed.

(b) Personal Protection.

1. Respiratory Protection.

- Where exposures to respirable crystalline silica exceed the Permissible Exposure Limit (of mg/m based on an 8-hour time-weighted average per WAC 296-63-07515), workers will be provided, as a minimum, with personally issued and marked respirators equipped with high efficiency particulate air (HEPA) filters approved by NIOSH (99.97% efficient) to be worn in the designated work area. Sufficient filters will be provided for replacement as required by the workers or applicable regulations. Disposable respirators will not be used for this work activity.
- The Contractor and its subcontractors will comply with OSHA 29 CFR Part 1926.134, WAC 296-62-071 (Respiratory Protection) and ANSI Standard Z88.2-1990 “Practices for Respiratory Protection”.
- Workers will not be exposed to levels greater than 0.1 mg/m3 respirable crystalline silica as determined by the protection factor of the respirator worn and the work airborne area respirable crystalline silica levels.
- A sufficient supply of replacement parts and HEPA filter cartridges will be provided as needed to the workers using respirators.
- The Contractor or its subcontractors will maintain daily inspection(s) of all respirators to verify cleanliness and to insure replacement of damaged, worn or missing parts.

2. Protective Clothing.

- Workers will, where appropriate, be provided with sufficient sets of protective full-body clothing to be worn in the designated work area whenever an exposure to respirable crystalline silica concentrations above the PEL exists. Such clothing will include, but not be limited to coveralls and eye protection.
- Protective clothing will not be worn outside the work area. Non-disposable- type protective clothing and footwear must be left in the work area.
- Appropriate eye protection will be provided and worn as appropriate for the work being performed. At a minimum, safety glasses will be worn at all times in active construction areas. Equipment will conform to ANSI Z87.1-1991.
- Head protection: Hardhats or other head protection will be provided and worn while in construction work areas. Hardhats will conform to ANSI Z89.1-1991, Class A or B. Theme hardhats such as cowboy hardhats are prohibited.
- Workers will not eat, drink, smoke, or chew gum or tobacco in or near the respirable silica work areas.

(c) Fugitive Dust and Silica Control Submittals. The Contractor or its subcontractors will prepare a safe work plan prior to start of work that may generate fugitive and/or silica dusts. The work plan will be reviewed and signed by an Industrial Hygienist chosen by the Contractor or its subcontractors. The plan will be suitably titled and indexed, providing detailed information concerning the following items as a minimum in the order listed below:

1. Safety and health hazards.
2. Personal protection measures and decontamination system requirements.
3. Respiratory protection program, fit testing and training records for all employees potentially exposed above the PEL.
4. Specific work practices and procedures.
5. Description of engineering controls designed to keep fugitive dust and silica exposures below the levels specified herein, for outside and inside each work area.
6. Silica Air Monitoring Plan.
7. Emergency procedures.
8. Internal administrative and inspection procedures.

(d) Silica Air Sampling Evaluation.

1. The Contractor or its subcontractors will conduct air sampling of workers and other subcontractors working within the defined work zone, for this activity, for respirable crystalline silica in accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 7500. This sampling is performed to evaluate workers' exposure levels.
2. The Contractor or its subcontractors will conduct outside area air sampling in areas of the terminal occupied by the Public and Port Employees for respirable crystalline silica in accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 7500. This sampling is performed to evaluate any potential public and port employee exposure levels.
3. The Contractor or its subcontractors will conduct air sampling in accordance with the NIOSH Method to collect a sufficient enough volume to determine if the airborne silica dust levels are below the Permissible Exposure Limits. If the sampling detection levels are above the Permissible Exposure Limits, the Contractor or its subcontractors will take appropriate measures to reduce the PEL and resample the area.
4. Results of area air samples collected by the Contractor or the subcontractors performing this work will be submitted to the Port Engineer within 48 hours after sample collection.

(e) Tools and Equipment.

1. Suitable tools for dust collection and water-jet dust suppression system will be available and, where appropriate, used.
2. HEPA- filtered vacuum cleaners to clean-up visible dust residues will be provided.
3. Air filtration devices will utilize high efficiency particulate absolute (HEPA) filtration systems bearing a UL 586 label indicating its ability to perform under specified conditions. Filters marked with the name of the manufacturer, serial number, airflow rating, efficiency and resistance, and the direction of the test airflow will be provided. Units will have two stages of pre-filtering as follows:

    - The first stage pre-filter will be a low efficiency type for particle sizes 100 micrometers and larger.
    - The second stage pro-filter will be a medium efficiency type effective for particle sizes down to 5 micrometers.
    - Pre-filters will be installed either on or in the intake grid of the exhaust unit and will be held in place with special housings or clamps.

4. Air filtration devices will also include:

    - An elapsed time meter showing the total accumulated hours of operation.
    - An electrical interlock preventing operation of the unit without a HEPA filter.
    - An automatic shutdown system to stop the fan in case of a rupture in the HEPA filter or a blocked air discharge.
    - Warning lights to indicate normal operation (green), moderately high pressure drop across the filters, such as due to filter overloading (yellow), and too high of a pressure drop due to an overloaded or ruptured HEPA filter or obstructed discharge (red).
    - An audible alarm if the unit shuts down due to operation of the safety systems.
    - Electrical components approved by the National Electrical Manufacturers Association (NEMA) and/or the Underwriter's Laboratories (UL). Each unit will be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet must be properly grounded.

22.6 Implementation

(a) Wet Method. “Wet” systems that eliminate or reduce dust generated by demolition activities will be used. Clean up sludge and/or waste will be removed immediately following its generation.

(b) Enclosure Method. Enclosures in conjunction with air filtration devices. Air will be moved through the filtration unit with a minimum of 1500 CFM. HEPA filter-based shop vacuum units to control dust generated at the work face and tools that include dust control features, where possible, will be provided and used.

(c) Negative Air Pressure Systems.

1. Where appropriate, if respirable crystalline concentrations exceed 0.05 mg/m3 outside of the work area, or if visible levels of dust emissions are observed outside work areas, differential air pressure systems for each work area will be provided in accordance with Appendix J of the EPA’s “Guidance for Controlling Asbestos-Containing Materials in Buildings”, EPA 560/5-85-024.
2. Where appropriate, negative air pressure will be continuously monitored by the Contractor using a recording instrument equal to Dwyer Instrument Co.’s “Photohelic Gauge” connected to an appropriate circular chart recorder. The location of the pressure measurement tap will be approved in advance by the Port. During the operation of the unit(s), circular charts will be collected on a daily basis, dated, and signed by the Contractor representative present on site.
3. Negative pressure will be checked at least four times per day by a person familiar with the operation of the negative pressure filtration units, as well as the recording device. Each check will be documented with a time and date notation on the circular chart record will be submitted to the Engineer on a daily basis. The recording instrument will be connected to an audible alarm that will activate at pressure differential of-0.020 inches water gauge air pressure. Defective or non-operating instrumentation may require temporary cessation of work until instrumentation is replaced.
4. Use of linear strip recorders will be acceptable as approved by the Engineer.
5. Exhaust air will only be vented to the exterior of the building at locations approved by the port unless otherwise noted or directed. Such outlets will not be near or adjacent to other building intake vents or louvers or at entrances to the building. The Contractor or its subcontractors will provide on-site certification of the negative pressure units to document adequate filtration efficiency for all units exhausting internally within the building or as otherwise required by the Port. Testing may need to be repeated if the unit(s) or their filtration systems have been repaired or replaced during the course of the work, following movement between zones, or if damage has occurred since the units were previously tested. Certification will be by DOP or portacount testing and signed by an independent tester or the contractor’s trained Health and Safety personnel. DOP testing will verify an in-site efficiency of 99.3% or better. The tester(s) will show knowledge of the testing procedures and limitations to the satisfaction of the Port, including but not limited to knowledge of test modes, variability of results, calibration techniques, and equipment operating procedure. Where knowledge or testing procedures are deemed inadequate, test results will be signed by a Professional Engineer or Certified Industrial Hygienist.
6. The work area will have a minimum differential air pressure of - 0.020 inches w.g. at all times during concrete demolition activities.

(d) Work Area Isolation and Cleanup.

1. The Contractor or its subcontractors will ensure that fugitive dust and silica contaminants from the work area do not contaminate the interior of the building.
2. Work areas where fugitive dust and silica-containing materials will be disturbed will be isolated from other parts of the building with 6 mil polyethylene critical barriers on all doors, windows, and work area penetrations. Other methods may be approved upon written requests.

(e) Record Keeping. The Contractor or its subcontractors will maintain for at least thirty (30) years, a record of the project. One copy will be furnished to the Engineer. The record will include the following information:

1. The starting and completion dates of the project.
2. A copy of all analytical results.
3. Copies of negative pressure documentation records (as required).

4. The name and address of the analytical laboratory used for silica analyses.
5. The name, address, and social security number of all persons who were engaged in the concrete demolition activities.

22.7 Exhibits/Attachments

Not applicable.

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23. Hazard Communication

23.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for an effective hazard communication program, as required under WAC 296-155-180 and WAC 296-901-140.

23.2 Definitions

(a) Acute. An adverse effect on the human body with an immediate onset of symptoms.

(b) Catalyst. A substance that changes the rate of a chemical reaction between two other chemicals but undergoes no permanent change itself.

(c) Chemical Name. The scientific designation of a substance in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry or the system developed by the Chemical Abstracts Service.

(d) Chronic. Adverse effects on the human body with symptoms that develop slowly over a long period of time or that frequently recur.

(e) Common Name. Any designation or identification such as code name, code number, trade name, or brand name used to identify a substance other than by its chemical name.

(f) Expose or Exposure. Any situation arising from work operations where an employee may ingest, inhale, absorb through the skin or eyes, or otherwise come into contact with a hazardous substance.

(g) Flammable. A substance that falls into one of the following categories:

(h) Aerosol, flammable. An aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or flashback (a flame extending back to the valve) at any degree of valve opening.

(i) Gas, flammable. A gas that, at ambient temperatures and pressure, forms a flammable mixture with air at a concentration of 13 percent of volume or less, or a gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit.

(j) Liquid, flammable. Any liquid having a flashpoint below 100°F (37.8°C), except any mixture having components with flashpoints of 100°F (37.8°C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

(k) Solid, flammable. A solid, other than a blasting agent or explosive, that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, retained heat from manufacturing or processing, or which can be ignited readily and when ignited bums so vigorously and persistently as to create a serious hazard. A chemical will be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

(l) Flash Point. Minimum temperature of a liquid at which it gives off significant vapors to form an ignitable mixture with the air near the surface of the liquid or within the container used.

(m) Hazardous Substances and Carcinogens. Those substances or carcinogens appearing at any of the following reference sources are established as hazardous substances or carcinogens or potential carcinogens for hazard communication purposes.

(n) Hazardous Mixtures. Any solution or intimate mixture of two or more substances, at least one of which is present as a hazardous substance. A hazardous substance is present in any mixture of product if it is 1 percent or more of the mixture or product or 2 percent if the hazardous substance exists as an impurity in the mixture. The State may, however, by regulation, raise the concentration requirement for a hazardous substance which the State finds is not hazardous at the threshold levels; and lower the concentration requirement for a hazardous substance for which there is valid and substantial evidence that the substance is extraordinarily hazardous.

(o) MSDS. A material safety data sheet prepared pursuant to state and federal regulations, e.g., OSHA Form 174.

(p) Polymerization. A chemical reaction which results in the joining together of two or more like molecules to form a more complex molecule whose molecular weight is a multiple of the original and whose chemical properties are different. Polymerization reactions commonly produce excessive heat and may cause an increase in pressure, which requires adequate venting to prevent destructive explosive failure of containers.

(q) Reactivity. A measure of the tendency of a substance to undergo chemical reaction with the release of energy.

(r) Specific Gravity (density). The ratio of the weight of a substance to the weight of the same volume of another substance. As used in this directive, specific gravity or density refers to the weight of substance as compared to the weight of an equal volume of water.

23.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

23.4 General Requirements

(a) Hazardous substances in the workplace in some forms, concentrations, and job activities, pose potential acute and/or chronic health hazards to employees who are exposed to these substances.

(b) All employees have a right and a need to know the properties and potential hazards of substances to which they may be exposed, as such knowledge is essential to reducing the incidence and cost of occupational disease and industrial accidents.

(c) The OSHA Form 174 has entries for all of the information now required by the Federal and OSHA standards. This new form replaces the OSHA Form 20, which is no longer acceptable.

(d) The MSDS Request Form Letter may be used to request MSDSs from suppliers. All new MSDSs will be forwarded to the field safety and health staff, with a copy to the Vice President of Safety and Health, for maintenance and distribution as necessary.

(e) Pursuant to the requirements of OSHA regulations to make chemical safety and health information available to employees, this directive prescribes the use of material safety data sheets, by business unit management, to provide the required information to inform employees.

23.5 Implementation

(a) Supervisory Responsibility.

1. Before any employee is permitted to work with a hazardous substance or hazardous mixture, the potential fire, toxic, or reactivity hazards, which are likely to be encountered in the handling, application, or utilization of such a material, will be determined.
2. In order to ascertain the hazards, supervisors will have available a completed OSHA Form 174: MSDS or an essentially similar form, provided by the supplier, for each hazardous substance used.
3. Supervisors will notify employees of hazardous substances used in their work area for which MSDSs are available, making such MSDSs available on a timely and reasonable basis, upon request of an employee or his authorized representative. Such notification may be:
    - Posted lists of MSDSs where they are readily available to workers.
    - Prominently displayed binders containing MSDSs used in the work area.
4. Supervisors will notify subcontractor employers with employees working for the Contractor of any hazardous substances to which their employees may be exposed, and provide suggestions for appropriate protective measures. This will be done in coordination with the field safety and health staff.

(b) Training and Information Program.

1. Supervisors, in coordination with the field safety and health staff will furnish employees who may be exposed to a hazardous substance with an appropriate explanation of information on the contents of the MSDS. Such information must be comprehensible to the workers. Information should also relate to the entire class of hazardous substances to the extent appropriate and relevant to the job, i.e., acids, caustics, chlorinated hydrocarbons, etc.
2. For hazardous substances to which the worker may be exposed, employees will be informed of their right of access to an MSDS, their right to request an MSDS from their employer for material they suspect is hazardous, and the right of their representative or physician to obtain such MSDS.
3. All employees who may be exposed to a hazardous substance will be given training and information:
    - Upon a timely and reasonable basis.
    - Prior to assignment of an employee to an area containing a hazardous substance for which previous training has not been received.
4. Subject training and information will be accomplished by either formal classroom instruction or by jobsite safety meetings, and will be documented accordingly.
5. A completed MSDS, when available, or equivalent information for each hazardous substance or hazardous mixture used or encountered by employees, will be maintained in the workplace, and made accessible to employees in their work area. This will include, but is not limited to:
    - Cleaning agents, such as solvents, detergents, acid inhibitors, etc., used for industrial cleaning.
    - Hazardous substances or hazardous mixtures contained in process vessels.
    - Janitorial and housekeeping substances used by employees at the Contractor’s facilities. Not included are consumer products used in accordance with manufacturer's instructions, and comparable to typical consumer use.

(c) Information Required on a MSDS.

1. The MSDS must conform with the Globally Harmonized System for hazard communication pursuant to WAC 296-901.
2. The name, address, and telephone number of the source of the information specified in this paragraph, preferably those of the manufacturer of the product or material.

3. The trade name and synonyms for a mixture of chemicals; a basic structural material; or for a process material, the chemical name and synonyms, and/or chemical family and formula for a single chemical.
4. Chemical names of hazardous ingredients including, but not limited to, those in mixtures such as:

    - Paints, preservatives, and solvents.
    - Alloys, metallic coatings, and filler metals, and their coatings or core fluxes.
    - Other liquids, solids, or gases (e.g., abrasive materials).

5. An indication of the percentage, by weight of volume, of each ingredient to the whole mixture, and of each ingredient (in appropriate units) for the threshold limit value.
6. Physical data about a single chemical or a mixture of chemicals, including boiling point (in F), vapor pressure (in millimeters of mercury); vapor density of gas or vapor (air = 1); solubility in water (in percent by weight); specific gravity of material (water = 1); percentage volatile by volume (at 70 QF; evaporation rate for liquids (either butyl acetate may be taken as 1); and appearance and odor.
7. Fire and explosion hazard data about a single chemical or a mixture of chemicals, including flash point (in QF); flammable limits (in percent by volume in air); suitable extinguishing media or agents; special firefighting procedures, and unusual fire and explosion hazard information.
8. Health hazard data, including threshold limit value (in appropriate units) for a single hazardous chemical, or for the individual hazardous ingredients of a mixture; and as appropriate, effects of overexposure, and emergency and first-aid procedures concerning these chemicals are also included.
9. Reactivity data, including stability, incompatibility, hazardous decomposition products, and hazardous polymerization.
10. Procedures to be followed and precautions to be taken in cleaning up and disposing of materials leaked or spilled.
11. Special protection information, including use of personal protective equipment-- such as respirators, eye protection, protective clothing, ventilation, or other control measures.
12. Special precautionary information about handling and storage.
13. Any other general precautionary information.

(d) Obtaining Information.

1. MSDS Binders.

    - A master file of MSDSs will be maintained by the Project Safety Manager.
    - MSDS binders will be maintained locally by area management for materials used at that location.
    - Employees may request copies of MSDS.

(e) Employee Information and Training.

1. Employees will be provided with information and training on hazardous substances in their work area at the time of their initial assignment, as well as whenever a new hazard is introduced into their work area. This orientation and training will address the following:

    - Regarding on site investigations or site remediation of unknown materials, every effort will be made to categorize the hazard(s) before starting work. Safety meetings will be used to inform employees of the hazards.
    - Employees will be informed about what an MSDS is, and of the contents of the MSDS for hazardous substances to which employees may be exposed, or equivalent information will be provided, either in written form or through training programs.
    - When training employees on the contents of an MSDS, supervisors will explain: any health hazards associated with use of the substance or mixture, proper precautions for handling, and necessary personnel protective equipment or other safety precautions necessary to prevent or minimize exposure. Emergency procedures for spills, fire, disposal, and first aid are also to be explained.
    - When the Project Safety Manager receives a new or revised MSDS, such information will be provided to employees in a timely manner. This is especially the case if such new information indicates significantly increased risks to, or necessary protective measures for, employee health, as compared to those stated on a MSDS previously provided.

2. Employees will be informed of their right:

    - To personally receive information regarding hazardous substances to which the employee may be exposed. The Employee Request for MSDS will be used by employees requesting MSDS copies.
    - For their physician or collective bargaining agent to receive information regarding hazardous substances to which the employee may be exposed.

3. Employees will be informed of:

    - Any operations in their work area where hazardous substances are present.
    - Location and availability of this written hazard communications program/procedure.

4. Employees will be trained in the following:

    - Methods and observations that may be used to detect the presence or release of hazardous substance in the work area, such as personal monitoring, visual appearance, or odor of hazardous substances being released, etc. Also, the physical and health hazards of substances in the work area, and measures and procedures the Contractor implemented to protect employees.
    - Details of this Hazard Communication Program/Procedure and how appropriate hazard information can be obtained and used.

(f) Trade Secrets.

1. Some hazardous substance suppliers may claim the information requested on MSDSs is proprietary and, therefore, may not provide the information to the Contractor.
2. When suppliers claim trade secrets, the name of the supplier and the hazardous substance in question will be supplied to the field safety and health staff for further action.
3. The field safety and health staff will either obtain the necessary information to make a hazard assessment or reject the material for use by the Contractor.

(g) Labeling.

1. All hazardous substances received from outside suppliers will conform to legal requirements, and will have on each container, as a minimum, the following:

    - Identification of the hazardous substance(s).
    - Appropriate hazard warnings.
    - Name and address of the manufacturer, importer, or other responsible party.

    Any failure to have proper labeling on the container at the time of receipt will be cause to refuse delivery of the product.

2. Stationary process containers or pipes may have signs, placards, process sheets, batch tickets, operating procedures, or other written material as a substitute for fixed labels on the containers, as long as the alternative method conveys appropriate hazard information. The written materials will be readily accessible to the employees in the work area.
3. Portable containers of hazardous substances need not be labeled when the substance is transferred from labeled containers, and which are intended for immediate use by the employee who performs the transfer; although, this practice is not recommended.
4. Containers of hazardous substances transferred from labeled containers and not intended for the immediate use of the employee performing the transfer will be labeled in accordance with a hazardous materials identification system (HMIS), as outlined in Exhibit E of this procedure, or an equivalent commercial system.
5. Labels on incoming containers will not be removed or defaced.
6. Labels or other forms of warning will be legible, written in English, prominently displayed on the containers, and/or readily available throughout each work shift.

23.6 Exhibits/Attachments

The following records are used for documenting activities associated with this procedure.

(a) Hazardous Materials Identification System (HMIS), Exhibit E

(b) U.S. Department of Labor MSDS, (OSHA Form 174), Attachment 13

(c) Hazardous Material Inventory List, Attachment 14

Exhibit E. Hazardous Materials Identification System (HMIS)

This HMIS is based on a comprehensive system for hazardous materials identification. This system conveys chemical identity by chemical, common names, code numbers, or other descriptive terms, which clearly identify the material for hazardous information purposes. The acute health, flammability, and reactivity hazards are communicated by numerical ratings imprinted on the label itself. An alphabetical designation is used to denote a combination of proper personal protective equipment. The designation is also imprinted on the label. The field safety and health staff will provide guidance on what hazard index and what personal protection index should be used.

Hazard Index (HI)

4 Severe Hazard

3 Serious Hazard

2 Moderate Hazard

1 Slight Hazard

0 Minimal Hazard

These designations will be imprinted (written) with indelible ink next to each hazard category on the label, i.e., Health Flammability, Reactivity, etc. Such information is obtainable from the MSDS, among other sources.

DEFINITIONS OF HAZARD CATEGORIES

Health Hazard

4 Danger: May be fatal on short exposure. Specialized protective equipment required.

3 Warning: Corrosive or toxic - avoid skin contact or inhalation.

2 Warning: May be harmful if inhaled or absorbed.

1 Caution: May cause irritation.

0 No unusual hazard.

Fire Hazard

4 Danger: Flammable gas or extremely flammable liquid.

3 Warning: Flammable liquid, flash point below 100°F.

2 Caution: Combustible liquid, flash point of 100°F to 200°F.

1 Combustible if heated.

0 Not combustible.

Reactivity Hazard

4 Danger: Explosive material at room temperature.

3 Danger: May be explosive if shocked, heated under confinement, or mixed with water.

2 Warning: Unstable, or may react if mixed with water.

1 Caution: May react if heated or mixed with water.

0 Stable: Not reactive when mixed with water.

Personal Protection Index (PPI)

Alphabetic designations A through K are used to indicate personal protection required. The letter X indicates that the employee should ask the supervisor for guidance.

The alphabetical designations are:

A Safety glasses

B Safety glasses, gloves

C Safety glasses, gloves, apron

D Face shield, safety glasses, gloves

E Safety glasses, gloves, vapor respirator

F Safety glasses, gloves, apron, dust respirator G Safety glasses, gloves, vapor respirator

H Safety glasses, gloves, apron, vapor respirator

I Safety glasses, gloves, dust and vapor respirator

J Splash goggles, gloves

K Airline hose or mask, gloves, full suit, boots, dust and vapor respirator

X Ask your supervisor for guidance

Attachment 13. U.S. Department of Labor MSDS, OSHA Form 174

Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910 1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(as Used on Label and List)*	*Note: Blank spaces are not permitted. If any item is not applicable or no information is available, the space must be marked to indicate that.*

Section I

Manufacturer's name	Emergency Telephone Number
Address *(Number, Street, City, State and ZIP Code)*	Telephone Number for Information
	Date Prepared
	Signature of Preparer *(optional)*

Section II—Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)

Section III—Physical/Chemical Characteristics

Boiling Point		Specific Gravity (H_20 = 1)	
Vapor Pressure (mm Hg)		Melting Point	
Vapor Density (AIR = 1)		Evaporation Rate (Butyl Acetate = 1)	

Solubility in Water

Appearance and Odor

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL

Extinguishing Media

Special Fire Fighting Procedures

Unusual Fire and Explosion Hazards

(Reproduce locally) OSHA 174 Sept. 1985

Section V—Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable		

Incompatibility *(Materials to Avoid)*

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur		

Section VI—Health Hazard Data

Route(s) of Entry	Inhalation?	Skin?	Ingestion?

Health Hazards *(Acute and Chronic)*

Carcinogenicity	NTP?	IARC Monographs?	OSHA Regulated?

Signs and Symptoms of Exposure

Medical Conditions
Generally Aggravated by Exposure

Emergency and First Aid Procedures

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Waste Disposal Method

Precautions to Be Taken in Handling and Storing

Other Precautions

Section VII—Control Measures

Respiratory Protection *(Specify Type)*

Ventilation	Local Exhaust	Special
	Mechanical *(General)*	Other

Protective Gloves	Eye Protection

Other Protective Clothing or Equipment

Work/Hygienic Practices

Attachment 14. Hazardous Material Inventory List

Hazardous Material Inventory Spreadsheet

Principal Investigator _____ (Last Name) _____ (First Name)

Person Completing Inventory _____ (Last Name) _____ (First Name)

Department _____

Inventory Date: _____

Building: _____

Room: _____

Phone: _____

Chemical Name	Manufacturer	Maximum Quantity	CAS Number	MSDS on File?
(example) Ethyl Alcohol	*Sigma*	*4 L*	*64175*	*yes*

24. Hazardous Material/Waste Handling and Disposal

24.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for inventory control, handling and storage, disposal and regulatory reporting of hazardous materials/hazardous waste.

24.2 Definitions

Not applicable.

24.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure. They are also responsible for: maintaining inventory records and material safety data sheets of all hazardous materials stored on site; ensuring compliance with the labeling/off-site transportation of hazardous materials and/or waste; and initiating/maintaining the documents required by this procedure

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

24.4 General Requirements

(a) Requirements of this procedure apply to hazardous materials/hazardous waste generated onsite, including but not limited to the following:

1. Gasoline and Diesel Fuels.
2. Paint and Paint Thinners (Toluene, Xylene).
3. Ethylene Glycol.
4. Cleaning Solvents (Methylene Chloride/Trichlorotrifluoroethene "M6").

(b) All phases of hazardous material handling will be undertaken with complete adherence to state and federal requirements and safe work practices.

24.5 Implementation

(a) Inventory Control.

1. The Site Superintendent will make a review of the hazardous materials required during construction. Inventory quantities including used and unused will be established for each type of material. Designated storage locations will be established for quantities on hand. The types of liquids to be stored, quantity levels and locations will be reviewed and approved by the Project Executive prior to implementation.
2. The Site Superintendent or designee throughout the duration of the project will maintain an inventory of the hazardous materials.
3. The Site Superintendent or designee will perform periodic inspection of the site to prevent inventory build-up. Any exceptions found during inspection will be reported to the Project Executive for corrective action.

(b) Handling and Storage.

1. To the extent practical, oils and other hazardous liquids will be stored in a controlled area away from modules, other buildings, and/or equipment. Containers must not be handled or stored in a manner that may rupture the drum or cause it to leak.
2. Portable skids to contain 55-gallon drums will be utilized at long-term storage locations. The skid will have a sealed floor with a collection system to contain all possible leaks due to either faulty valves or damaged drums. The drums will be protected from weather and water intrusion.
3. Drums will be stored vertically, wherever practical. A wedge, block, etc. will be placed under the edge of the drums so that the top of the drum will be at an angle, such that rainwater will not accumulate on the lid and drain into loosely capped bungholes.
4. All drums, which are kept in a horizontal position for the purpose of filling other containers, will have a drip pan or bucket under the discharge point in order to catch small leaks. All faulty valves used on dispensing drums will be replaced immediately. Valves are to be of the automatic shut-off type.
5. In locations where drip pans or catch basins are used, the basins or pans will be checked frequently for accumulation of liquids. Any accumulation of liquids in the basins will be disposed of in accordance with this procedure.
6. Pumping is the preferred method of dispensing hazardous liquids from drums. When pumping is not practical, liquids will be transferred from drums to containers that are easily handled by one person. Transfer of liquids will be accomplished in such a manner as to minimize spills.

(c) Collection.

1. Waste Oils.

    - All waste oil will be collected in 55-gallon drums at the project site. The drums will be stored in a rack with a sealed lip to prevent ground spillage.
    - When a drum is nearly full, the Site Superintendent will notify a certified waste oil re-claimer to remove the waste oil from the site.
    - Under no circumstances will waste oil be used for dust control.

2. Hazardous Waste.

    - Waste solvents will be collected to non-returnable 55-gallon drums unless otherwise approved. Drums will be free of severe rusting, apparent structural defects and leaks, and be equipped with a full complement of bung plugs.
    - Each drum will be labeled as to its contents as soon as the filing operation begins. To the extent possible, each drum will contain only one type of liquid. Labels will conform to requirements. See Attachment 1 for sample labels.
    - Bungs will be replaced on the drum each time waste liquid is added.
    - When a drum has been filled with liquid, it will be sent to the designated area for temporary storage pending disposal.
    - The spent liquid storage areas will be inspected weekly by the Site Superintendent or designee to verify acceptability of containers.

(d) Disposal.

1. Collected waste liquid, regardless of type, will not be allowed to remain in temporary storage longer than is specified by generator category.
2. Waste Oils

    - The Site Superintendent will make advance arrangements with a waste oil re- claimer for disposal. When notified by the Site Superintendent or designee that a drum is full, the waste oil re-claimer will be contacted to have collection drum pumped.
    - During low levels of waste oil generation, periodically dispose of accumulated amounts.

3. Hazardous Waste

- Upon receipt of a waste drum in the designated temporary storage area, the Site Superintendent or designee will accomplish the following:
  - Clearly mark on the drum the date of its arrival to the area.
  - Verify and/or clearly mark the drums as to their content.
  - Number the drums consecutively.
- The Site Superintendent will contact a registered waste processor to arrange for shipment of the waste when any container has been stored for the maximum number of days or the maximum number of barrels have been accumulated, whichever comes first.
- Off-site transportation of dangerous wastes is to be done only by those who are approved hazardous waste haulers. Prior to shipment off site, the Site Superintendent or designee will verify that each drum is labeled in accordance with DOT 49 CFR part 172.
- The authorized transporter will prepare a manifest for the shipment. The Contractor must provide the transporter with our EPA/State identification number for referencing purposes. The transporter of the waste will sign the manifest to accept custody of the waste. The Project Executive retains a copy of the signed manifest.
- Upon acceptance of the waste at an approved Dangerous Waste Management facility, the operator will sign the manifest to accept custody of the material. A fully signed copy of the manifest is to be returned within 35 days. Upon receipt of the fully signed copy, previous copies may be destroyed; otherwise it must be retained for three (3) years. The signed copy of each manifest will be retained for three years from the date the waste was accepted by the initial transporter

NOTE: If the manifest is not returned within 45 days, notify the Corporate Safety Management.

- Small quantity hazardous waste generators are required to complete the "Notification of Hazardous Waste Activity Form" and register with the EPA. The project site assigned EPA identification number is EPA ID # TBD.

24.6 Emergency Information

(a) Phone Numbers.

(To be listed on each project Emergency Plan)

1. Location of Emergency Equipment

- Fire Extinguishers - 20-lb. type ABC dry chemical fire extinguishers are located at each project.
- Sorbent Materials - 3M Type 100 Sorbent is located, where indicated, on each project.

2. Emergency Coordinator

- Primary
  - Day Shift: (To be listed on the project Emergency Plan)
  - Office Phone: (To be listed on the project Emergency Plan)
- Alternate
  - Day Shift: (To be listed on the project Emergency Plan)

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25. Hearing Conservation

25.1 Purpose

To establish the minimum requirements for the Contractor's and its subcontractors for hearing conservation. A hearing loss prevention program must be provided in accordance with the provisions of WAC 296-155-210 and WAC 296-817.

25.2 Definitions

(a) Ambient Noise (Residual Noise, Background Noise). Noise of a measurable intensity that is normally present in the background in a given environment.

(b) Audiologist. A professional specializing in the study of rehabilitation of hearing, who is certified by the American Speech, Hearing and Language Association or licensed by a state board of examiners.

(c) Auditory Trauma. Damage to the hearing mechanism resulting in some degree of permanent or temporary hearing loss. Auditory trauma may be caused by agents other than noise; e.g., head injury; burns; sudden or excessive changes of atmospheric pressure.

(d) A-Weighted Sound Level. A single number representing the sound level of a noise containing a wide range of frequencies in a manner representative of the ear's response.

(e) Decibels - A-Weighted (dBA). A unit of measurement of sound level corrected to the A-weighted scale, as defined in ANSI S1.4 - 1981 (R 1976), using a reference level of 0.00002 Newton per square meter.

(f) Dosimeter. An instrument which registers the occurrence and cumulative duration of noise exceeding a predetermined level at a chosen point in the environment or on a person.

(g) Earmuff. A hearing protective device that encloses the entire outer ear.

(h) Earplug. A hearing protective device, having specified or standard acoustic characteristics, which upon insertion occludes the external auditory meatus.

(i) Frequency. The number of times per second that a sine wave repeats itself. It is expressed in hertz (Hz) or cycles per second (cps).

(j) Hearing Impairment. Hearing loss exceeding a designated criterion (commonly 25 decibels (dB), re International Safety Operations (ISO) standard, averaged from the threshold levels at 500, 1,000, and 2,000 Hz).

(k) Hearing Protective Device (HPD). A device inserted into or placed over the ear in order to attenuate air-conducted sounds.

(l) Impulse Noise (Impact Noise). Noise of short duration (typically, less than one second) especially of high intensity, abrupt onset and rapid decay, and often of rapidly changing spectral composition.

(m) Medical Pathology. A disorder or disease affecting the ear, which should be treated by a physician specialist.

(n) Noise Reduction Rating (NRR). A rating system for hearing protective devices developed by the Environmental Protection Agency. The NRR is a measure of the ability of a given protective device to attenuate noise, as a function of noise intensity and frequency. The NRR must be shown on the hearing protector package.

(o) Otolaryngologist. A physician specializing in diagnosis and treatment of disorders of the ear, nose, and throat.

(p) Representative Exposure. Measurements of an employee's noise dose or 8-hour time-weighted average sound level that the employers deem to be representative of exposures of other employees in the workplace.

(q) Standard Threshold Shift. As defined by OSHA a change in hearing threshold relative to the baseline audiogram of 10 dB or more at 2,000, 3,000, and 4,000 Hz-in either ear, corrected for aging (presbycusis).

(r) Sound Level. Ten times the common logarithm of the ratio of the square of the measured A-weighted sound pressure to the square of the standard reference pressure of 20 micropascals, given in decibels (dB). For use with the directive, slow time response, in accordance with ANSI S1., 4-1971 (S 1976), is required.

25.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

25.4 General Requirements

(a) Factors Considered

To assess employee noise exposure, the following factors will be considered:

1. The overall decibel level of the noise exposure. If a noise exposure does not cause auditory fatigue, the exposure is not considered harmful to hearing sensitivity.
2. The frequency spectrum of the noise. Noise exposure in the high frequency ranges is generally more harmful than low frequency noise.
3. The daily time distribution of the noise exposure. Noise that is intermittent in character is generally less harmful to hearing than steady-state noise exposure. The potential for hearing loss increases as a function of the duration of the exposure over a working lifetime.
4. The susceptibility of the worker to hazardous noise. Not every individual will develop identical hearing impairment if exposed to the same noise intensity over the same time period.
5. The extra-auditory (or non-auditory) effects of noise. While evidence to support extra-auditory health effects may not be as complete as the case for hearing loss, some concern exists. Noise can alter the normal functions of the endocrine, cardiovascular, and neurological systems. Subjective complaints of nausea, malaise, and headache have been reported in workers exposed to ultrasonic noise levels.

(b) Hearing Conservation Program

1. A hearing conservation program will be implemented and protection against the effects of noise exposure will be provided when the noise exposures equal or exceed an 8-hour time weighted average sound level of 85 decibels measured on the A-weighted scale of a standard sound level meter at slow response.
2. For compliance purposes as regulated by OSHA, an effective hearing conservation program will include as a minimum:

- Monitoring of the workplace to determine the representative exposure of employees to excessive noise levels.
- A training program for all employees exposed to noise levels of this standard will be performed in accordance with the Contractor's Hearing Conservation Program.
- Workers will be provided personal protective equipment when administrative or engineering controls fail to reduce sound levels to within the levels of the standards.

25.5 Implementation

(a) Monitoring

1. Monitoring of employee exposures to noise will be conducted by the field safety and health staff.
2. The monitoring requirement may be met by either area monitoring or personal monitoring that is representative of employee exposures. Personal monitoring is preferred, and may be required based on the type(s) of noise sources.
3. For purposes of the hearing conservation program, employee noise exposures will be computed in accordance with Exhibit F of this procedure and without regard to any attenuation provided by the use of hearing protective equipment.

(b) Employee Training and Information

1. Training Program. A training program will be established as follows. All employees who may be exposed to excessive noise levels will complete a formal training program, which will include, as a minimum, the following information:

   - The effects of noise on hearing.
   - The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care.
   - The specific nature of the operations which could result in exposure to excessive noise levels.
   - A description of the medical surveillance program, including a description of the purpose of audiometric testing, and an explanation of the test procedures.
   - The engineering controls and safe work practices associated with the employee's work assignment.

   The training program will be repeated annually, and each employee receiving such training will complete a Hearing Protection Training Completion Form. All training will be documented in accordance with the Contractor's Hearing Conservation Program.

2. Safety Meetings. Job site safety meetings and site-specific health and safety plans will include instruction on the need for hearing protective devices in designated areas. All safety meetings will be in accordance with the Contractor Employee Orientation and Training Program.

(c) Control Measures

1. Examination of the Problem. To control noise exposure, its three basic elements will be examined, i.e., source of the sound, travel path, and effect on receiver or listener. Solution of a given noise problem might require alteration or modification of any or all of these three basic elements.
2. Noise Control at the Source. Controlling noise at the noise source can be achieved by the following:

   - Select quiet equipment initially. In selecting quiet equipment the following features will be considered:
     - Low-noise certification.
     - Advertisement of "quiet" operation, evidence of noise control design.
     - Evidence of "lower" and "slower" operating characteristics.
     - Side-by-side noise testing of equipment.
     - "On-site" or "in operation" inspection of mechanical equipment before purchase.
   - Reduce operating noise by considering the following control measures:
     - Reduce impact or impulse noise by reducing weight, size, or height of fall of impacting mass.
     - Reduce speed in machines and flow velocities and pressure in fluid systems.

- Balance rotating parts - to control machinery noise and vibration of fans, fly wheels, pulleys, cams, shafts, etc.
- Reduce frictional resistance between rotating, sliding or moving parts in mechanical systems: frequent lubrication, proper alignment of moving parts; static and dynamic balancing of rotating parts; correction of eccentricity or "out-of-roundness" of wheels, gears, rollers, pulley, etc.
- Reduce resistance in air or fluid systems: use of low flow velocities, smooth boundary surfaces of duct or pipe systems, and long-radius turns and flared sections in pipes, etc., to reduce turbulence noise.
- Isolate vibration elements in machinery; install motors, pumps, etc., on most massive part of machine; use belt or roller drives in place of gear trains; use flexible hoses and wiring instead of rigid piping and stiff wiring, etc.
- Apply vibration damping materials such as liquid mastic; pads of rubber, felt, foam or fibrous blankets; or sheet metal viscoelastic laminates or composites to vibrating machine surfaces.
- Reduce noise leakage from the interior of machines such as compressors by sealing or covering all openings or applying acoustical materials to machine interiors.

3. Noise Control in the Transmission Path. This can be achieved by the following: Separate the noise source and receiver as much as possible.

    - Use sound-absorbing materials on ceiling, floor or wall surfaces as close to the machine as possible.
    - Use sound barriers and deflectors in the noise path.
    - Use acoustical lining on inside surfaces of such passageways as ducts, pipe chases, or electrical channels.
    - Use mufflers, silencers or snubbers on all gasoline or diesel engines, regardless of size; and particularly on equipment when large quantities of high-pressure, high-velocity gases, liquids, steam or air are discharged into the open air.
    - Use vibration isolators and flexible couplers where the noise transmission path is structure-borne in character.

4. Protection for the Receiver. When engineering controls fail to reduce the levels to within the levels specified in Exhibit F of this procedure the following measures will be implemented:

    - Personal protective equipment will be provided and replaced as necessary at no cost to employees.
    - Supervisors will ensure that hearing protective devices are worn by all employees who are exposed to a time-weighted average of 85 decibels or greater and who have experienced a significant threshold shift.
    - Employees will be given the opportunity to select their hearing protectors from a variety of suitable protectors.

25.6 Exhibits/Attachments

(a) Permissible Noise Exposure, Exhibit F

(b) Hearing Protection Training Record, Attachment 15

Exhibit F. Permissible Noise Exposure (per 29 CFR 1910.95)

A-Weighted Sound Level	Permitted Duration per Workday	A-Weighted Sound Level	Permitted Duration Per Workday
(dB)	(Hours)	(dB)	(Hours)
80	32	106	0.87
81	27.9	107	0.76
82	24.3	108	0.66
83	21.1	109	0.57
84	18.4	110	0.50
85	16.0	111	0.44
86	13.9	112	0.38
87	12.1	113	0.33
88	10.6	114	0.29
89	9.2	115	0.25
90	8.0	116	0 22
91	7.0	117	0.19
92	6.2	118	0.16
93	5.3	119	0.14
94	4.6	120	0 125
95	4.0	121	0.110
96	3.5	122	0.095
97	3.0	123	0.082
98	2.6	124	0.072
99	2.3	125	0.063
100	2.0	126	0.054
101	1.7	127	0.047
102	1.5	128	0.041
103	1.3	129	0.036
104	1.1	130	0.031
105	1.0		

Attachment 15. Hearing Protection Training Record

HEARING PROTECTION TRAINING RECORD

Name: _____

Please Print

INITIAL

_____ 1. I have been informed about the health hazards associated with exposure to excessive noise levels and the effect of noise on hearing.

_____ 2. I have been informed about the types of work that may result in exposure to excessive noise levels, and the necessary protective steps to prevent exposure, including engineering controls and required safe work practices.

_____ 3. I understand the purpose for, proper use and limitations of hearing protective devices, and I have received instruction on selection, fitting, use and care of such devices.

_____ 4. I have been informed about the monitoring and medical surveillance programs, including information on audiometric testing and an explanation of the test procedures.

_____ 5. I have received copies of the applicable regulations governing occupational exposure to excessive noise.

Employee Signature: _____

Date: _____

Signature of Trainer: _____

26. Hot Environments

26.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to protect workers exposed to hot environments, in accordance with the provisions of WAC 296-62-09013.

26.2 Definitions

(a) Acclimatized. Workers who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat; and much of its benefit may be lost if exposure to hot environments is discontinued for a week.

(b) Unacclimatized. Workers who have not been exposed to hot work conditions for one week or more, or who have become heat-intolerant due to illness, or other reason.

(c) Chemical Protective Clothing. Apparel that is constructed of relatively impermeable materials with the intent to act as a barrier to physical contact of the worker with potentially hazardous materials in the workplace. Such materials include: Tyvek coveralls (all types), CPF Series coveralls, and polyvinyl chloride (PVC) coveralls and rain suits.

(d) Heat Stress (hyperthermia). A common hazard to employees working on projects involving exposure to hazardous substances, most particularly when impermeable protective clothing is used. This problem can occur at ambient temperatures below what is normally considered "hot weather." The body normally sheds excess heat primarily through radiation (capillaries in the skin dilate, transferring heat from the body core to the surface), and evaporation of sweat. Thermodynamically, evaporation is much more effective than radiation. Heat stress results when the body's regulating mechanisms are inadequate to dispose have internally generated and externally supplied heat.

Heat is normally generated internally through metabolic processes, and the quantity of heat generated corresponds to the level of muscle activity. External heat sources include radiant bodies (the sun, furnaces, fires, etc.), and convection (temperature difference between the skin and ambient air). External heat gain can occur through conduction from hot surfaces, but this is normally not significant since such contact will be avoided (it could be a very important factor if immersed in water, however).

The overall heat balance of a human can be written as an equation:

H = M R C - E

Where: H = body heat burden

M = metabolic heat gain

R = radiant or infrared heat load

C = convective heat load

E = evaporative heat loss.

The "normal" person maintains a core body temperature of 37°C + 1°C, (98.5°F + 1.8°F). Core body temperatures should not exceed 38°C (100.4°F) as a result of the total heat burden. Heat stroke occurs when the core temperature is greater than 40°C (104°F), and death is probable at core temperatures = 42°C (107.6°F).

Working outdoors in hot, sunny weather places the worker under increased heat load from M, R, and C. If the heat loss from E is less than the sum of M, R, and C, the total body heat balance will increase. Unfortunately, the use of impermeable protective clothing can reduce the heat loss from E to near zero.

26.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

26.4 General Requirements

Not applicable.

26.5 Implementation

(a) Recommended Controls.

NOTE: The guidelines discussed in this section are only intended to be used as a means for initial establishment of a work-rest regimen.

1. The field safety and health staff will evaluate the conditions at a specific operation and make final determinations of the work-rest regimen.
2. Intake of fluid will be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.
3. Two 8-oz glasses of water should be taken prior to beginning work, then up to 32 oz per hour during the work shift; although fluid replacement at frequent intervals is more effective.
4. The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration, and may increase loss of water.
5. If commercial electrolyte drinks (Gatorade, Squincher, etc.) are used, the drink should be diluted 1:1 with water, i.e., 8 oz of water should be taken with each 8 oz of electrolyte beverage.
6. Additional salt is usually not needed; moreover, salt tablets should never be taken.
7. Replacement fluids should be cool, but not cold.
8. Breaks should be taken in a cool, shaded location, and any impermeable clothing should be removed.
9. Dry clothing and/or towels should be available to help minimize chills when taking breaks.
10. Manual labor, other than paperwork or similar light tasks, should not be performed during breaks.
11. Other heat controls that may be used include:
    - Scheduling work at night or during the cooler parts of the day (6 a.m. - 10 a.m. and/or 3p.m. -7p.m.).
    - Erecting a shade over the work area.
    - Use of cooling garments, although expensive and logistically difficult to implement.
12. Work Schedules.
    - Work schedules providing periodic rest periods should be implemented when employees are exposed to heat stress. Schedules will be developed based on instrumental measurements of the environment, by assessing temperature, radiant heat, humidity, and wind speed, with the resulting measurement compared

to published guidelines, as outlined by NIOSH REL and ACGIH TLV, for Heat Stress. When using this method, allowance must be made for the use of impermeable protective clothing.

- Alternate methods of establishing a work schedule are based on measuring physiological indices, such as heart rate or oral temperature, which correlate to the core body temperature.

NOTE: Oral temperature does not correlate well with increasing core temperature, and is subject to effects from drinking replacement fluids. During heat exhaustion, oral temperature may be normal or even depressed due to extreme peripheral vasodilatation).

- Measures of heart rate (pulse) appear to correlate well with heat-related stress, and can be used to estimate the impact of heat stress on individuals with differing levels of fitness. For example, less fit individuals with a pulse of 150 beats/minute experience about the same level of stress as a fit person, even though the work output required for the fit person to reach this rate will be quite higher. The heart rate also incorporates the combined effects of environmental heat, muscle activity, and elevated body temperature, making it a useful and easily measured variable.
- The procedure for controlling heat stress via establishment of work schedules based on the measurement of heart rate is presented below.

13. The Project Safety Manager will determine the potential for heat stress based on planned activities and weather forecasts.

    - If the potential for heat stress exists:
        - All site workers should be informed of the potential for heat stress during the daily safety meeting. The Project Safety Manager will determine if any workers are at particular risk for heat stress due to illness, etc. Also, the Project Safety Manager will assure that sufficient quantities of portable water and electrolyte drinks are available in the decon area, and that a shaded rest area is available at or immediately outside the decon area.
        - All workers should drink 16 oz of water prior to beginning work, and at least 16 oz during each rest period.
    - The initial work period and monitoring frequency, is set according to the table in Exhibit G.
    - Within the first minute of each rest period, each worker's heart rate (pulse) should be measured and compared to the following (see Attachment 16):
    - Initial heart rate: 110 beats/minute (28 beats/15 sec).
    - Each worker's heart rate should be measured again three minutes later and compared to the following:
    - Recovery heart rate: 80 beats/minute (20 beats/15 sec.).
    - If both heart rate criteria are met, the subsequent work period may be increased by one third, provided the temperature remains constant.
    - If the initial heart rate is greater than 110 beats per minute or the recovery rate is not less than 80 beats per minute, the subsequent work shift is decreased by one third.

14. Additional Means of Prevention.

    - Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments. If cooling devices are worn, only physiological monitoring is to be used to determine work activity.
    - All breaks should be taken in a cool, shaded rest area.
    - Employees will open or remove chemical protective garments during rest periods.
    - All employees will be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
    - Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.

(b) Training. Those personnel potentially exposed to heat stress will receive the training listed below. Training provided as a part of this procedure will be documented in accordance with Employee Safety Orientation and Training.

1. Employees will be trained on:
    - Sources of heat stress, the influence of protective clothing, and the importance of acclimatization;
    - How the body handles heat;
    - Heat related illnesses;
    - Preventative/Corrective measures;
    - First Aid procedures for heat stress.
2. The Contractor's supervisors will be trained on measurement methods and calculations of heat stress indices, as well as the establishment of work schedules.

26.6 Exhibits/Attachments

(a) Measurement Schedule, Exhibit G

(b) Physiological Monitoring Record for Heat Stress, Attachment 16

Exhibit G. Measurement Schedule

FREQUENCY OF MEASUREMENT		
Ambient Temperature (°F)	**Normal Work Clothing***	**Impermeable Work Clothing**
70 – 80	N/A	90 min
80 – 85	120 min	60 min
85 – 90	90 min	30 min
> 90	60 min	15 min

* Normal work clothing is cotton coveralls or other cotton clothing with long sleeves and pants.

Note: Individuals with pre-existing medical conditions or restrictions contraindicating exposure to elevated environmental heat are precluded from assignments that involve exposure to high temperatures.

Note: Healthy individuals will vary significantly in their tolerance to heat; and heat tolerance can be affected by minor illnesses (cold, flu), and by prescription and over-the-counter medications.

Note: The heart rate measure is only a part of the overall situation to be considered; other objective and subjective symptoms of heat stress, such as: extreme fatigue, nausea, disorientation, lightheadedness, and breathlessness, must be fully considered when evaluating the adequacy of control measures.

Note: The heart rate measure will provide guidance that can be significantly different for each member of a field team, based on their acclimatization, physical fitness, and heat-tolerance. If it is critical that all team members use the same work/break schedule, the schedule that accommodates the least heat-tolerant team member should be observed.

Attachment 16. Physiological Monitoring Record for Heat Stress

PHYSIOLOGICAL MONITORING RECORD FOR HEAT STRESS

Employee Name			
Employee SS#		**Date**	
Project Location		**Business Unit**	
Completed By		**Project No.**	
Pre-Work Baseline		**After 5th Work Period**	
Ambient Air Temperature		Ambient Air Temperature	
Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 1st Work Period		**After 6th Work Period**	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 2nd Work Period		**After 7th Work Period**	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 3rd Work Period		**After 8th Work Period**	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 4th Work Period		**After 9th Work Period**	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	

27. Housekeeping Practices

27.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to perform housekeeping activities.

27.2 Definitions

(a) Housekeeping Zone I. Areas requiring the highest order of cleanness. Zone 1 areas must be equipped with a clean clothing change facility at the vestibule or entrance, preferably with toilet facilities immediately adjacent to the controlled areas so that personnel working in those controlled areas do not need to continue wearing the special clothing in other areas. Such areas must provide for complete outer change of clothing by personnel, including use of shoe covers, head covers, and gloves to protect all equipment surfaces from outside contamination. Material entering this zone must have been appropriately cleaned prior to entry.

(b) Housekeeping Zone II. Intermediate cleanness requirements less restrictive than Zone I but where foreign matter may have detrimental effects.

(c) Housekeeping Zone III. Areas less restrictive than Zones I and II but requiring access control over personnel and materials.

(d) Housekeeping Zone IV. Areas where it is desired to regulate the use of tobacco and eating for material and equipment protection or for health and fire hazards.

(e) Housekeeping Zone V. Unrestricted construction areas requiring good construction site housekeeping practices only.

NOTE: These work zones are not to be confused with the authorized work zones required to be established on sites controlled by OSHA'S Hazardous Waste Operations and Emergency Response standard.

27.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

27.4 General Requirements

(a) Safe access and egress routes will be established and maintained neat and orderly to allow prompt emergency use.

(b) Work areas will have adequate lighting and ventilation.

(c) Necessary protection, such as barriers, screens, shields, or restricted access, etc., will be provided in areas where noise, dust, severe weather, or other conditions may affect the quality of work being performed.

(d) In areas where air quality is adversely affected by activities such as grinding or machining, a temporary enclosure with a medium efficiency filter will be erected around the work area.

(e) Clean rags, duct tape, plastic covering, shielding, and other material required to protect critical components will be available at the work site.

(f) All tools, parts, and other materials entering the work area will be free of dirt, grease, oil, and visible loose particles.

(g) Clothing worn by personnel will be clean and in such condition so as not to contribute to the contamination of the work area or component being serviced.

(h) Labeled containers will be used for combustible and non-combustible trash and will not be placed under cable trays or near material or equipment vulnerable to fire damage.

(i) If poor housekeeping practices are observed by anyone, the condition observed will be discussed with the first-line supervisor and corrective action promptly provided. Cluttered work areas will not be tolerated. All supervisors will follow through and make sure that these conditions are not allowed to recur.

(j) All personnel are responsible for good housekeeping practices and will be instructed to the requirements of this procedure in accordance with Procedure - Employee Safety Orientation and Training.

27.5 Implementation

(a) Control of Site Areas.

1. Work areas will be divided into housekeeping zones and cleanliness requirements will be established on the basis of the zone designations, as shown on the table below.

Requirements	Zone				
	I	II	III	IV	V
Clothing Change	Yes	No	No	No	No
Clean gloves, shoe covers head covering	Yes	Yes	No	No	No
Filtered air	Yes	No	No	No	No
Material pre-cleaning	Yes	No	No	No	No
Material accountability	Yes	Yes	Yes	No	No
Personnel accountability	Yes	Yes	Yes	No	No
Restriction on use of tobacco or eating	Yes	Yes	Yes	Yes	No

2. Areas will be assigned for refuse and garbage dumps, storage locations, parking lots, eating places, smoking areas, subcontractor work areas, common areas, and waste collection container locations. These areas will be regulated as appropriate for their zone designations.
3. For Zones I, II, and III a written record of the entry and exit of all personnel, visitors, and material will be maintained.
4. Grading, drainage, roads, construction facilities, plant fencing, and utilities will be provided in accordance with specific requirements and will be maintained in good condition throughout the construction phase or until replaced with the permanent facilities.
5. Control of work and storage areas where important items are handled will be established and maintained to conform to the appropriate housekeeping zones. Atmospheric control will be provided where necessary.
6. The control of all tools, equipment, materials, and supplies used in Zones I, II, and III will be maintained to prevent the inadvertent inclusion of deleterious materials or objects into critical systems. Appropriate control measures will be provided through utilization of such items as logbooks and tethered tools.

(b) Construction Site Cleanliness.

1. Work areas will be kept sufficiently clean and orderly so that construction activity can proceed efficiently and produce and maintain quality work in conformance with specific requirements.
2. Where large accumulations of materials occur on a non-routine basis, such as the stripping of concrete forms, the material will be promptly removed or stored neatly away from heavily traveled areas.
3. Garbage, trash, scrap litter, and other excess materials will be collected, removed from the job site, or disposed of daily. Such excess material will not be allowed to accumulate.

(c) Working Environment.

1. To maintain a safe working environment, areas of activity will be adequately lighted, ventilated, protected, and accessible as appropriate for the work being performed.
2. Temporary lighting will be installed as needed and maintained to provide good visibility.
3. Ventilation will be provided where necessary to prevent accumulation of dust, noxious fumes, and temperature extremes.
4. Adequate working space for personnel will be provided utilizing proper work stages and platforms having accessibility by stairs or ladders.
5. Barriers, screens, shields, restricted access, or other protection will be provided as necessary for isolation of areas where noise, welding arcs, dust, inclement weather, or other conditions exist that may affect the quality of work being performed.

(d) Materials and Equipment. Materials and equipment delivered to the work area will be placed so that they are accessible but do not hinder construction progress. Material and equipment will be so positioned that it will not be damaged by construction activity.

(e) Tools, Supplies, and Equipment.

1. The use, location, and deployment of construction tools, supplies, and equipment will be regulated to keep access and work areas clear.
2. These regulated provisions will include, but not limited to, such items as the movement of materials to the work area, welding and stress relieving leads, power leads, temporary heating equipment, pumps, air and water hoses, welding machines, air compressors, hoisting equipment, air tools, grinding tools, and burning tools.

27.6 Exhibits/Attachments

Not applicable.

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28. Impalement Protection

28.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for the guarding of reinforcing steel to eliminate the hazard of impalement in accordance with the provisions of WAC 296-1155—680(7).

28.2 Definitions

Not applicable.

28.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

28.4 General Requirements

The exposure to impalement from rebar protrusions is a recognized hazard in the construction industry. The Federal OSHA standards regarding this hazard are defined in Subpart Q of 29 CFR 1926.700, and WAC 296-155 Part O. Standard number 1926.701 (b) states, “All protruding reinforcing steel, onto and into which employees could fall, will be guarded to eliminate the hazard of impalement.” Where the requirements of this program differ from Federal or WISHA standards, the most stringent requirements will apply.

28.5 Implementation

(a) All reinforcing steel less than 54 inches above the working surface will be protected to eliminate the hazard of impalement.

(b) All reinforcing steel greater than 54 inches above the working surface installed in locations where overhead work is being performed will be protected to eliminate the hazard of impalement.

(c) All reinforcing steel greater than 54 inches installed within 10 feet of access/egress ladders leading to/from work areas above the protruding reinforcing steel will be protected to eliminate the hazard of impalement.

(d) The protective devices will be installed as soon as it is safe to complete the installation.

(e) The protective devices will be secured to prevent displacement if the protruding reinforcing steel is uneven or work activities at that location may cause the cover to be knocked off.

(f) The performance criterion for impalement protection devices (covers or wooden troughs) are that the device be capable of withstanding an object weighing a minimum of 250 pounds dropped from a height of 10 feet.

(g) Removal of the protective devices will occur immediately preceding the installation of additional reinforcing steel, wall forms etc. as the sequence of work prescribes. Once the protective devices have been removed, the individual/crew are responsible for identifying other job activities in or above the work area containing unprotected reinforcing steel that create employee exposure to impalement from the rebar. In the event that impalement exposures are identified, the hazards of impalement must be removed by re-scheduling job activities, use of barricades limiting access or other means to eliminate the exposure.

28.6 Protective Systems

(a) Column Rebar Dowels: Will be covered by a fabricated wood cover using a minimum of 1/2-inch plywood and 2x4s. This protective device must fully cover all of the dowels.

(b) Wall Rebar Dowels: Will be covered using one of the systems described below:

1. Manufactured impalement caps tested to the above performance criteria. The plastic caps containing a metal plate meet these criteria. The standard size cap will fit #3-9 rebar.
2. “Carnie Caps” utilizing either a 2x4 (fits #3-9 rebar) or 2x6 (fits #5-18 rebar). The caps must be placed every 8 feet and secured to the lumber with nails. This system must cover all of the protruding rebar in order to eliminate the hazard.
3. Field engineered trough systems can be manufactured using a combination of a minimum of 1/2-inch plywood, 2x4s and 2x6s. The trough must completely cover all of the protruding rebar.
4. The practice of bending the rebar dowels over is an acceptable means of protection under the following conditions:
    - The bars must be bent to a position perpendicular to the working surface. The use of a 4x4 under the dowel as it is bent will create a 90-degree angle bend.
    - All of the bars must be bent in the same direction.
    - The bent over bars must not create a trip/fall hazard. If the bent over bars are located in an access/egress route, a fabricated ramp, cover or other acceptable system will be installed to eliminate the exposure.
5. Reinforcing steel manufactured with a 180-degree bend at the top does not require protection.

28.7 Exhibits/Attachments

Not applicable.

29. Job Hazard Analysis

29.1 Purpose

To provide a method for evaluating and identifying job hazards.

Some tasks, by their nature, can expose employees to the risk of injury. To make them as safe as possible, such work activities require special planning and training. Job Hazard Analysis (JHA) is a process to identify the hazards or risks associated with a task or work activity and to be systematically address them. A thorough JHA is also an excellent tool to train employees performing the task and to solicit their input into the safe execution of the task or activity.

29.2 Definitions

Hazard: A condition or activity that, if left uncontrolled, can result in an injury or illness.

29.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual

29.4 General Requirements

Not Applicable.

29.5 Implementation

(a) Job Hazard Analysis. The JHA is a method of evaluating a job, task, or activity to determine the safest, most efficient way in which it may be accomplished. The JHA process directly carries out two basic safety principles:

1. It determines the potential accident causes by detecting the hazards inherent in a job.
2. It eliminates potential accident causes by eliminating identified potential hazards.
3. The JHA process has three basic components:

    - Determining the basic steps of a job or task.
    - Identifying potential hazards that are associated with each step.
    - Developing solutions for eliminating or controlling the hazards. Once these phases are complete, the result is a written end product that describes the sequence of basic job steps, the potential for accidents and/or hazards and the recommended safe work practices or procedures to be followed for each.

(b) Job Hazard Analysis Development Responsibilities. The JHA process ideally involves both employees and supervisors working together to develop safe work practices and procedures that can be practically implemented into the process. Employee participation is essential in having practical input and involving

the employees who will actually perform the work contributes to the successful and safe completion of the work. The key to a successful JHA is total management commitment to see that it gets done.

By “walking through” the steps involved in a particular job assignment, the employee and the supervisor develop an increased awareness of potential hazards and an understanding of how “shortcuts” can result in dangerous situations or conditions.

(c) Job Hazard Analysis Worksheet. This JHA worksheet (see Attachment 17; also see Attachment 18 for a sample worksheet) has been selected to simplify and document the JHA process. The left column, the Sequence of Basic Job Steps, is for listing the steps in the order in which they would logically occur from the beginning to the end of the process. The middle column, Potential hazards, is for listing all of the hazards associated with each step listed in the left column. The right column, Recommended Safe Job Procedures, is for identifying the best method of eliminating or controlling the hazard.

(d) Job Hazard Analysis Development on Projects. Most supervisors have a large number of tasks or jobs regularly performed by their employees. The needs of every project quite often differ. The following should be considered when determining the work to be analyzed:

1. Accident or injury frequency.
2. New tasks or jobs.
3. On-routine tasks or jobs.
4. Unusual tasks or jobs.
5. Tasks or jobs using new technology.
6. Tasks or jobs using hazardous materials.
7. Tasks or jobs with new or inexperienced workers.
8. Tasks or jobs that have a greater potential for accident or injury.

Each time a crew begins a new task, they should jointly prepare a Job Hazard Analysis using the mini-JHA form at the end of this section. For crews that do essentially the same thing every day, the JHA should be reviewed at least once a week or when conditions change such that different hazards should be considered. Crews that perform several different tasks in a day should prioritize those tasks and prepare a mini-JHA form for each of the tasks.

The Foreman should lead the crew through the process using their input rather than doing the work for them.

(e) Benefits of a Job Hazard Analysis.

1. Demonstrating management’s interest, in and commitment to, safety.
2. Giving employees a voice in suggesting better methods.
3. Focusing supervisors and employees on safety.
4. Defining safety goals for continued improvement.
5. Joining workers and supervisors into a working partnership.
6. Removing guess work and chance when doing a job.
7. Standardizing training.
8. Job Hazard analysis can reduce costs by:
    - Structuring training to control safety, quality, and costs.
    - Controlling losses.
    - Increasing efficiency through improving and standardizing operating procedures.
    - Helping solve engineering problems.
9. Job Hazard Analysis improves operations by:
    - Promoting standard operating procedures.
    - Allowing for follow up job observations.
    - Facilitating the use of new technology.
    - Improving job performance through coaching, training, and teaming.
    - Planning the work.

29.6 Exhibits/Attachments

(a) JHA Phase List, Exhibit H

(b) JHA Worksheet, Attachment 17

(c) JHA Sample Worksheet and Procedure, Attachment 18

Exhibit H. JHA Phase List

A. PHASES OR TYPES OF WORK TO CONSIDER

1. Site-work, Clearing and Grubbing
2. Demolition
3. Excavations, Trenching, Shoring
4. Tunneling
5. Foundations/Piling
6. Concrete - Structural and Architectural
7. Steel Erection
8. Curtain Walls/Precast Erection
9. HVAC
10. Plumbing/Pipe fitting
11. Electrical, Instrumentation
12. Process Systems Erection, Assemble and Tie-In
13. Roofing
14. Marine Exposures
15. Miscellaneous

B. HAZARDS TO ADDRESS

As a minimum (for each phase) consider all potential hazards including those below.

1. Noise
2. Dust/Fumes/Mists/Chemical Exposures
3. Traffic Control
4. Falls, Working at Heights
5. Falling Objects/Flying Objects
6. Walking Surfaces/Access/Work Platforms & Scaffolding
7. Lighting
8. Radiation
9. Machinery/Vehicles
10. Interface with other contractors
11. Security
12. Pollution/Spills
13. Utilities Exposure Including Electrical, Gas, Water (onsite and Public)
14. Vibration/Subsidence/Ground Support/Trenching and Excavations
15. Fires, Welding, Burning Operations/Fire Prevention
16. Clothing/PPE Requirements
17. Craning/Hoisting/Rigging
18. Signage/Barricades
19. Tools-use, Inspection, Maintenance
20. Demolition Operations
21. Protection of the Public
22. Other Hazards Particular to this Project.
23. Weather conditions (Heat or Cold related factors)

Note: If the work to be done does not have any of these hazards, note this and move on to the next item.

C. PROCEDURES

For each phase and major type of work where a hazard is identified, spell out a simple procedure with the following components as a minimum.

1. Outline Purpose and Scope (overview)
2. Delegate Responsibilities
3. Identify Training Requirements
4. Identify specific Project conditions and circumstance and how to apply this procedure
5. List reporting and record keeping requirements
6. Determine emergency actions and responses needed in event of a failure of the plan.

Note: Generic Hazard Analyses may be written for routine tasks. These could be used as a basis for writing the specific analyses for the immediate job. Provided each Hazard Analysis addresses any special hazards to the current job, the generic Hazard Analyses can save preparation time.

D. EMERGENCY ACTION PLANS AND CONTINGENCIES

Emergency action plans and contingencies should be developed for each phase. The following should be addressed as a minimum:

1. Floods.
2. Chemical Spills and Leaks.
3. Fires.
4. Electrical Outage and Emergency.
5. Collapse or Failure of Supports.
6. Injury; Minor, Major, and Fatalities.
7. Catastrophe.
8. Severe Weather Procedures.
9. Earthquake
10. Volcanic Eruption
11. Job specific occurrences not listed above.

Attachment 17. JHA Worksheet

JOB HAZARD ANALYSIS WORK SHEET

Page ___ of ___ Date _____

Project Name _____ Phase _____

Contractor _____ Location _____

Activity/Operation	Unsafe Condition, Action, or Hazard	Preventive or Corrective Action

Attachment 18. JHA Sample Worksheet and Procedure

JOB HAZARD ANALYSIS SAMPLE WORK SHEET AND PROCEDURE

Date _____

Project Name _____ Phase General Sitework, Clearing, and Grubbing

Contractor _____ Location Right Wing of Building

Activity/Operation	Unsafe Condition, Action, or Hazard	Preventive or Corrective Action
1. Site work preparation.	Unauthorized personnel entering the site.	Signs and/or barricades/fencing will be provided.
2. General sitework.	Construction vehicles crossing sidewalks and roadways.	Warning signs/flagger(s) will be posted.
	Non-construction personnel slip/trip on mud and rocks outside the site.	Sidewalk roadway maintenance personnel and equipment will be provided. (Sweep and clean.)
	Flaggers and other workers exposed to contact by non-construction vehicles along roadway.	Orange vests/reflective clothing will be worn by exposed employees.
	Employees exposed to contact by construction vehicles and heavy equipment.	Back-up alarms/warnings/horns/lights/ mirrors will be provided. Employees will be trained to make eye contact with the operator and receive a "go ahead" signal from the operator before attempting to cross the path of a vehicle or equipment.
	Employees falling from vehicles and heavy equipment.	Employees may ride only where seats are provided by the manufacturer. Seatbelts will be worn when provided.
3. Fueling equipment and fuel storage.	Chemical hazards.	MSDSs will be reviewed with employees before they handle chemicals.
	Mix-up of fuels.	I.D. label fuel tanks and containers; for example, Gasoline, Diesel, etc.

Activity/Operation	Unsafe Condition, Action, or Hazard	Preventive or Corrective Action
	Drip/spill/leak of fuel.	Lined berm or other means of containment will be provided for fuel tanks. Drips/spills/leaks will be cleaned up and disposed of as hazardous waste.
	Tank or container damaged/ruptured.	High visibility warning barricade or barrier.
	Fire hazards.	The phone number for the Fire Department and the Fire Emergency notification procedures will be posted in the Company's office trailer. Fuel trucks will be used to minimize stored fuels where practical. Proper tanks and metal safety containers will be used to store fuel on site. Tanks and container piles will be stored 20 feet from buildings.

INSTRUCTIONS FOR COMPLETING THE JOB HAZARD ANALYSIS FORM

Job Hazard Analysis (JHA) is an important accident prevention tool that works by finding hazards and eliminating or minimizing them before the job is performed and before they have a chance to become accidents. Use a JHA for job clarification and hazard awareness, as a guide in new employee training, for periodic contacts and for retraining of senior employees, as a refresher on jobs that run infrequently, as an accident investigation tool and for informing employees of specific job hazards and protective measures.

Set priorities for doing JHA's: jobs that have a history of many accidents, jobs that have produced disabling injuries, jobs with high potential for disabling injury or death, and new jobs with no accident history.

Select a job to be analyzed. Before filling out this form, consider the following: The purpose of the job--What has to be done? Who has to do it? The activities involved--How is it done? When is it done? Where is it done?

In summary, to complete this form you should consider the purpose of the job, the activities it involves, and the hazards it presents. If you are not familiar with a particular job or operation, interview an employee who is. In addition, observing an employee performing the job, or "walking through" the operation step by step may give additional insight into potential hazards. You may also wish to videotape the job and analyze it.

Here's how to do each of the three parts of a Job Hazard Analysis:

SEQUENCE OF BASIC JOB STEPS

Examining a specific job by breaking it down into a series of steps or tasks, will enable you to discover potential hazards employees may encounter.

Each job operation will consist of a set of steps or tasks. For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. To determine where a step begins or ends, look for a change of activity, change in direction or movement.

Picking up the box from the conveyor and placing it on a handtruck is one step. The next step might be to push the loaded handtruck to the storage area (a change in activity). Moving the boxes from the truck and placing them on the shelf is another step. The final step might be returning the handtruck to the receiving area.

Be sure to list all the steps needed to perform the job. Some steps may not be performed each time; an example could be checking the casters on the handtruck. However, if that step is generally part of the job it should be listed.

POTENTIAL HAZARDS

A hazard is a potential danger. The purpose of the Job Hazard Analysis is to identify ALL hazards--both those produced by the environment or conditions and those connected with the job procedure.

To identify hazards, ask yourself these questions about each step:

Is there a danger of the employee striking against, being struck by or otherwise making injurious contact with an object?

Can the employee be caught in, by or between objects?

Is there potential for slipping, tripping or falling?

Could the employee suffer strains from pushing, pulling, lifting, bending or twisting?

Is the environment hazardous to safety and/or health (toxic gas, vapor, mist, fumes, dust, heat or radiation)?

Close observation and knowledge of the job is important. Examine each step carefully to find and identify hazards--the actions, conditions and possibilities that could lead to an accident. Compiling an accurate and complete list of potential hazards will allow you to develop the recommended safe job procedures needed to prevent accidents.

RECOMMENDED ACTION OR PROCEDURE

Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the hazards that could lead to an accident, injury or occupational illness.

Begin by trying to: 1) engineer the hazard out; 2) provide guards, safety devices, etc.; 3) provide personal protective equipment; 4) provide job instruction training; 5) maintain good housekeeping; 6) insure good ergonomics (positioning the person in relation to the machine or other elements in such a way as to improve safety).

List the recommended safe operating procedures. Begin with an action word. Say exactly what needs to be done to correct the hazard, such as, "lift using your leg muscles." Avoid general statements such as, "be careful."

List the required or recommended personal protective equipment necessary to perform each step of the job.

Give a recommended action or procedure for each hazard.

Serious hazards should be corrected immediately. The JHA should then be changed to reflect the new conditions.

Finally, review your input on all three columns for accuracy and completeness. Determine if the recommended actions or procedures have been put in place. Reevaluate the job hazard analysis as necessary.

30. Ladders – Use, Handling, and Storage

30.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to use, handle, and store ladders. Ladders will be handled, used, stored and repaired in accordance with WAC 296-876.

30.2 Definitions

Not applicable.

30.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual.

30.4 General Requirements

The following are minimum requirements for the use and care of ladders by the Contractor personnel and subcontractors. Compliance is also required with ANSI A14.1, ANSI A14.3, and applicable State Regulations.

(a) Ladders will be maintained in good condition at all times. Those that are defective in any way will be removed from service and tagged with an unsafe equipment tag until made safe for use or destroyed.

(b) Ladders purchased for use on the Contractor’s sites will be appropriate for industrial applications (Class 1-A). Light-duty household ladders are not acceptable.

(c) Ladder safety devices may be used in lieu of cage protection on ladders of unbroken length.

(d) Landing platforms are not required in these, cases except at regular step-off points. All ladder safety devices will be compatible with the ladders with which they are used.

(e) Fixed ladders will be installed wherever regular access by ladder is necessary.

(f) Metal ladders will not be used where potential electrical hazards exist.

(g) Ladders having metal parts (other than hardware) will not be used where potential electrical hazards exist, unless they bear a manufacturer's label that indicates:

1. The ladder complies with ANSI 14.5.
2. It is approved for electrical use.

(h) Job-made ladders will be constructed in accordance with OSHA 1926.1053 and WAC 296-876.

(i) All personnel involved in the use of ladders on the project will be instructed to the requirements of this procedure, in accordance with the Contractor’s procedure - Employee Safety Orientation and Training.

30.5 Implementation

(a) Use of Ladders.

1. Ladders will be inspected by the user before each use.
2. Straight ladders will be equipped with safety shoes, tied, blocked, or otherwise secured to prevent displacement.
3. Straight ladders will be used at an angle of approximately 75 degrees from the horizontal. (This position may be readily established by placing the base of the ladder 1/4 of its working length from the vertical plane of the top support.)
4. When working from a ladder, the ladder will be secured both at the top and bottom.
5. No type of work requiring the use of both hands will be performed on a ladder over 10 feet from the ground or floor, unless a safety belt is worn and the safety lanyard is secured.
6. No objects that restrict the use of both hands for climbing will be carried in the climber's hands.
7. A ladder will not be placed in front of a door opening toward the ladder, unless the door is blocked open, locked, guarded, or removed.
8. Ladders must only be used on firm, stable bases. Ladders will not be placed on boxes, barrels, or other unstable bases to form longer sections.
9. Ladders will not be spliced together to form longer sections.
10. Ladders used to gain access from one level to another will be long enough for the top to extend 3 feet above the landing or suitable grab rails, for safe moving to or from the point of access.
11. The platform and top step of ordinary types of stepladders will not be used as steps.
12. Stepladders will not be used as straight ladders, and will be used with legs fully extended.

(b) Care of Ladders.

1. Ladders will be handled with care, and are not be subjected to unnecessary abuse or misuse.
2. Immediate inspection and appropriate maintenance is required of any ladder exposed to fire, subjected to damaging chemicals, involved in a fall or collision, or which has become coated with oil or grease.
3. When not in use, ladders will be stored where they are protected from potential damage by collision, temperature, moisture, etc.
4. Users will return ladders to proper storage location when the job is completed.
5. Ladders will not be painted.

30.6 Exhibits/Attachments

Not applicable.

31. Lead Abatement

31.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for the removal of lead or where lead-containing coatings may be disturbed. Although demolition of lead containing structures is not anticipated for construction of the Facility, lead may be present in debris, abandoned or to-be relocated utilities, etc. If lead abatement is necessary, it will be conducted in accordance with WAC 296-155-176.

31.2 Definitions

Not applicable.

31.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual.

31.4 General Requirements

If lead is found at any concentration in coatings, paints, or other materials to be disturbed, the L&I requires worker notification of the potential hazard. Furthermore, the contractor must follow proper worker health and safety precautions. Construction contractors should be informed of the presence of lead paint, provided with the any testing or survey results, and to take appropriate health and safety measures, as required by law. Work must comply with 29 CFR 1926.62 and WAC 296-155 and 296-26 regulations. Where lead abatement is going to occur, a licensed lead contractor must conduct the lead removal work.

Representative samples (by weight proportion) of each demolition waste stream should be analyzed by the Toxicity Characteristic Leaching Procedure (TCLP) to determine if the waste stream constitutes a dangerous waste regulated pursuant to Chapter 173-303 WAC. If a material is recycled it is not a waste and a TCLP determination maybe unnecessary. However, the recycling facility or end user may have other restrictions.

31.5 Procedures

(a) General Procedures

1. Wear proper protective clothing and respiratory protection prior to entering an abatement/removal area.
2. There will be no eating, drinking, smoking, or any other activity in the work area that breaks the seal of the respiratory protection.
3. Packing, labeling, loading, transporting, and disposing of hazardous waste will be done using sealed DOT-approved drums to avoid the release of lead particulate.
4. Emergency procedures will be in place in the event of a medical or safety emergency inside of the work area.

5. Appropriate safety procedures will be in place to minimize the hazards inside the work area (i.e., Lockout/Tagout of existing dangerous equipment such as mechanical systems or electrical systems must be done prior to beginning impacting work operations).
6. The abatement contractor will have a competent person on-site at all times. The competent person is a person who is capable of identifying existing and predictable lead exposure hazards in the work area(s), in the proposed abatement methods, and the typical symptoms employees will have when overexposed to lead, and who has the authority to take prompt corrective measures. The competent person must be trained and licensed as a "Lead Supervisor" with a current certification. He must also be able to perform the following functions.

    - Monitor the set-up of the work area.
    - Control entry and exit into the work area.
    - Insure that employees are adequately trained in the use of engineering controls, proper work practices, proper personal protective equipment, and decontamination procedures.
    - Insure that employees use proper engineering controls, proper work practices, proper personal protective equipment, and proper decontamination procedures.
    - Check for rips and tears in work suits, and insure that they are repaired immediately or discarded and replaced.

7. The abatement contractor will have all workers trained and certified as "Lead Workers". Certification must be current.

(b) Disposal Activities and TCLP Sampling

1. A representative sampling of the waste will be collected. It will be at least 100 grams, and represent the relative proportions of waste components. The results will be analyzed using Lead Toxic Characteristic Leaching Procedure (TCLP) protocol.
2. If the TCLP results are greater than or equal to 5.0-PPM lead, then the following disposal protocol must be followed:

    - The contractor must package all lead waste in drums approved by the U.S. Department of Transportation (DOT). The subcontractor must comply with DOT CFR 49 and EPA CFR 40 as well as applicable OSHA and WISHA requirements.
    - Waste drums will be filled in such a way that at least 3 to 5 inches of space remains at the top of the drum to the lid.
    - The subcontractor must label all generated waste drums as hazardous.
    - Any hazardous waste water (i.e. from the shower and used in cleaning, and greater than 5.0 ppm lead content as determined by the TCLP analysis) will be drummed as lead waste.
    - Copies of manifests for each drum must be provided to the Project Manager.

(c) Air, Wipe, and Soil Sampling.

1. The contractor will employ an independent industrial hygiene consultant and laboratory to perform air, wipe, and soil sampling.
2. The laboratory used will be a current proficient participant in the American Industrial Hygiene Association/National Institute of Occupational Safety and Health (AIHA/NIOSH) PAT Program for the analysis of Lead.
3. The consultant performing the sampling will meet all of the following criteria as defined:

    - Certified Industrial Hygienist; or
    - Industrial Hygienist with experience in the monitoring of lead abatement projects.

4. Air sampling and analysis methods will be as per NIOSH 7082. Air sampling results must be delivered to the Contractor within three working days. The air sampling results will include the signatures of the sampler, the analyst, and the Certified Industrial Hygienist.

5. Wipe sampling will be performed prior to and after demolition of lead-based paint materials.
    - Locations of pre-demolition and post-demolition wipe samples will be taken as follows:
        - At least 3 wipe samples from inside the work area;
        - One exterior work area sample; or
        - Taken, as contract specifications require.
    - The clearance criteria is as follows:

Substrate	Clearance Level (ug/m3)
Bare and carpeted floors	200
Exterior concrete and other rough surfaces	800

    - Wipe sample results will be submitted to the Contractor within seven working days. The wipe sample results must include signatures of the sampler, the analyst, and the CIH.
6. Soil Sampling. There will be a baseline conducted prior to demolition activities. After demolition, there will be one exterior composite soil sample per work area. Soil sampling does not apply if there is no soil. Soil sample results must be submitted to the Contractor within seven working days. The clearance criteria is the higher of:
    - 2,000 ug/g; or
    - Baseline lead level in the soil.

31.6 Exhibits/Attachments

Not applicable.

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32. Lock and Tag Program

32.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to perform equipment lockout and tagout operations in accordance with the provisions of WAC 296-155-429.

32.2 Definitions

(a) Danger Tag. A numbered tag stating "DANGER" on both sides in white letters on a red, white, and black background with specific instructions to protect personnel working on equipment and/or systems.

(b) Energy Source. Any electrical, mechanical, hydraulic, pneumatic, chemical, radiation, thermal, or compressed gas energy source; energy stored in springs; and potential energy from suspended objects (gravity) that may injure personnel, cause property damage, and/or cause a release of hazardous substance to the environment.

(c) Isolation. A physical activity using a device that prevents the transmission or release of energy. Examples of devices used to isolate equipment/systems include, but are not limited to: restraint blocks, electrical circuit breakers, disconnect switches, fuses, slip gates, slip blinds, or double valves. Control circuit devices, motor controllers, etc., are not acceptable isolation devices.

(d) Locking Device. A device that utilizes a lock, key, and identification number to hold an energy isolation device in the safe position for the purpose of protecting personnel.

(e) Tag Disposal. The act of returning all approved and removed tags to the manager, supervisor, or engineer, who then destroys the tags to prevent reuse.

32.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual.

32.4 General Requirements

(a) A Lock and Tag Program will be established whenever the release of energy during major replacement, repair, renovation, or modification of machines or equipment, or during installation of new machines or equipment may cause injury to personnel, create property damage, or release a harmful substance to the environment.

(b) Where design permits, a lock will be applied in support of a "DANGER" tag to ensure the energy source is kept isolated.

(c) No device will be operated with tag or lock attached regardless of circumstances.

(d) In an emergency, or if the person who placed the tag is not available, the project manager and/or the Site Superintendent will have the authority to remove the danger tags and locks ONLY AFTER POSITIVELY DETERMINING THAT THE EQUIPMENT OR SYSTEM IS SAFE FOR OPERATION AND THAT ALL PERSONNEL ARE IN THE CLEAR.

(e) Personnel deviating from these instructions, or unauthorized persons removing danger tags, will be subject to disciplinary action that may include their removal from the project.

(f) Where possible, isolation devices will provide visible indication of the position of the device, by using push buttons, selector switches, or other types of position indicators of the circuit control device.

(g) After removal, the tag will be destroyed. Simply placing the tag in a trash can does not constitute proper tag disposal. Potentially contaminated tags will be disposed of at the controlled entry point to the site.

32.5 Implementation

(a) Use of Locks and Tags.

1. Locks and "DANGER" tags will be installed by authorized personnel. If locks cannot be used, an alternate method of isolating the system must be implemented. A tag will always be used in conjunction with the locking device or system.
2. Affected employees, and contractors if applicable, will be notified of the placement of locks/tags prior to locking out the equipment for repair or service work.
3. The authorized individual will install the lock and tag on the equipment or system requiring the energy source to be controlled. In operations where more than one individual is working on the equipment or system, each authorized individual will install a lock and tag. The authorized employee will retain the key to each lock he/she places.
4. The individual installer will verify that the equipment or system has been properly isolated. Verification will be accomplished by operating or testing the equipment or system for energy release. If there is any doubt regarding the isolation of the equipment or system, the field safety and health staff will be contacted.
5. The required service/maintenance work will then be performed. If the required work extends over a single work shift, and will be continued by craft workers on multiple shifts, a system that guarantees the safe transfer of energy control between shifts will be implemented.
6. After the service/maintenance work is completed, a physical check will be conducted of the area to ensure all personnel working on the equipment or system and all affected employees and contractors are accounted for and have been notified of the imminent reenergizing of the equipment before the authorized employee who installed the lock and tag removes them for the area/activity under his/her control.
7. The installer will return the lock to the designated area cabinet location, enter into the logbook the date when the lock and/or tag were removed, then destroy the tag.

(b) Lock and Tag Cabinets.

1. Lock and tag cabinets will be provided at central locations in each area. The area manager or designee will control the cabinets.
2. Each cabinet will contain numbered locks and tags.
3. The cabinets will be locked, and the key of one cabinet will not open the lock of any other cabinet.

(c) Lock and Tag Requirements. The Project Manager, or designee, will specify the physical appearance of the locks and tags to be used on the project. Tags will contain a space to identify the person placing the tag. Locks and tags will be sufficiently strong to resist inadvertent removal or casual vandalism, and will not be significantly affected by the ambient environmental conditions.

1. The area manager or designee will number each lock (serial numbers on locks can be used) before placing it in a cabinet to ensure it can be accounted for. The area manager or designee will keep a list of lock numbers.
2. The key of one lock will not fit any other lock. Master keys are not permitted.
3. Each tag will be numbered and logged in the logbook by the area manager/designee before being placed in a cabinet to ensure accountability.

4. The authorized individual removing the tag from a cabinet will complete the information required on the tag, such as:

    - Log book location.
    - Job identification.
    - Name of installer and signature (manager/supervisor/foreman).
    - Component tagged.
    - Component position.
    - Any special instructions to employees.

(d) Log Book Requirements.

1. A logbook entry is required to account for each tag and lock issued.
2. Each time a lock and tag is removed from a cabinet, the following information will be recorded in the logbook:

    - Tag number.
    - Lock number.
    - Work order.
    - Craft number.
    - Location of the tag and/or lock.
    - System or component affected.
    - Date and time when lock and/or tag were attached.
    - Name of individual using lock and tag.
    - Date and time lock and/or tag were returned to cabinet.

32.6 Exhibits/Attachments

Lock and Tag Log, Exhibit I

The Lock and Tag Log will be used for documenting activities associated with this procedure. Requirements for record distribution, retention, and maintenance will be established within applicable project planning documents.

Exhibit I. Lock and Tag Log

Tag Number	Lock Number	Work Order	Craft Number	Location Used	Component Affected	Date/Time Attached	Manager/Supervisor Foreman	Date/Time Returned

33. Microbial Remediation Program

33.1 Top Ten Things You Should Know About Mold

1. Potential health effects and symptoms associated with mold exposures include allergic reactions, asthma and other respiratory ailments.
2. There is no way to eliminate mold in the indoor environment; the way to control indoor mold growth is to control moisture.
3. If mold is a problem in building, clean up the mold and eliminate sources of moisture.
4. Fix the source of the water problem or leak to prevent mold growth.
5. When porous materials get wet, reduce indoor humidity (to 30-50%) to decrease mold growth by:

   - Increasing ventilation;
   - Using air conditioners and de-humidifiers;
   - Venting bathrooms, dryers, and other moisture sources to the outside; and
   - Using exhaust fans whenever cooking, dishwashing, and cleaning.

6. Clean and dry any wet building materials and furnishings within 24-48 hours to prevent mold growth. If the materials cannot be dried out in 48 hours, remove and replace them.
7. Clean mold off hard surfaces with an anti-microbial treatment and dry completely. Porous materials such as ceiling tiles, drywall, carpet, etc., that are moldy, must be removed and replaced.
8. Prevent condensation: Reduce the potential for condensation on cold surfaces (i.e., windows, piping, exterior walls, roof, or floors) by adding insulation.
9. In areas where there is a perpetual moisture problem, do not install carpeting.
10. Molds can be found almost anywhere; they can grow on virtually any substance, providing moisture is present. There are molds that can grow on wood, paper, carpet, and foods.

33.2 Suggested Water Intrusion and Quality Control Methods

Value Engineering Items to Be Avoided

1. Elimination of façade mock-up and testing – (especially lab mock-ups)
2. Downgrading of flashing systems or elimination of flashing elements
3. Elimination of window sub-sills or receptors
4. Downgrading of window systems – (e.g. drainage system to barrier system or elimination of thermal breaks)
5. Downgrading of roofing systems
6. Downgrading of horizontal or below grade waterproofing, including expansion joints
7. Downgrading of air/moisture barrier (e.g. felt paper for tyvek)
8. Elimination of vapor barriers – (especially slab on grade)
9. Elimination of secondary line of defense – (e.g. 2nd line of sealant)
10. Substitution of EIFS or GFRC for precast or masonry

Peer Review of Contract Documents

1. Window & Façade Systems
2. Interface Details
3. Flashing
4. Vapor Barrier
5. Roof Systems
6. Waterproofing Systems
7. HVAC Systems
8. Plumbing Systems

QC Plan

1. Pre-Installation Conferences
2. Inspections
3. Check Lists

4. Documentation – Photographs, Daily Reports
5. Ceiling and Wall Close-In Inspection Procedures

Water Intrusion Control Plan

1. Require all subcontractors to keep all interior materials dry – prior to, during and after installation.
2. Do not permit the installation of wet building materials.
3. Report any water damage, leaks or water intrusion to the Site Superintendent immediately.
4. Dry out or remove any water damaged materials immediately.
5. Build in strict accordance with the Project Plans and Specifications.
6. Immediately alert the Architects to designs, which we are aware of, that may allow water intrusion or moisture accumulation.

Temporary Measures

1. Temporary Roofing Plan (possible temporary roof on intermediate floors)
2. Temporary Window Enclosures (Visqueen)
3. Hold Drywall ½" Above the Slab
4. Temporary Dams around Elevator Shafts, Openings, etc.
5. Install Greenboard in Shaft Walls
6. Cover Tops of Exterior Walls During Construction
7. Ensure That All Roof Drains are Properly Installed and Tied Into the System
8. Install Curbs Around Busduct Openings
9. Protect Ends of Insulated Duct Work
10. Proper Storage of Materials
11. Have Industrial Fans On-Site to Immediately Address Ponding Water, etc.
12. Temporary Humidity Control

34. Inspections by the Washington Department of Labor and Industries

34.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to prepare for and provide the necessary assistance in project inspections by the Washington Department of Labor and Industries conducted under WAC 296-900-120.

34.2 Definitions

(a) Compliance officer. An official of the Washington Department of Labor and Industries (L&I) that has enforcement authorization designated by the Washington Industrial Safety and Health Act (WISHA).

(b) Inspection. The process, through observation and investigation, by which matters of compliance with the safety and health standards contained in the L&I regulations codified in Washington Administrative Code (WAC) are evaluated.

(c) Washington Department of Labor and Industries (L&I). A state organization whose purpose is to assure safe and healthful working conditions for employees, by authorizing enforcement of the standards developed under WISHA, namely the L&I regulations codified in Washington Administrative Code (WAC).

(d) Point of contact. The “agent in charge” on the project; either the Project Safety Manager or the Site Superintendent.

(e) Scope of the inspection. The type of inspection and whom the inspection will affect (see 7(b).1 below).

34.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual.

34.4 General Requirements

(a) Preparation for an inspection. L&I will give no advance notice; therefore several steps must be taken to prepare for an inspection.

1. In the event of an inspection, the SHE&Q manager and Site Superintendent must be contacted.
2. Site Superintendent will be the point of contact for the L&I inspection. The Site Superintendent may request a delay in beginning an inspection until a Contractor Corporate Safety Manager is present.
3. All documents that are requested, as well as interviews, must go through the point of contact. All records provided to the L&I inspector for review must be specifically identified and logged.

4. Upon arrival of the compliance officer, he/she will be directed to the jobsite point of contact. Only persons requested to be interviewed by the compliance officer and supervisory personnel attending the inspection should communicate with the will compliance officer.

34.5 Reasons for OSHA Inspections

The following are various reasons why L&I may enter a project for an inspection:

(a) Any report of a fatality, an incident that will hospitalize 5 or more employees, or an imminent danger situation.

(b) A formal written complaint submitted to L&I by an employee or employee representative.

(c) A referral sent to L&I from another government agency, such as building inspectors, Fire Marshall, District Attorney, etc.

(d) If a jobsite or incident on a project is publicized by the media.

(e) Failure to respond to a letter sent by L&I requesting a response to an informal, unwritten, employee complaint.

(f) Random selection by L&I.

(g) A follow-up inspection to ensure violations from a previous inspection have been corrected.

(h) Selection as part of a general schedule of inspections.

(i) Any operation covered by a special emphasis program targeting high hazard areas that require such an inspection.

34.6 Preparation for the Inspection

(a) Arrival of the compliance officer.

1. When a compliance officer arrives on the project and intends to perform an inspection, the point of contact must be notified immediately. The point of contact will meet with the compliance officer before the inspection begins and will verify the compliance officer's credentials. This must be done in a professional manner and not used as a delaying tactic. Compliance officers should have an identification card with their photograph on their person. If the point of contact is unsure whether or not the compliance officer is an authorized representative of a state or federal agency he should contact the Contractor's Safety Manager before allowing the inspection process to continue.
2. Once the point of contact is satisfied with the compliance officer's credentials, there are two courses of action to choose from:
    - Allow the compliance officer to begin the inspection process; or
    - Require a warrant before the inspection can begin.

NOTE: If the Point of Contact feels that a warrant may be necessary, the ultimate decision must be made by the Contractor's Safety Manager.

3. If the point of contact is not present, upon arrival the compliance officer may be asked to delay the inspection until the appropriate point of contact person arrives. Ensure that the compliance officer knows this is not a delay tactic and that no request for a warrant is being made.

(b) The opening conference. Before the actual inspection begins, an opening conference should be held. The objective of this conference is to provide affected employers with the scope and objectives of the inspection.

1. The opening conference is required by law, and the compliance officer will tell you what type of inspection he intends to perform. These types include:
    - General inspection.
    - Imminent danger.
    - Fatality/catastrophe investigation.
    - Complaint investigation.
    - Referral inspection.
    - Special emphasis inspection.
    - Follow-up inspection.
    - Focused inspection.
2. At the opening conference the compliance officer will attempt to gather all prime and subcontractors on the project.
3. If a company is not represented at the opening conference, it does not negate the validity of any citation that may be issued.
4. Union representatives do not have an absolute right to be present during the opening conference.
5. The compliance officer will gather specific information from each company, including, but not limited to:
    - Establishment name and address.
    - Central office address and telephone.
    - Number of persons employed by the company.
    - Completed OSHA 300 Form.
    - Names of employees and employee representatives.
6. All information must be given to the compliance officer that is requested. However, do not issue information or materials that is not requested. All records provided to the compliance officer for review must be specifically identified and logged. If copies are requested by the compliance officer, ask for a written document request and explain that documents provided in writing will be provided as soon as practicable.
7. Any information, operation, or other process that may be considered a “trade- secret” or “business confidential” will be noted and discussed.
8. If possible, the compliance officer should furnish the employer with the following items at the opening conference:
    - Copies of the OSHA Poster.
    - OSHA 300 Forms.
    - OSHA standards, as well as other applicable laws, regulations, etc.

NOTE: If such documentation is not provided, it should be requested after the inspection.

9. At the opening conference, an agreement will be made with the compliance officer on the procedures that will be allowed during the course of the inspection. These include, but are not limited to:
    - Procedures for controlling the production of documents.
    - Taking “side-by-side” photographs or samples and the work permits that may be required.
    - The identification and handling of trade secrets or business confidential information.

34.7 The Inspection

(a) Scope of the inspection. Once the scope of the inspection is determined, the appropriate action will be taken:

1. Inspections based on complaints of alleged imminent danger or other violations will be limited to the area of the alleged violation.

2. Fatality/accident investigations will be limited to the specific area of the accident. However, the L&I may authorize an expanded inspection if the inspection record of the employer indicates a history of “significant violations”, or for other “legitimate reasons.”
3. Referral inspections will be limited to only the specific items addressed in the original inspections.
4. Special emphasis inspections will be limited to the areas covered by the program.
5. In all cases, the compliance officer will be escorted along the most direct route to and from the area to be inspected.

NOTE: Do not allow any compliance officer to exceed the original and necessary scope of the inspection. Any attempt by L&I to broaden the inspection to include other issues or areas of the project besides those that were part of the initial purpose of the inspection will be thoroughly discussed in the opening conference and, if possible, negotiated. The compliance officer will be required to conduct a new opening conference to explain any activity that goes beyond the scope of the original inspection.

(b) Complaints.

1. Formal. Written complaints by employees or employee representatives that allege hazards to employee safety and/or health.
2. Informal. Verbal complaints based on alleged hazards.

(c) The walk around.

1. The compliance officer will perform a walk around inspection.
2. The Contractor’s point of contact, employee representative, and union representatives have the right to accompany the compliance officer during the walk around.
3. The walk around inspection must be restricted to the scope of the inspection that was discussed in the opening conference.
4. If the inspection is being conducted under a warrant do not allow the inspector to exceed the scope of the warrant. Also, make sure to obtain a copy of the warrant.
5. If an alleged violation or hazard is discovered during the walk around, ensure that the hazard is immediately abated (corrected).
6. During the walk around inspection, compliance officers are legally authorized to talk to employees on the jobsite.
7. Do not allow private supervisor interviews unless a subpoena or a court order authorizing same has been appropriately issued. However, even if the inspection is conducted under a warrant that authorizes private interviews, Contractor and its subcontractors still have certain rights. Before any private interviews are conducted, an attorney will be contacted by the Contractor to appropriately handle this issue.
8. Employees will not be forbidden to talk to the compliance officer on the project, but they must be aware that they are under no obligation to do so.

(d) During the inspection.

1. During the inspection, careful and detailed notes must be taken, specifically listing questions asked and comments made. These notes must be taken at the opening conference, continued during the actual inspection, and at the closing conference. The following must be noted and documented:
    - The name, address, and telephone number of the compliance officer.
    - A list of the persons present at the opening conference and during the walk around.
    - A concise, accurate summary of statements made by all present.
    - The details of comments made by the compliance officer when observing alleged violations.
    - Any statements made during the closing conference.
    - Any action taken by the point of contact or agent in charge during the inspection.
2. A point-and-shoot camera or video camera must be used by the point of contact to take the same photographs or video footage that the compliance officer takes at the same time and at the same angle.
3. Any undisputed violations that are pointed out during the inspection will be immediately corrected and/or abated, but no fault will be admitted.
4. Never leave the compliance officer unattended and never argue with the compliance officer.

(e) Closing Conference.

1. At the conclusion of the inspection, the compliance officer will hold a closing conference. At this point he/she will separately inform all contractors involved of any alleged violations.
2. The compliance officer will reference standards that may have been violated on the jobsite.
3. The compliance officer will also inform referral to another compliance officer, such as an industrial hygienist.
4. Request the compliance officers notes from the inspection, this may be honored, although not required by L&I.
5. Immediately after the compliance officer leaves, as much information about the alleged violations should be documented, including any agreements or disagreements with the compliance officers statements, additional pictures from different vantage points, and other relevant notes.
6. Every employee that was interviewed by L&I should be re-interviewed by an appropriate Contractor representative after the inspection.

(f) Citations. If a citation is received after the inspection it must be posted on the project conspicuously so that it is in plain view of all employees for a period of three days or until the alleged violation is corrected, whichever is longer.

34.8 Exhibits/Attachments

OSHA Checklist, Attachment 19

Attachment 19. OSHA Checklist

Checklist for the Construction Industry

ITEM	YES	NO
OSHA Form 300: Are occupational deaths, injuries and illnesses recorded and reported as required? (Article I, Subarticle III, Section 302)		
OSHA Form 300A: Is the annual summary portion of the OSHA 300 completed by February 1? Is the summary posted from February 1 through April 30? (Article I, Subarticle III, Section 305)		
OSHA Form 301 or other records with same information as OSHA Form 301: Is a supplementary individual record of each occupational injury and illness completed within 7 calendar days after a case occurs? (Article I, Subarticle III, Section 304)		
Is the S.C. Department of Labor, Licensing and Regulation (LLR) poster SCLD-5-SH "Safety and Health Protection on the Job" posted in a conspicuous place? (Article I, Subarticle V, Section 502A)		
Is SC OSHA notified within eight hours of any employment fatality or accident which results in in-patient hospitalization of three or more employees? (Article I, Subarticle III, Section 308)		

General Safety and Health Provisions

ITEM	YES	NO
Safety and Training Education: Is each employee instructed in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury? 1926.21(b)(2)		
Are employees who are required to handle or use poisons, caustics, and other harmful substances instructed in their safe handling and use, and made aware of the potential hazards, personal hygiene, and personal protective measures? 1926.21(b)(3)		
Are employees who are required to enter confined or enclosed spaces instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment? 1926.21(b)(6)(i)		
Housekeeping: Is form and scrap lumber with protruding nails and all other debris kept cleared from work areas, passageways, and stairs? 1926.25(a)		
Personal Protective Equipment: Are employees required to wear appropriate personal protective equipment when there is an exposure to hazardous conditions? 1926.28(a)		

Occupational Health and Environmental Controls

ITEM	YES	NO
Medical Services and First Aid: Where life threatening injuries could occur, is a facility for the treatment of injured employees located within three minutes of the jobsite? If not, is there an employee(s) trained in first aid at the site? 1926.50(c)		
Are telephone numbers of physicians, hospitals, or ambulances conspicuously posted? 1926.50(f)		
Sanitation: Are potable (drinking) water and adequate toilet facilities available at the jobsite? 1926.51		
Occupational Noise Exposure: Are the regulations concerning protection of employees against the effects of noise exposure understood and complied with? 1926.52		
Gases, Vapors, Fumes, Dusts, and Mists: Does the employer assure that no employee is exposed to inhalation, ingestion, skin absorption, or contact with any material or substance at a concentration above those specified in the *"Threshold Limit Values of Airborne Contaminants for 1970"* of the American Conference of Governmental Industrial Hygienists? 1926.55(a)		
Illumination: Are employees provided with light not less than the minimum illumination intensities listed in Table D-3 while any work is in progress? 1926.56 (a)		
Ventilation: Does the employer ensure that concentrations of hazardous substances such as dusts, fumes, mists, vapors, or gases produced in the course of construction work does not exceed the limits specified in 1926.55(a)? 1926.57(a)		
Hazard Communication: Does the employer have any hazardous materials on site? If so: Does employer have a written Hazard Communication Program? 1910.1200(e)(1)		
Does employer have a complete list of hazardous chemicals used on site at the worksite? 1910.1200 (e)(1)(i)		
Does the employer either: (1) Provide other employers who may have exposed employees with SDS or (2) Make SDS available at a central worksite location? 1910 .1200(e)(2)		
Does the employer inform other employers of any precautionary measures they may need to take? 1910.1200 (e)(2)(ii)		
Does the employer inform other employers of labeling system? 1910.1200(e)(2)(iii)		
Are containers of hazardous chemicals, labeled, tagged, or marked? 1910.1200(f)(1)		
Do labels include product identifier, signal word, hazard statement, pictogram, precautionary statement, and the name, phone no., and address of manufacturer if shipped out? 1910.1200(f)(1)(i-vi) Note*: Labels need not be used on portable containers to be immediately used by employee making transfer.*		
Does the employer have an SDS for each hazardous chemical on site? 1910.1200(g)(1)		
Are SDS available to employees in their work area? 1910.1200 (g)(8)		
Are employees trained in the hazards of chemicals in their work area? 1910.1200(h)		
Does training include the following: Requirements of the Hazard Communication Standard? 1910.1200(h)(1)		
Any operation in employee's area where hazards chemicals may be present? 1910.1200(h)(2)(ii)		
Where is the Hazard Communication Program located and is it available to all employees? 1910.1200(h)(2)(iii)		
What methods are used to detect a chemical release? 1910.1200(h)(3)(i)		
Have all physical and health hazards related to chemicals on the jobsite been identified? 1910.1200(h)(3)(ii)		

ITEM	YES	NO
Details of employers Hazard Communication Program? (Labeling, SDS, and How to obtain and use information) 1910.1200(h)(3)(iv)		
Does employer have a method of informing employees of the hazards of non-routine tasks, unlabeled pipes, etc? 1910.1200(e)(1)(ii)		

ITEM	YES	NO
Lead: Are employers who engage in construction work occupationally exposed to lead? 1926.62(a) Typical/common operations which involve potential employee exposure to Lead: Application of coating materials (paints, primers) to surfaces, particularly spray application Removal of lead containing coatings (surface preparation operations which involve, abrasive blasting, scraping, grinding, heat gunning etc.) Lead burning Welding, brazing, torch cutting, torch burning, and soldering on or with materials containing lead Rivet busting Demolition of structures where lead containing paint, mortars, or other materials containing lead (Note) To determine whether or not there is a lead exposure hazard, the following resources should be consulted: (1) MSDS sheets of materials used (paint, welding materials, etc.), (2) Visual observations of presence of suspect materials (paints used for corrosion resistance, red, yellow, or orange paints), (3) Environmental survey reports. Bulk samples of suspect materials should be tested to determine if material contains significant amounts of lead.		
ITEM	**YES**	**NO**
Permissible exposure limit (PEL): Are employers exposed to lead at concentrations greater than 50ug/m3 averaged over an 8-hour period? 1926.62(c)(1)		

ITEM	YES	NO
Exposure assessment: If the presence of lead is indicated or construction work involving work listed above is being performed: Has a determination of employee exposure to lead been performed by utilizing personal air sampling on a representative number of exposed employees to specific lead related tasks over an eight hour time weighted average? 1926.62(d) If no, the employer must implement interim protective measures as follows: Provide respiratory protection specified for operation Provide protective clothing (coveralls, head covers) Provide hand washing facilities Provide biological monitoring (Blood sampling and lead and ZPP analysis) Provide training program to inform employees of hazards of exposure to lead and and necessary measures employees must follow to protect themselves 1926.62(d) If YES, then is level of employee eight-hour time weighted exposure greater than 30 ug/m3 (action level)? Then employer shall: Provide a medical surveillance program for affected employees. 1926.62(j) Provide training program. 1926.62(l) Is exposure level greater than 50 ug/m3 (PEL)? Then in addition, the employer shall: Implement engineering and work practice controls to the extent feasible. 1926.62(e) Develop a written compliance program. 1926.62(e) Provide appropriate respiratory protection and appropriate practices governing the use of respirators in accordance with 1926.62(f). Provide and require the use of hygiene facilities (change rooms, showers and hand washing facilities). 1926.62(i) Ensure that employees do not eat, drink, smoke, or apply cosmetics in areas where employees are exposed to lead above the PEL. 1926.62(i)(4) Maintain all surfaces as free as practicable of lead. 1926.62(h)(1) Ensure that vacuums used to collect lead contaminated dust are equipped with HEPA filters. 1926.62(h)(4) Ensure that compressed air is not used to remove lead from surfaces unless used in conjunction with ventilation systems designed to capture/contain dust generated from process. 1926.62(h)(5)		

ITEM	YES	NO
Negative initial determination: Has employer developed a written record which documents employees determination that no employee is exposed to airborne concentrations of lead at or above the action level? Does this record include at least the information specified in 1926.62(d)(3)(i)? 1926.62(d)(5)		
Engineering and work practice controls: Are engineering and work practice controls, including administrative controls, to reduce and maintain employee exposure to lead to or below the PEL to the extent that such controls are feasible? 1926.62(e)(1) Examples of engineering controls: Substitution with materials that do not contain lead (paints) Use of dust collection/local exhaust systems Use of negative air containment systems Use of an alternative method of application		
Employee information and training: In addition to the requirements set forth in 29 CFR 1910.1200, OSHA's Hazard Communication Standard for the construction industry, does the employer communicate information concerning lead hazards, including but not limited to, warning signs and labels, safety data sheets (SDS), and employee information and training? 1926.62(l)(1)(i)		
Does the content of the employers training program include at least those elements addressed in 1926.62(l)(2)(i-viii)? 1926.62(l)(2)		

Personal Protective and Life Saving Equipment

ITEM	YES	NO
Head protection: Are protective helmets (hard hats) worn at all times where there is a possible danger of head injury from impact, falling or flying objects, or electrical shock and burns? 1926.100		
Hearing protection: Are ear protection devices provided and used wherever it is not feasible to reduce noise levels or where a deviation to exposures levels specified in Table D-2, Permissible noise exposure in 1926.52 exist? 1926.101		
Eye and Face protection: Are employees provided with and use eye and face protection when machines or operations present potential eye or face injury from physical, chemical, or radiation agents? 1926.102 *Note: See Table E-1*		
Foot protection: Is the employer requiring the wearing of appropriate personal protective equipment by employees in all operations where there is an exposure or potential exposure to hazardous conditions such as falling or rolling objects, objects piercing the sole, or electrical hazards? 1926.28 (a), 1926.96, 1910.136(a) & (b)		
Selection, Issuance, Use and Care of Respirators: Are employers provided with and use appropriate respiratory protective devices in emergencies or when controls required by Subpart D of this part either fail or are inadequate to prevent harmful exposure? 1910.134(a)(1)		
Working over or near Water: Are employees working over or near water provided with and use U.S. Coast Guard-approved life jacket or buoyant work vests and are ring buoys with at least 90 feet of line and at least one lifesaving skiff provided? 1926.106		

Fire Protection

ITEM	YES	NO
General Requirements: Has a fire protection program been developed? 1926.150(a)(1)		
Is firefighting equipment conspicuously located? 1926.150(a)(3)		
Is firefighting equipment periodically inspected and maintained in operating condition? 1926.150(a)(4)		
Is firefighting equipment selected and provided according to the listed requirements? 1926.150(c)		
Have employees been trained not to use gasoline to start fires to burn trash, etc.?		
Has an educational program to familiarize employers with the general principles of fire extinguishers use and the hazards involved been provided? 1926.150(a)(1)		
Flammable Liquids: Are all flammable liquids stored and handled in approved containers and portable tanks? 1926.152(a)(1)		
If more than 25 gallons of flammable liquid is stored in a room, is it in an approved cabinet? 1926.152(b)(1)		
Is at least one portable fire extinguisher with a rating of not less than 20-B:C located within 75 feet of each pump, dispenser, underground fill pipe opening and lubrication or refueling service area? 1926.152(g)(11)		

Signs, Signals and Barricades

ITEM	YES	NO
Accident prevention signs and tags: Are accident prevention signs and tags visible at all times when work is being performed and/or removed or covered promptly when the hazard no longer exists? 1926.200(a)		
Accident prevention signs and tags: Do all traffic control signs or devices used for workers' protection conform with Part IV of the Manual of Uniform Traffic Control Devices (MUTCD) 1988 edition revision 3 or Part VI of the MUTCD Millennium Edition? 1926.200(g)(2)		
Signaling: Is signaling by flaggers and the use of flaggers, including warning garments worn by flaggers, in conformance with Part vi of the MUTCD(1988 Edition, Revision 3 or the Millennium Edition) ?1926.201(a)		
Barricades: Are barricades used for protection of workers in conformance with Part VI of the MUTCD (1988 Edition, Revision 3 or the Millennium Edition) ?1926.202		

Materials Handling, Storage, Use, and Disposal

ITEM	YES	NO
General requirements for storage: Are materials which are stored in tiers either stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse? 1926.250(a)(1)		
Are materials stored more than 6 feet from any hoistway or inside floor opening and more than 10 feet from any exterior walls that do not extend above the top of the stored materials? 1926.250(b)(1)		
Are materials being stored beneath powerlines being moved or unloaded?		
Are safe procedures utilized when unloading pipes?		
Are aisles and passageways kept clear and in good repair to provide for the free and safe movement of material handling equipment? 1926.250(a)(3)		
Rigging equipment for material handling: Do alloy steel chain slings have a permanently affixed durable identification stating size, grade, capacity, and manufacturer? 1926.251(b)(1)		
Are monthly inspection records being maintained on all alloy steel chain slings? 1926.251(b)(6)(ii)		
Do any hooks, rings, oblong links, pear-shaped links, coupling links, and other attachments have a rated capacity at least that of the chain? 1926.251(b)(2) *Note: Job or shop hooks and links or makeshift fasteners are not to be used 1926.251(b)(3)*		
Is all rigging equipment for material handling inspected prior to use on each shift? 1926.251(a)(1)		
When forming eyes in wire rope are U-bolt clips properly spaced and installed? 1926.251(c)(5) and (c)(5)(i)		
Disposal of waste materials: Are waste materials disposed of properly? 1926.252		

Tools, Hand and Power

ITEM	YES	NO
General requirements: Are hand and power tools furnished by employer or employee maintained in a safe condition? 1926.300(a)		
Are power tools, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, and chains properly guarded? 1926.300(b)(1) & (2)		
Power-operated hand tools: Are electric power operated tools equipped with proper ground or are they double-insulated? 1926.302(a)		
Are employees using foot protection when using jackhammers or tampers?		
Eye and Face protection: Are employees provided with eye and face protection when machines or operations present potential eye or face injury from physical, chemical, or radiation agents? 1926.102 *Note: See Table E-1*		
Have all employees who operate power actuated tools been trained in the use of the particular tool they use? 1926.302(e)(1)		
Woodworking tools: Do all portable circular saws have a guard above the base plate and a guard below the base plate that will automatically and instantly return to the covering position when the saw is withdrawn from the work? 1926.304(d)		
Do all circular saws have an exhaust hood or a guard to prevent accidental contact with the saw blade if there is a possibility of contact either beneath or behind the table? 1926.304(d) ANSI 01.1-1992 (R 2002)		
Do hand-fed circular rip saws have an upper blade guard? 1926.304(i) ANSI 01.1-1992 Section 2.2.4		
Do hand-fed circular rip saws have a spreader? 1926.304(i) ANSI 01.1-1992 Section 2.2.4)		
Do hand fed circular rip saws have non-kickback fingers or dogs? 1926.304(i) ANSI 01.1-1992 Section 2.2.4		
Do all radial arm saws have upper and lower blade guards? 1926.304(g) ANSI 01.1-1992 Section 2.2.3		
Are radial arm saws equipped with an adjustable stop or sufficiently wide table so that saw blade does not pass the edge of the table? 1926.304(g) ANSI 01.1-1992 Section 2.2.3		

Welding and Cutting

ITEM	YES	NO
Gas welding and cutting: When transporting or storing compressed gas cylinders, are cylinders secured and caps in place? 1926.350(a)(1)		
Are cylinders secured in a vertical position when transported by powered vehicles? 1926.350(a)(4)		
Are all compressed gas cylinders secured in an upright position at all times? 1926.350(a)(9)		
Is the employer sure that all cylinders, full or empty, are never used as rollers or supports? 1926.350(c)(1)		
Are employees instructed in the safe use of fuel gas? 1926.350(d)		
Are torches inspected for leaking shut off valves, hose couplings, and tip connections at the beginning of each shift? 1926.350(g)(2)		
Are oxygen cylinders and fittings kept away from oil and grease? 1926.350(i)		
Are oxygen and fuel gas regulators in proper working order? 1926.350(h)		
Arc welding and cutting: Are frames of all arc welding and cutting machines grounded? 1926.351(c)(5)		
Are employees instructed in the safe means of arc welding and cutting? 1926.351(d)		
Are welding and cutting operations shielded by noncombustible or flameproof screen whenever practicable? 1926.351(e)		
Are electrodes removed and electrode holders placed or protected so they cannot make electrical contact with employees when the holders are left unattended? 1926.351(d)(1)		
Fire prevention: Is suitable fire extinguishing equipment immediately available in the work area and ready for instant use? 1926.352(d)		
Are drums, containers, or hollow structures which have contained toxic or flammable substances either filled with water or thoroughly cleaned of such substances, ventilated and tested before welding, cutting, or heating? 1926.352(i)		
Before heat is applied to a drum, container, or hollow structure, is a vent or opening provided to release built up pressure? 1926.352(j)		
Ventilation and protection in welding, cutting, and heating: Is mechanical ventilation system of sufficient capacity and so arranged to remove fumes and smoke and keep the concentration within safe limits? 1926.353(a)(2) and (3)		
When employees are welding, cutting, or heating in confined spaces, is either general mechanical ventilation, local exhaust ventilation, or airline respirators provided? 1926.353 (b) (1) & (2)		
Are employees who are performing any type of welding, cutting, or heating protected by suitable eye protective equipment? 1926.353(e)(2)		
Are employees welding inside of a pipe?		
Are pipes blanked off, and flushed etc. before any welding operations take place?		
Is there a "Hot Work Permit" system followed by your employees?		

Electrical

ITEM	YES	NO
General requirements: Does the employer examine all electrical equipment to ensure that recognized electrical hazards (i.e. exposed live parts, splices in cords, missing ground pins, reverse polarity etc.) are identified? 1926.403(b)(1)		
Are disconnecting means legibly marked to indicate purpose unless located so that purpose is evident? 1926.403(h)		
Is sufficient working space provided to permit safe operation and maintenance of electrical equipment? 1926.403(i)(1)		
Are live electrical parts guarded against accidental contact? 1926.403(i)(2)		
Wiring design and protection: Is polarity of conductors correct? 1926.404(a)(2)		
Are ground fault circuit interrupters used to protect employees? 1926.404(b)(1)(i) If not, is an assured equipment grounding program in place? 1926.404(b)(1)(iii)		
Are all 120-volt, single phase, 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, protected by a ground-fault circuit interrupter(s) GFCI? 1926.404(b)(1)(ii)		
Are outlet devices correctly matched with load being served? 1926.404(b)(2) *See Table K-4*		
Are all electrical circuits and equipment grounded? Is path to ground from circuits, equipment, and enclosures permanent and continuous? 1926.404(f)(6) Are exposed noncurrent carrying metal parts of cord and plug-connected equipment grounded? 1926.404(f)(7)(iv) Are electrical extension cords of the three wire type? 1926.405(a)(2)(ii)(J)		
Are lamps for general illumination protected against breakage? 1926.405(a)(2)(ii)(E)		
Are flexible cords and cables protected from damage? 1926.405(a)(2)(ii)(I)		
Are conductors entering boxes, cabinets, or fittings protected from abrasion and do unused openings in cabinets, boxes, and fittings have covers? 1926.405(b)(1)		
Wiring methods, components, and equipment for general use: Do all pull boxes, junction boxes, and fittings have covers? 1926.405(b)(2)		
Are all cabinets, cut out boxes, fittings, boxes, panel board enclosures, switches, circuit breakers, and switchboards located in wet or damp locations enclosed in weather proof enclosures. 1926.405(e)(1) and (2)		
Are flexible cords and cables used as a substitute for fixed wiring of a structure; run through holes in walls, ceilings, or floors; through doorways or windows; attached to building surfaces; or concealed behind walls, ceilings, or floors? 1926.405(g)(1)(iii)		
Are fixtures and receptacles in wet or damp locations identified for that purpose and installed so that water cannot enter? 1926.405(j)(1)(v) and (j)(2)(ii)		
Hazardous locations: Is all electrical equipment used in hazardous locations either approved for the location or intrinsically safe? 1926.407(b)		
Safety-related work practices: Are electrical cords or cables taken out of service when worn or frayed? 1926.416(e)(1)		
Are contractors/subcontractors (painters) using aluminum extension handles (or ladders) around electrical power lines?		

Scaffolding

ITEM	YES	NO
General requirements. Capacity: Are scaffolds and scaffold components capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it? 1926.451(a)		
Scaffold platform construction: Are scaffold platforms fully planked? 1926.451(b)(1) Does the employer ensure that each platform (on all working levels of scaffolds) is fully planked or decked between the front uprights and the guardrail supports…1926.451(b)(1)(i) and (ii)		
Criteria for supported scaffolds: Where support scaffolds are used with a height to base width (including outrigger supports, if used) ratio of more that four to one (4:1)…does employer ensure that scaffold is restrained from tipping by guying, tying, bracing, or equivalent means? 1926.451(c)(1) and 1926.451 (c)(i-iii)		
Criteria for suspension scaffolds: Are all suspension scaffold support devices, such as outrigger beams, cornice hooks, parapet clamps, and similar devices, resting on surfaces capable of supporting at least 4 times the load imposed on them? 1926.451(d)		
Access: Is safe access to scaffold platforms provided to employees working on scaffolds where cross braces are **not** used as a means of access? 1926.451(e)(1) Are hook-on, and attachable ladders positioned so that their bottom rung is not more that 24 inches (61 cm) above the scaffold supporting level? 1926.451(e)(2)(ii) Are rest platforms provided at 35-foot (10.7m) maximum vertical intervals where supported scaffolds are more than 35 foot high? 1926.451(e)(2)(iii)		
Use: Are scaffolds and scaffold components capable of supporting their maximum intended load or rated capacities, whichever is less? 1926.451(f)(1)		
Are scaffolds inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity? 1926.451(f)(3)		
Fall Protection: Are employees who are working from a scaffold more than 10 feet (3.1m) above a lower level protected from falling to that lower level? 1926.451(g)(1)		
Falling object protection: In addition to wearing hard-hats, are employees provided with additional protection from falling hand tools, debris, and other small objects through the installation of toeboards, screens, or guardrail systems, or through the erection of debris nets, catch platforms or canopy structures that contain or deflect the falling objects? 1926.451(h)(1)		
Additional Requirements: In addition to the applicable requirements of 1926.451(a)-(h), General Requirements…has the employer addressed ***any additional requirements*** which are applicable to specific types of scaffolds? 1926.452(a)-(y)		
Aerial lifts: Are aerial lifts designed and constructed in conformance with the applicable requirements of American National Standards for "Vehicle Mounted Elevating and Rotating Work Platforms," ANSI A92.2-1969, including appendix? 1926.453(a)-(b)		
Aerial Lifts (Extensible & Articulating Boom Platforms): Are workers in aerial lifts equipped with standard guard rails also wearing fall-restraint devices connected to manufacturer suggested tie off points on the boom or basket? 1926.453(b) (2)(v)		
Training Requirements: Are employees who perform work while on a scaffold trained by a qualified person to recognize the hazards associated with the type of scaffold being used and in the understanding of procedures to control or minimize those hazards? 1926.454(a)		

Training requirements: Does training address the nature of electrical hazards; fall hazards; falling object hazards; procedures for dealing with electrical hazards; for erecting, maintaining, and disassembling fall protection systems; falling object protection systems; proper use of the scaffold and proper handling of materials on the scaffold; maximum intended load and load carrying capacities of scaffolds used in the work area? 1926.454(a)(1)-(5)		
Are employees involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold trained by a competent person? 1926.454(b)		
Are employees retrained where there is reason to believe that an employee lacks the skill(s) or understanding needed for safe work involving the erection, use, or dismantling of scaffolds? 1926.454(c)		

Fall Protection > 6 Feet

ITEM	YES	NO
General requirements: Is walking/working surface strong enough to support employees and the work to be done? 1926.501(a)(2)		
Are employees on walking/working surfaces with unprotected sides and edges protected by guardrails, safety nets or personal fall arrest systems? 1926.501(b)(1)		
Are employees who are constructing leading edges protected by guardrails, safety nets or personal fall arrest systems if feasible? (If not feasible, requirements of paragraph (k) of 1926.502 must be met) 1926.501(b)(2)(i)		
Is each employee in a hoist area protected by either guardrails or personal fall arrest system? 1926.501(b)(3)		
In hoisting areas where guardrails are used and guardrails are removed to facilitate landing of material and the employee must lean out over the edge or through the access opening, is *that* employee protected by a fall arrest system? 1926.501(b)(3)		
Are employees exposed to falling through holes (including skylights) protected by fall arrest systems, guardrails or covers? 1926.501(b)(4)(i)		
Are employees on walking/working surfaces protected from tripping or stepping into holes by covers? 1926.501(b)(4)(ii)		
Are employees on walking/working surfaces protected from objects falling through holes by covers? 1926.(b)(4)(iii)		
Are exposed employees working on the face of form work or reinforcing steel protected by fall arrest systems, safety nets, or positioning device systems? 1926.501(b)(5)		
Are exposed employees working on ramps, runways or other walkways protected by guardrail systems? 1926.501(b)(6)		
When excavations, wells, shafts, pits, are not readily seen (shrubs, plants, etc.) are employees protected by guardrails, fences, or barricades? 1926.501(b)(7)(i) and (ii)		

Cranes and Derricks

ITEM	YES	NO
General Requirements: Are manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks complied with? 1926.1417(a)		
Are rated load capacities, recommended operating speeds, and special hazard warnings posted on all equipment and visible from operator's station? 1926.1417(c)		
Is equipment inspected by a competent person before each use? 1926.1417(e)(1)(iii)		
Are thorough annual inspections made on hoisting machinery and records of the dates and results of inspection maintained by employer? 1926.1412(f)(1)		
Are accessible areas within the swing radius of the rear rotating superstructure of the crane barricaded? 1926.1424		
Are employees working within 10 feet of powerlines? 1926.1407		
Before leaving crane unattended, is the boom securely fastened? 1926.1417(e) ANSI B30.5-1968 Chapter 5-3		
Are booms which are being assembled or disassembled on the ground, with or without support of the boom harness, securely blocked to prevent dropping of the boom and boom sections? 1926.1403-1406 ANSI B30.5-1968 Chapter 5-3		
Are cranes or derricks only used to hoist employees on a personnel platform when conventional means are more hazardous or impossible? Section 1431		
If a personnel platform is being used, are all operation criteria required by this standard being followed? 1926.1431		
Does the crane or derrick used with a personnel platform have a boom angle indicator (if equipped with a variable angle boom), a device to indicate boom length (if equipped with telescoping boom), and an anti-two blocking device or two block damage prevention feature? 1926.1431		
Does the personnel platform meet all design criteria and platform specifications required by this standard? 1926.1431(e)		

Before each crane component is erected, it must be inspected by a qualified person for damage or excessive wear. 1926.1435(f)(2)

Hoists and Elevators

ITEM	YES	NO
Material hoists, personnel hoists, and elevators: Are employees prohibited from riding on material hoist except for the purpose of inspection and maintenance? 1926.552(b)(1)(ii)		
Are hoistway entrances protected by substantial gates or bars? 1926.552(b)(2)		
Are hoistway door or gates on personnel hoists at least 6 feet 6 inches high? 1926.552(c)(4)		
Are hoistway doors or gates provided with mechanical locks which cannot be operated from landing side and are accessible only to persons in car? 1926.552(c)(4)		
Are overhead protective coverings provided on top of hoist cages or platforms? 1926.552(c)(7)		
Overhead hoists: Is the safe working load for overhead hoists, as determined by the manufacturer, indicated on the hoist, and that safe working load not being exceeded? 1926.554(a)(1)		

Conveyors

ITEM	YES	NO
Conveyors: Where conveyors pass over areas or aisles, have guards been provided to protect employees from falling materials? 1926.555(a)(5)		
Are conveyors equipped with audible warning signals and is that signal sounded immediately before starting the conveyor? 1926.555(a)(1)		
Are conveyors locked-out while employees perform maintenance and/or repairs? 1926.555 (a)(7)		

Motor Vehicles, Mechanized Equipment, and Marine Operations

ITEM	YES	NO
Equipment: Are all vehicles which are left unattended at night, adjacent to a highway in normal use or a construction site where work is in progress, equipped with lights, reflectors, or barricades to identify the location of the equipment? 1926.600(a)(1)		
Are safety tire racks, cages, or equivalent protective devices provided and used when inflating, mounting or dismounting tires installed on split rims or locking rings? 1926.600(a)(2)		
Are bulldozer and scraper blades, dump bodies, etc., fully lowered or blocked when being repaired or not in use? 1926.600(a)(3)(i)		
Are parking brakes set on parked equipment, and are wheels chocked when parked on an incline? 1926.600(a)(3)(ii)		
Do these vehicles have a service brake system, emergency brake system, and parking brake system in operable condition? 1926.601(b)(1)		
Are all vehicles equipped with an audible warning device in operable condition at the operator's station? 1926.601(b)(3)		
Do all vehicles with an obstructed view to the rear have a backup alarm or are they always used with an observer? 1926.601(b)(4)		
Do all vehicles have seat belts and are they used? 1926.601(b)(9)		
Are trucks with dump bodies (beds) equipped with a positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body (bed of truck) while maintenance or inspection work is being done? 1926.601(b)(10)		
Are operating levers on dump trucks equipped with latches? 1926.601(b)(11)		
Are tail gate handles on dump trucks arranged to keep operator clear? 1926.601(b)(12)		
Are vehicles in use inspected at the beginning of each shift to assure that all parts, equipment, and accessories affecting safety operations are free of defects? 1926.601(b)(14)		
Material handling equipment: Are seat belts provided on all earth-moving equipment except those not equipped with ROPS and those designed for a stand up operation? 1926.602(a)(2)(i) **Note: See Rollover Protective Structures (ROPS).*		
Does all bi-directional earthmoving equipment have a horn in operable condition? 1926.602(a)(9)(i)		
Is all earthmoving or compacting equipment with an obstructed rear view equipped with an operable backup alarm or used only with an observer? 1926.602(a)(9)(ii)		
Are all high lift rider industrial trucks equipped with overhead guards? 1926.602(c)(1)(v)		
Powered Industrial Trucks: Are all powered industrial truck operators trained in accordance with 1926.602(d)?		
Are all powered industrial trucks equipped with inspection data plate or tag? Does each industrial truck possess working brakes, steering mechanisms, control mechanisms, warning devices, lights, overhead lift devices, and guards and safety devices? 1926.602(c)(1)(vi) *Note: ANSI B56.1-2009 Section 7.5.2*		
Site clearing: Is all equipment used in site clearing operations equipped with proper rollover protection? 1926.604(a)(2)		
Marine operations and equipment: Is a ramp of adequate strength, with side boards, well maintained and properly secured or a safe walkway provided in such a way that employees are able to step safely to or from a wharf, float, barge, or river towboat,? 1926.605(b)(1) and (2)		

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Excavations

ITEM	YES	NO
General requirements: Are all surface encumbrances that may create a hazard removed or supported as necessary to safeguard employees? 1926.651(a)		
Have all underground utility installations been located? 1926.651(b)(1), (2), and (3)		
In trenches more than 4 feet deep, are stairways, ladders, or ramps located so that travel to them is no more than 25 feet? 1926.651(c)(2)		
Are employees exposed to vehicular traffic wearing warning vests made of reflectorized or high visibility material. 1926.651(d)		
Is a warning system such as barricades, hand or mechanical signals or stop logs used when mobile equipment approaches the edge of the excavation? 1926.651(f)		
Are testing and controls used to prevent exposure to hazardous atmospheres? 1926.651(g)		
Are excavation or other materials kept at least 2 feet from the edge of the excavations? 1926.651(j)(2)		
Is the excavation inspected daily and after any hazard increasing occurrence by a competent person? 1926.651(k)(1)		
Requirements for protective systems: Are employees in an excavation 5 feet deep or more, or with the potential for cave in, protected by an adequate protective system? 1926.652(a)(1) *Note: See appendices A, B, C, D, E, and F to this standard*		

Concrete, and Masonry Construction

ITEM	YES	NO
General requirements: Is all protruding reinforcing steel, onto or into which employees could fall, guarded to eliminate the hazard of impalement? 1926.701(b)		
Requirements for equipment and tools: Do powered, rotating-type concrete trowels, that are manually guided, have a control switch that automatically shuts off if operators hands are removed from handles? 1926.702(c)		
Are respirators provided for employees who engage in sandblasting operations?		
Are enclosed spaces adequately ventilated when using gasoline powered concrete cutters, buggies, and trowels?		
Are employees wearing steel-toe boots when handling concrete block?		
Is proper personal protective equipment (PPE) provided for employees engaged in cutting brick, block, or when using acid to clean brick?		
Are employees prohibited from riding concrete buckets? 1926.701(d)		
Is a lock-out/tag-out procedure in use of any machinery where inadvertent operations could cause injury? 1926.702(j)(1)		
Requirements for cast-in place concrete: Is all form work for cast-in-place concrete designed, fabricated, erected, supported, braced, and maintained so that it will support without failure all loads that may be anticipated? 1926.703(a)(1)		
Are cement mixers guarded properly?		
Is erected shoring equipment inspected immediately prior to, during and immediately after concrete placement? 1926.703(b)(3)		
Are forms and shores left in place until employer determines that the concrete can support its weight and superimposed loads? 1926.703(e)(1)		
Requirements to precast concrete: Are precast concrete wall units, structural framing, and tilt-up wall panels supported to prevent overturning and collapse until permanent connections are made? 1926.704(a)		

Requirements for lift-slab construction operations: Are lift-slab operations designed and planned by a qualified professional engineer or architect? Do designs and plans include prescribed method of erection? 1926.705 Appendix A		
Does jacking equipment have a safety factor of 2.5? 1926.705 Appendix A		
Is the maximum number of manually controlled jacks on one slab limited to fourteen? 1926.705 Appendix A		
Are jacking operations synchronized to insure even and uniform lifting? 1926.705 Appendix A		
Are only those employees required for jacking and to secure slabs permitted under slab during jacking? 1926.705 Appendix A		
Requirements for masonry construction: Is a limited access zone established when constructing a masonry wall? 1926.706(a)		
Are all masonry walls over eight feet in height braced or supported to prevent collapse? 1926.706(b)		

Steel Erection

ITEM	YES	NO
Approval to begin Steel erection: Has the controlling contractor provided in writing to the steel erector that the concrete has cured properly before steel erection begins and any repairs, replacements and modifications were conducted within accordance to 1926.755(b)? 1926.752(a)		
Site layout: Has the controlling contractor provided and maintained adequate access roads inside the construction site; keeping them, properly graded, drained, and firm? 1926.752(c)		
Hoisting and Rigging: Are cranes being inspected before each shift by a competent person? 1926.753(c)(1)		
Is a Qualified Rigger inspecting the rigging prior to each shift? 1926.753(c)(2)		
Is the headache ball or hook used to transport personnel? 1926.753(c)(3)		
Are routes for suspended loads preplanned to ensure that no employee is required to work directly below a suspended load? 1926.753(d)(1)		
Structural Steel Assembly: Are fully planked or decked floors or nets maintained within two stories or 30 feet, whichever is less, directly under any erection work being performed? 1926.754 (b)(3)		
Are roof and floor holes and openings decked over? Are metal decking holes and openings not being cut until immediately prior to being permanently filled? 1926.754(e)(2)		
Are roof and floor opening covers designed to withstand at least twice the weight of employees, equipment , and materials that may be imposed upon it? Are they secured to prevent displacement? Are they marked with the word "HOLE" or "COVER"? 1926.754(e)(3)		
Column Anchorage: Are all columns anchored by a minimum of four anchor bolts? 1926.755(a)		
Systems-Engineered Metal Buildings: Are both ends of all steel joists or cold formed joists fully bolted or welded to the support structure before releasing hoisting cables, allowing employees on the joist, or allowing construction loads on the joists? 1926.758(f)		
Falling Object Protection: Are all materials, equipment and tools, which aren't in use while aloft secured against accidental displacement? Is overhead protection provided for people below? 1926.759		
Fall Protection: Are employees engaged in steel erection activities on a walking and working surface with unprotected sides or edges more than 15 feet above a lower level protected by guardrails, safety nets or personal fall arrest systems? 1926.760 (a) (1)		

Have perimeter safety cables been installed at the final interior and exterior perimeters of floors as soon as the metal decking is installed? 1926.760(a)(2)		
Is each Connector protected from fall hazards of more than two stories or 30 feet above a lower level, whichever is less? Have they Completed connector training in accordance with 1926.761? Are they provided with a personnel fall arrest system at heights over 15 and up to 30 feet? 1926.760(b)		
If a controlled decking zone is used, have all employees working in the CDZ completed CDZ training in accordance with 1926.761? 1926.760(c)(4)		
Is there more than 3,000 square feet of unsecured decking in the CDZ? 1926.760(c)(5)		
Training: Has appropriate training been provided for all employees exposed to fall hazards? 1926.761(b)		
Has special training been provided to employees engaged in multiple lift rigging, Connector procedures and Controlled Decking Zone Procedures? 1926.761(c)		

Underground Construction, Caissons, Cofferdams, and Compressed Air

ITEM	YES	NO
Underground construction: Are safe means of access and egress provided and maintained to all working places? 1926.800(b)(2)		
Is a check-in and check-out system used that will provide positive identification of every employee underground? Is an accurate record and location of the employees kept on the surface? 1926.800(c)		
Are emergency evacuation plans and procedures developed and made known to employees? 1926.800(d)(10)		
Are Bureau of Mines approved self-rescuers available to equip each employee near the advancing face and on haulage equipment and other areas where employees may be trapped by smoke or gas? 1926.800(g)(2)		
Is a maximum of one days supply of diesel fuel stored underground? 1926.800(m)(3)		
Are gasoline and liquefied petroleum gases prohibited from being taken, stored, or used underground? 1926.800(m)(5)		
Are enclosed metal cages used to raise and lower persons in the shaft? 1926.800(t)(4)(iii)		
Caissons: Are employers who expose employees to compressed air working environments complying with the requirements contained in 1926.803? 1926.801(f)		
Cofferdams: At cofferdams, are warning signals for evacuation of employees in case of emergency developed and posted? 1926.802(b)		
Compressed Air: Is a competent person present at all times who is designated and representing the employer, who is familiar with all requirements of this subpart and is responsible for full compliance with this and other applicable subparts? 1926.803(a)(1)		

Demolition

ITEM	YES	NO
Preparatory operations: If employees are exposed to the hazard of falling through wall openings, are the openings protected to a height of approximately 42 inches? 1926.850(g)		
If debris is dropped through holes in the floor without chutes, is the area onto which the material is dropped completely enclosed with barricades at least 42 inches high and at least 6 feet back from the projected edge of the opening above? 1926.850(h)		
Are all floor openings, not used as material drops, equipped with a properly secured cover that will support any load which may be imposed? 1926.850(i)		
Stairs, passageways, and ladders: Are all stairs, passageways, ladders, and incidental equipment covered by this section periodically inspected and maintained in a clean safe condition? 1926.851(b)		
Chutes: Is any area where material is dropped outside the exterior walls of the structure effectively protected? 1926.852(a)		
Manual removal of floors: Are workers engaged in razing the steel after floor arches are removed protected by planking as required in 1926.855(b)? 1926.858(a)		
Mechanical demolition: Are continuous inspections made by a competent person as work progresses to detect hazards from weakened or deteriorated floors or walls or loosened materials? 1926.859(g)		
Has employer made provisions for the removal of lead containing materials, asbestos, or any other hazardous materials or chemicals prior to the onset of demolition operations?		

Blasting and Use of Explosives

ITEM	YES	NO
General provisions: Are only authorized and qualified persons permitted to handle explosives 1926.900(a)		
Are smoking, firearms, matches, open flame lamps and other fires, flame or heat producing devices, and sparks prohibited in or near explosive magazines and while explosives are being handled, transported, or used? 1926.900(b)		
Is an inventory and use record of all explosives maintained by the employer? 1926.900(d)		
Are explosives not in use kept in a locked magazine? 1926.900(d)		
Are precautions taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lighting, adjacent power lines, dust storms and other sources of extraneous electricity? 1926.900(k)		
Surface transportation of explosives: Is every vehicle or conveyance used for transporting explosives marked on both sides, front, and rear with placards reading "EXPLOSIVES" in red letters not less than 4 inches high on white background? 1926.902(h)		
Are motor vehicles transporting explosives always attended? 1926.902(k)		
Storage of explosives and blasting agents: Are explosives and related materials stored in approved facilities? 1926.904(a) *Note: See Bureau of Alcohol, Tobacco and Firearms regulations contained in 27 CFR part 56, Commerce in Explosives.*		
Are blasting caps, electric blasting caps, detonating primers, and primed cartridges stored in separate magazines from explosives or blasting agent? 1926.904(b)		
Loading of explosives or blasting agents: Is tamping done only with wood rods or plastic tamping poles without exposed metal parts except for non-sparking metal connections of jointed poles? 1926.905(c)		

Use of safety fuse: Is the so-called "drop fuse" method of dropping or pushing a primer or any explosive with a lighted fuse prohibited? 1926.907(k)		
Is a loud warning signal given by the blaster in charge before that blast is fired? 1926.909(b)		

Power Transmission and Distribution

ITEM	YES	NO
General requirements: Are electric equipment and lines considered energized until determined to be de-energized by test or other appropriate methods or means? 1926.950(b)(2)		
Does the employer provide training or require that his employees are knowledgeable and proficient in procedures involving emergency situations and first aid fundamentals including resuscitation or comply with 1926.50(c)? 1926.950(e)(1)		
Tools and protective equipment: Does rubber protective equipment meet the requirements of American National Standards Institute J6 series? 1926.951 (a)(1)(i)		
Mechanical Equipment: Are aerial lift trucks working near energized lines or equipment grounded or barricaded and considered as energized equipment or the lift truck insulated for the work being performed? 1926.952(b)(2)		
Material handling: Are tag lines or other suitable devices used to control loads being handled by hoisting equipment where hazards to employees exist? 1926.953(d)		
Grounding for protection of employees: When attaching grounds, is the ground end attached first and the other end attached and removed using insulated tools or other suitable devices? 1926.954(e)(1)		
Underground lines: When working on buried cable or a cable in manholes, is metallic sheath continuity maintained by bonding across the opening or by equivalent means? 1926.956(c)(7)		

Rollover Protective Structures (ROPS); Overhead Protection

ITEM	YES	NO
Rollover protective structures (ROPS) for material handling equipment: Are all rubber tired, self-propelled scrapers, rubber-tired front end loaders, wheel type agricultural and industrial tractors, crawler tractors, crawler type loaders, and motor graders (with or without attachments) equipped with rollover protective structures? 1926.1000(a)(1) **Note: Not required if the above equipment was manufactured before July 1969. See Motor Vehicles, Mechanized Equipment, and Marine Operations: Material handling equipment.*		
Do ROPS meet minimum performance criteria detailed in these standards? 1926.1001 and 1926.1002 *Note: Check with Office of OSHA Standards*		

Stairways and Ladders

ITEM	YES	NO
General requirements: Is a ladder or stairway provided at all personnel points of access where there is a break in elevation of 19 inches or more? 1926.1051(a)		
Is there always at least one clear point of access between levels of a building or structure? 1926.1051(a)(3)&(4)		
Stairways: Is each stairway having four or more risers or rising more than 30 inches equipped with: (a) at least one handrail; and (b) at least one stairrail system along each unprotected side or edge? 1926.1052(c)(1)		
Are the unprotected sides and edges of stairway landings provided with a guardrail system? 1926.1052(c)(12)		
Ladders: Are ladder rungs, cleats, and steps parallel, level, and evenly spaced when the ladder is positioned for use? 1926.1053(a)(2)		
Does each stepladder have a metal spreader or locking device? 1926.1053(a)(8)		
Do portable ladders used for access to an upper landing surface have side rails that extend at least 3 feet above the landing? 1926.1053(b)(1)		
Do ladders that are used where the employee or the ladder could contact exposed energized parts have nonconductive side rails? 1926.1053(b)(12) (see 1926.951(c)(1) for exception)		
Are ladders periodically inspected by a competent person? 1926.1053(b)(15)		
Are portable ladders with structural defects marked as defective and withdrawn from service? 1926.1053(b)(16)		
Training requirements: Have all employees been trained to recognize hazards related to ladders and stairways? 1926.1060(a)		

Toxic and Hazardous Substances

ITEM	YES	NO
Asbestos: Has a determination been made as to whether or not building contains Asbestos Containing Materials (ACM = Greater than 1% Asbestos) or Presumed Asbestos Containing Materials (PACM)? 1926.1101 Was the building/structure constructed prior to 1980? Does it contain materials such as thermal system insulation (TSI), surfacing materials, floor tile, roofing materials, gaskets, and/or drywall/plaster? Is the material ACM? [Has a survey been performed to determine if materials in question are ACM?] If no survey has been performed, and the building is older than 1980, then above mentioned materials are PACM. NEXT, determine "class" of ACM work: Class I = work activities involving removal of TSI or surfacing materials. Class II = any ACM other than TSI or surfacing material [floor tile, roofing, etc.] Class III = maintenance work where ACM may be disturbed. Class IV = maintenance/custodial activities where employees may contact but NOT DISTURB ACM. Once the class of ACM work is determined, a complete copy of 1926.1101 should be obtained and consulted to determine the specific requirements related to the specific class of ACM work. Below is a list of general requirements applicable to all classes of ACM work: Has a regulated area been established? 1926.1101(e) Has an exposure assessment/personal air sampling been performed to determine degree of employee exposure? 1926.1101(f) Is a "competent person" who has an appropriate level of training to supervise the class of ACM work being performed been designated? 1926.1101(e)(6) and (o) Have appropriate respirators and practices been implemented? 1926.1101(h) Has protective clothing (coveralls, head covers) been provided for employees to wear? 1926.1101(i) Are Hygiene facilities and practices appropriate to the class of ACM work and size of Job (Less than or Greater than 25 linear or 10 square feet)? 1926.1101(j) Are asbestos hazards communicated to affected employees and to other contractors by means of signs, labeling, and exchange of information concerning the work being done involving ACM? 1926.1101 (d) and (k) Is training appropriate for class of ACM work provided? 1926.1101(k) Has a medical surveillance program been made available to affected employees? 1926.1101(m) Have appropriate housekeeping practices such as the use of HEPA filtered vacuuming equipment to collect ACM dust and placing ACM wastes/debris into impermeable, labeled, and sealed containers been established? 1926.1101(l)		

Cadmium: The following is a list of potential construction activities which are covered under this standard: 1926.1127

Wrecking, demolishing, or salvage of structures where cadmium is present.
Use of paints/coating materials which contain cadmium (consult SDS of material in question).
Cutting, brazing, grinding, welding, or abrasive blasting on surfaces coated with cadmium containing paints.
Welding/cutting cadmium plated materials or welding, brazing, or soldering using cadmium containing alloys.
Electrical work involving cadmium; Cadmium welding electrical grounding, using cadmium coated conduit (refer to SDS).

Actions to be taken once determination of a potential cadmium exposure hazard has been made:

Has personal air monitoring been performed to determine level of employee exposure to cadmium in air (eight-hour time weighted average,)? 1926.1127(d)
Is exposure > 2.5ug/m3, eight-hour TWA (action level)?

If yes, then the employer must:

Provide medical surveillance program in accordance with 1926.1127(l).
Provide training program(s) to affected employees and inform them of the potential hazards associated with over exposure to cadmium in accordance with 1926.1127(m)(4).
Is exposure > PEL (5ug/m3, eight-hour TWA)?

Has a regulated area been established? 1926.1127(e)
Have feasible engineering controls and work practice controls (i.e. local exhaust ventilation, product substitution) and a written compliance program been implemented as required? 1926.1127(f)
Are appropriate respirators provided and are appropriate practices governing the use of respirators implemented? 1926.1127(g)
Are hygiene facilities such as change rooms, showers, and hand washing facilities provided and required to be used by employees? 1926.1127(j)
Is protective work clothing (coveralls, head covers) provided? 1926.1127(i)
Are employees prohibited from eating, drinking, smoking, or applying cosmetics in areas where employees are exposed to cadmium? 1926.1127(j)(4)

Other general requirements pertaining to employee exposure to cadmium:

For welding/brazing involving cadmium based metals, cadmium plated metals, coated with cadmium containing paint, local exhaust ventilation and/or air-line respirators (depending on exposure level) are used?
Use of high speed saws/abrasive equipment prohibited, unless equipped with engineering controls to eliminate emissions.
Use of abrasive blasting (use of compressed air) as means of removing cadmium containing coatings is prohibited, unless engineering controls such as containment of dusts (negative air containment systems) and use of respiratory protective equipment which is specifically approved for abrasive blasting. 1926.1127(f)(2) and (k)(6)

35. Outdoor Heat Exposure

35.1 Purpose

The purpose of this addendum is to ensure compliance with the Outdoor Heat Exposure rule, WAC 296-62-095, for employees who are exposed to temperatures at or above regulations (see Table 1 below). Employees with only incidental exposure as defined in the rule are not covered.

Table 1	
All other clothing	89°
Double-layer woven clothes including coveralls, jackets and sweatshirts	77°
Non-breathing clothes including vapor barrier clothing or PPE such as chemical resistant suits	52°

The following requirements are only in effect during the months of May through September each year for employees working outdoors according to Table 1 above.

WAC 296-62-095 through 296-62-09560 does not apply to incidental exposure which exists when an employee is not required to perform a work activity outdoors for more than 15 minutes in any 60-minute period. This exception may be applied every hour during the work shift.

35.2 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

35.3 Definitions

Outdoor environment means an environment where work activities are conducted outside. Work environments such as inside vehicle cabs, sheds, and tents or other structures may be considered an outdoor environment if the environmental factors affecting temperature are not managed by engineering controls. Construction activity is considered to be work in an indoor environment when performed inside a structure after the outside walls and roof are erected.

35.4 Training

Each year prior to the month of May when Table 1 shown above applies, all employees working in the categories listed above will be provided training on signs and symptoms of outdoor heat exposure and on the company policies to prevent heat-related illness. Additional training will be scheduled for a make-up class as needed. When new employees are hired during the summer months, training will be provided prior to the new employee working in the outdoor environment.

35.5 Employee Training Content

Training on the following topics will be provided to all employees who may be exposed to outdoor heat at or above the temperatures listed in WAC 296-62-09510(2) Table 1:

(a) The environmental factors that contribute to the risk of heat-related illness;

(b) General awareness of personal factors that may increase susceptibility to heat-related illness including, but not limited to, an individual's age, degree of acclimatization, medical conditions, drinking water consumption, alcohol use, caffeine use, nicotine use, and use of medications that affect the body's responses to heat. This information is for the employee's personal use;

(c) The importance of removing heat-retaining personal protective equipment such as non-breathable chemical resistant clothing during all breaks;

(d) The importance of frequent consumption of small quantities of drinking water or other acceptable beverages;

(e) The importance of acclimatization;

(f) The different types of heat-related illness, the common signs and symptoms of heat-related illness; and

(g) The importance of immediately reporting signs or symptoms of heat-related illness in either themselves or in co-workers to the person in charge and the procedures the employee must follow including appropriate emergency response procedures.

35.6 Supervisor Training Content

Prior to supervising employees working in outdoor environments with heat exposure at or above the temperature levels listed in WAC 296-62-09510(2) Table 1, supervisors will be given training on the following topics:

(a) The information required to be provided to employees listed in subsection (1) of this section;

(b) The procedures the supervisor must follow to implement the applicable provisions of WAC 296- 62-095 through 296-62-09560;

(c) The procedures the supervisor must follow if an employee exhibits signs or symptoms consistent with possible heat-related illness, including appropriate emergency response procedures; and

(d) Procedures for moving or transporting an employee(s) to a place where the employee(s) can be reached by an emergency medical service provider, if necessary.

35.7 Drinking Water

On days when the temperature is at or above those listed in Table 1 of the regulation, employees will be provided a sufficient quantity of drinking water which is readily accessible at their work location. The water quantity will be sufficient to allow each employee to drink at least a quart or more of water each hour. It is not necessary to have the entire supply of water available at the beginning of shift as long as the water source is replenished during the work day and is always available for employee access. It is up to the employee to drink water and replenish their water jugs or bottles. As the temperature increases through the day, additional water will be made available or replaced. It is the responsibility of the Contractor to ensure that the supply of available drinking water does not run out.

35.8 Responding to Signs and Symptoms

Time is critical when people are experiencing heat stress/heat stroke. The quicker any employee experiencing symptoms can be removed from the heat and cooled down, the better the chances are for a full recovery. On days when the temperatures will be at or above those listed in Table 1 of the regulation, the company will identify the risk for outdoor heat exposure and encourage employees to frequently consume water or other acceptable beverages to ensure hydration.

Employees are responsible for monitoring their own personal factors for heat-related illness including consumption of water or other acceptable beverages to ensure Hydration. Never leave an employee who is experiencing heat-related problems by themselves; if they do not respond quickly to cooling attempts, immediately call emergency medical services. If a co-worker is experiencing difficulty, do not hesitate to bring it to the attention of the supervisor or lead worker.

35.9 Exhibits/Attachments

Not applicable.

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36. Personnel Hoisting

36.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to perform personnel hoisting operations, in accordance with the provisions of WAC 296-155-547 through – 54900.

L&I standards state that the use of a crane or derrick to hoist employees on a personnel platform (man basket) is prohibited, except when the erection, use and dismantling of conventional means of reaching the worksite, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold, would be more hazardous, or is not possible because of structural design or worksite conditions. This standard should be carefully considered before making the decision to use a crane supported platform. The decision to use a personnel platform must be made by the Site Superintendent.

36.2 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

36.3 Definitions

Not applicable

36.4 The Platform

(a) The personnel platform must be designed by a registered professional engineer.

1. Platforms must have a minimum safety factor of five.
2. Each platform must have a standard guardrail system that is enclosed from the toe board to the mid-rail to keep tools, materials and equipment from falling on employees below.
3. Each platform must have a grab rail located inside of the guardrail to prevent injuries to the hands from impact with structures or objects.
4. When needed to protect occupants from objects falling from above, overhead protection must be provided with adequate headroom for employees.
5. An access gate, if provided, must not be able to swing outward during hoisting and must have a restraining device to prevent accidental opening.

(b) The weight of the platform and its maximum load capacity must be clearly indicated on a plate or with other permanent markings.

(c) Rigging

1. When a wire rope bridle is used to connect the platform to the load line, the bridle legs must be connected to a master link or shackle so the load is evenly positioned between the legs. Bridles used as a connection for the personnel platform should not be used for any other purpose.

2. Attachment assemblies such as hooks must close and lock to keep the hook throat from opening. Mousing (using wire rope to close the hook opening) is not permitted.

36.5 The Crane

(a) Inspections and certifications must be current.

(b) The load (including rigging and attachments) must not exceed 50% of rated capacity of the crane as indicated by the load chart for the maximum radius being used.

(c) The load line must be capable of supporting at least seven times the maximum intended load.

(d) The crane used must have a properly functioning anti-two-block device and boom angle indicator.

(e) The crane must have a power-down device which can control the lowering speed of the platform without relying solely on the friction brakes.

(f) The operator must remain at the controls at all times while employees are in the platform.

(g) Traveling is not allowed while hoisting personnel unless this is the least hazardous way to accomplish the task or when portal, tower or locomotive cranes are used.

(h) No lifts will be made on another of the crane's load lines while personnel are suspended on a platform.

36.6 The Operation

(a) Use tag lines unless their use would create a hazard.

(b) Keep body parts inside the platform during raising, lowering and positioning.

(c) Make sure the platform is secure when entering and exiting.

(d) Wear a full-body harness with a shock-absorbing lanyard.

1. The lanyard must be attached to the load block or overhaul ball or to a structural member within the platform capable of supporting a fall impact.
2. If the operation is performed over water, a life vest must be worn instead of a harness.

(e) Stay in sight of or in direct communication with the operator or signal person.

36.7 Inspection and Testing

(a) At each project prior to hoisting employees and after any repair or modification, the platform and rigging must be proof tested to 125 percent of the platform's rated capacity by holding it in a suspended position for five minutes with the test load evenly distributed.

(b) Each time the crane is set up in a different location, a test lift must be made.

1. The test lift must be made with enough weight added to the platform to equal the maximum intended load for the operation.
2. The platform must be hoisted by the crane and moved to each work location to be used in the current configuration.

(c) After the platform is loaded, it should be hoisted a few inches to make sure it is balanced.

(d) Following the test lift and prior to hoisting people, the crane, rigging and platform are to be visually inspected by a qualified person.

1. Hoist ropes must be free of kinks.
2. Multiple part lines must not be twisted.
3. The primary attachment must be centered over the platform.

4. There should be no slack in the wire rope.
5. Crane controls and safety devices must be functioning properly.

36.8 Prelift Meeting

(a) A coordination meeting must be conducted by the Site Superintendent or the supervisor in charge of the work being performed prior to the actual lifting of the platform to review the requirements and procedures for hoisting personnel.

(b) The following personnel must attend this meeting:

1. The Site Superintendent or his designee.
2. The person(s) in charge of the work being performed.
3. The employee(s) who will be in the platform.
4. The crane operator.
5. The signal person(s).

(c) The prelift meeting will be conducted:

1. Each time the work location changes, or
2. If there is any change in the personnel included in the previous section.

36.9 The Permit

(a) The permit at the end of this section must be completed before any lift may be made.

(b) All sections must be filled out and all signatures are required.

(c) Each permit must be retained in the project safety files.

36.10 Exhibits/Attachments

Crane Hoisted Personnel Platform Permit, Attachment 20

Attachment 20. Crane Hoisted Personnel Platform Permit

Crane Hoisted Personnel Platform Permit

The persons below acknowledge that they have participated in a pre-lift meeting and acknowledge the above activities were completed satisfactorily.

Project Superintendent	Crane Operator
Superintendent in charge of work	Signal Person
Safety Manager	Employee(s) in Platform

37. Personal Protective Equipment

37.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for the use of personal protective equipment in accordance with WAC 296-155-200 through -240, and WAC 296-800-160.

37.2 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

37.3 Definitions

Not applicable.

37.4 General Requirements

(a) Minimum personal protective equipment requirements for the Contractor will include the following:

1. ANSI-approved leather or equivalent work boots. A protective safety toe and metatarsal cap is recommended;
2. ANSI-approved hardhat;
3. ANSI-approved safety glasses with side shields where eye hazards are present [see Section (b)];
4. A shirt with sleeves that cover the shoulders, and long work pants;
5. Respirator (as needed for location and type of work);
6. Clean shaven daily (if using a respirator);
7. Hearing protection (as required).

In addition to the requirements outlined above, the Facility has the following PPE requirements.

- High-visibility vests are worn by all personnel in the .construction areas. Requirement to wear vests may be waived in writing by the Facility HSSE manager as conditions warrant.
- Dust goggles are required under face shields when chipping or grinding concrete and are also required when working in dusty or dirty conditions.
- Face shields must be worn over safety glasses when using impact guns, grinders, or other particle producing tools or work.
- Workers full names must be visible on the front of their hard hats.
- Fire retardant clothing is not required for the portion of the work until hydrocarbons are introduced.

(b) Eye Protection

1. As standard eye protection, ANSI-approved, non-prescription industrial standard safety glasses with side shields are considered as minimum protection.
2. ANSI-approved eye protection is required in all designated construction, warehouse areas, and maintenance/equipment yards where hazards to the eyes may exist. Examples of hazards to the eyes may

include but are not limited to; chipping, grinding, welding, cutting, sawing, hammering, and blowing dust/dirt/debris.

3. Eye protection may be required in work atmospheres other than construction and warehouse areas as hazards dictate (as determined by the Project Safety Manager). Some examples are:

Operation	Hazards	Required Protection
Chipping	Flying particles	Goggles, flexible or cushion, rigid body, with regular ventilation Face shield with plastic window
Grinding	Flying particles	Same as chipping

4. Contact lenses are not recommended for use at the worksite due to the possibility of particles and chemicals getting behind the contact lens, the lens being broken into small particles in the eye, or welding spatter fusing the lens to the eye. These can be very serious injuries.
5. In cases where employees must wear prescription eye wear for proper vision, the following practices will be observed;

   a. Employees that wear contact lenses will be required to wear ANSI approved safety glasses with side shields as outlined above where hazards to the eye exist.

   b. Employees that wear prescription glasses are encouraged to obtain and wear ANSI approved lenses with side shields where hazards to the eye exist. If prescription lenses are not ANSI approved, employees will be provided with, and must wear, over the glass ANSI approved safety glasses with side shields. If prescription lenses are ANSI approved but to do not have side shields, clip-on/slip-on ANSI approved side shields must be worn with the ANSI approved prescription lenses where hazards to the eye exist.

   c. In certain cases, it may be recognized to be highly beneficial for certain employees to wear ANSI approved prescription eye wear with side shields. Under such circumstances and with approval from the Project Manager and Safety Manager, the company will provide the employee with prescription lenses as described above and will cover the costs associated with obtaining specialized equipment. This will only apply to key staff personnel, and will only cover the cost of basic prescription lenses with metal frames and side shields. The cost of the basic eye exam will NOT be covered, in that a prescription lens wearer would normally obtain an annual eye exam anyway. The costs of special transition lenses, colored lenses, bifocals or other special lens treatments (except scratch resistant lenses) will NOT be covered. The employee will be given the choice of adding any such enhancements at their sole cost and expense.

(c) Chemical (Splash-proof) Goggles

Approved chemical mono-goggles, cushion fitting, rigid body will be provided to ensure eye protection from the hazards associated with handling or dispensing liquid chemicals.

(d) Face Shield

An approved full-face shield will be worn to provide face protection to the employee from flying particles, splashes, or mist. A face shield only provides protection to the face from direct impact objects, and does not provide acceptable eye protection. Additional eye protection or goggles must be worn in conjunction with a face shield.

(e) Burning Goggles

Approved burning goggles with the appropriate shade number lens will be worn to provide employee protection from optical radiation whenever burning or cutting operations are to be conducted.

(f) Welding Hood

Welding hoods with a filtered lens of number 10 shade or darker will be used to provide protection from the optical radiation produced during electric arc welding. Welding hoods will meet ANSI standards.

(g) Head Protection

1. Approved hardhats include both plastic and fiberglass hats that meet ANSI Z89.1 standards for Class II and I only. Metal hardhats, cowboy type, or bump caps are not considered approved head protection and will not be used. ALL employees, at all times while on the project site, will wear approved hardhats.
2. Hardhats must conform to the approved specifications of the Contractor's Safety Policies and ANSI Z89.1.

(h) Hearing Protection

1. Employees will not be exposed to noise in excess of the Occupational exposure Limits established by OSHA. The two types of recognized hearing protection available for use in effectively reducing noise exposure are earplugs and earmuffs.
2. In most instances, universal-fit earplugs are acceptable hearing protection. Cotton plugs are not acceptable and will not be used.
3. When using earmuffs for hearing protection, special care will be given to ensure that the muffs are disinfected before being issued to another employee.

(i) Hand Protection

1. General-purpose work gloves should be worn by the employee for protection against splinters, sharp edges, jagged surfaces, wire rope, glass, and metal splinters.
2. Special purpose work gloves should be worn and, at times, will be required when employees are performing certain tasks. Special purpose gloves include:

    - Electric "hot" gloves
    - Cut-resistant gloves
    - Chemical-resistant gloves
    - Standard rubber gloves
    - Heat-resistant gloves
    - Foot protection

3. ANSI-approved leather or equivalent work boots are mandatory. Protective toe and metatarsal caps are highly recommended.
4. Sneakers (even if ANSI-approved), sandals, high heels, leather soled street or dress shoes, and thongs will not be considered approved industrial or construction footwear.

37.5 Exhibits/Attachments

Sample Job Safety Analysis, Exhibit J

Exhibit J. Sample Job Safety Analysis

Your Co Inc — Risk Assessment Form

Hazard	Control	Action Taken
Ingestion of chemicals Severity = 4 Likelihood = 3 Total = 12	All chemicals are to be assessed before initial use.	
	All persons handling any chemical are required to refer to the material assessment before the product is used for the first time.	
	Personal protective clothing detailed by the material assessment is provided and must be worn by all staff at all times when they are handling a hazardous material.	
	Products which are not on the approved list of chemicals must not be purchased or brought into the business without the prior approval of the Operations Manager.	
	Chemicals must never be mixed under any circumstances.	
	Waste must be controlled thru being held in sealed bins in the work area and all bins are to be marked to identify their contents.	
	Specific training should be given to all staff involved in the handling of hazardous materials. This training should establish the definition of a hazardous material.	
	Hazardous materials must always be kept in their original containers and they must always be kept sealed when they are not being used.	

Risk Level Calculation		Risk Level Action		
(a) Severity of risk/injury	1=no injury, 2=slight, 3=minor, 4=major, 5=fatality	1-5	Small risk	Acceptable
(b) Likelihood of event	1=very unlikely, 2=unlikely, 3=likely, 4=very likely, 5=inevitable	6-10	Medium risk	Requires monitoring
(c) Risk Rating = (a) x (b)		10-15	Severe risk	Requires immediate further action and control
		15+	Emergency risk	Halt activity and review immediately

Assessment Date		07/01/2003	Assessor's Name			John Citizen		
Review Dates	1st	01/07/2004	2nd	01/07/2005	3rd	01/07/2006		

page 12 of 35

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38. Portable Electrical Equipment

38.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to perform activities associated with portable electrical equipment.

38.2 Definitions

(a) Hazardous Location. Locations where flammable vapors, liquids, gases, or combustible dusts or fibers may be present. Classification of hazardous locations is made based on the likelihood of a flammable concentration or quantity being present. Six designations of hazardous locations are made:

1. Class I, Division 1.
2. Class I, Division 2.
3. Class II, Division 1.
4. Class II, Division 2.
5. Class III Division 1.
6. Class III, Division 2.

Detailed definitions of these six hazardous locations are given in 29 CFR 1910.399 and in the National Electrical Code (NEC 70-500), as supplemented by WAC 296-24, WAC 296-155, and WAC 296-45.

38.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

38.4 General Requirements

(a) Electrical equipment must be free from recognized hazards.

(b) Unless approved for the purpose, no electric conductors or equipment may be:

1. Located in damp or wet locations.
2. Exposed to gases, fumes, vapors, liquids, or other agents that could have a deteriorating effect.
3. Exposed to elevated temperatures.

(c) All electrical equipment must be marked with the manufacturer's name or other identifying description. Other markings will provide voltage, current, wattage, or other applicable ratings.

38.5 Implementation

(a) Cord and Plug Equipment.

1. Type of Equipment. Cord and plug sets containing exposed metal parts will not be used. Non-metallic cord and plug sets with ground connections will be used, unless the equipment is double-insulated and grounding is not required. Double-insulated equipment will be distinctively identified. Common examples of this equipment include:

    - Portable hand-held motor operated tools e.g., drills, sanders and saws.
    - Portable electric equipment used in damp or wet locations.
    - Portable equipment used in hazardous locations.
    - Portable hand lamps.

2. Grounding Methods. Cord and plug equipment will be grounded by one of the following methods:

    - By means of the metal enclosure of the conductors supplying such equipment if a grounding-type attachment plug with one fixed grounding contact is used for grounding the metal enclosure, and if the metal enclosure of the conductors is secured to the attachment plug and to the equipment by connectors approved for the purpose.
    - By means of a grounding conductor run with the power supply conductors in a cable assembly or flexible cord properly terminated in a ground-type attachment plug with one fixed ground contact.
    - By means of a separate flexible wire or strap, insulated or bare, protected as well as practicable against physical damage.

3. Multi-Outlet Power Cords. Multi-outlet power cords (power strips) may be used only under the following conditions:

    - The total current (start-up amps) of all equipment connected to the power strip must not exceed the rated capacity of the power strip or of the circuit into which the power strip is connected.
    - Power strips may not be used in series (pig-tailed).
    - Only one power strip may be connected to a single outlet receptacle.
    - With a ground fault circuit interrupter (GFCI) protected outlet.

(b) Portable Hand Lamps.

1. Hand lamps will be equipped with a handle of molded composition or other material approved for the purpose.
2. Hand lamps will be equipped with a substantial guard around the lamp, attached to the lamp holder or the handle.
3. Metallic guards will be grounded by means of an equipment-grounding conductor run with circuit conductors within the power supply cord.
4. Hand lamps may not contain plug receptacles.
5. Portable lighting used in wet or conductive locations, such as tanks or boilers, must be operated at no more than 12 volts, or must be protected by ground fault circuit interrupters (GFCIs).

(c) Flexible Cords and Cables.

1. Flexible cords and cables (extension cords) must be of the three-wire type, with dead front plugs and receptacles. A fixed ground connection must be present. Cords used with temporary or portable lights must be designed for hard or extra hard usage (types S, ST, or SO).
2. Flexible cords and cables may not be used as a substitute for the fixed wiring of a structure. Permitted uses include:

    - Connection of portable lamps or appliances.
    - Connection of stationary equipment to facilitate their frequent interchange.
    - Connection of fixed or stationary appliances where the fastening means and mechanical connections are designed to permit removal for maintenance or repair.

3. Flexible cords and cables may not pass through windows, doorways, or openings in walls, ceilings, or floors.
4. Flexible cords and cables will be protected from accidental damage.

5. Flexible cords and cables, where permitted, will be attached so that strain or pull is not transmitted to joints or terminal screws.
6. Worn, frayed, or damaged electrical cords will not be used. Cords may not be attached to building surfaces, hung from nails, or suspended by wire.
7. Receptacles, cord connectors, and plugs will not accept an attachment with a piece of equipment or a device of different voltage or current rating than that for which the equipment/device is designed. Non-grounding receptacles will not accept grounding-type attachment plugs.
8. Splices and repairs will be made only by qualified personnel. All splices or repairs will be made so that the insulation on the repaired section is equivalent to the original insulation rating of the device.

(d) Grounding.

1. The path to ground from circuits, equipment, and enclosures must be permanent and continuous.
2. Ground Fault Circuit Interrupters must protect electrical installations at project sites.
    - Ground Fault Circuit Interrupters (GFCI) must protect all 120-volt single phase, 15 and 20 amp receptacles that are not part of permanent wiring.
3. In addition to GFCIs a subcontractor may use an Assured Grounding Program.
    - The assured equipment grounding conductor program must cover extension cords, receptacles, and cord and plug-connected equipment. The program must include the following elements:
        - A written description of the program.
        - At least one competent person to implement the program.
        - Daily visual inspections of extension cords, and cord and plug-connected equipment for defects (see Exhibit K for a sample inspection program). Equipment found damaged or defective will be removed from use, and not used until repaired.
        - Continuity tests of the equipment grounding conductors or receptacles, extension cords, and cord- and plug-connected equipment every three months.
        - Compliance with the requirements for grounding of systems, circuits, and equipment (see 1926.404).
4. If the assured equipment grounding conductor program option is chosen, inspection records will be maintained by the designated competent person at the site.

38.6 Exhibits/Attachments

Sample Electrical Equipment Inspection Program, Exhibit K

Exhibit K. Sample Electrical Equipment Inspection Program

Maintenance of portable electrical equipment will be performed at regular intervals, not to exceed three months, by qualified personnel.

1. DAILY INSPECTION REQUIREMENTS

Each cord set, attachment cap, plugs, and receptacles of cord sets, and any equipment connected by cord and plug, including those that are not required to be grounded, will be visually inspected for external defects, such as deformed or missing pins or insulation damage, and for indication of possible internal damage. Equipment found damaged or defective will be removed from service until repaired.

2. PERIODIC INSPECTION GUIDELINES

The following guidelines will be followed when performing the periodic inspections of portable electrical equipment. In addition, Steps (1), and (2) will be performed before the first use of any new equipment, before equipment is resumed to service following repairs, and before equipment is used following any incident that may have damaged it.

(a) General Inspection Procedure.

1. Check the general condition of the equipment.
2. Look for loose fasteners, broken or cracked housings or casings, loose or broken switches.
3. Check the power cord carefully for cracks or deterioration of the insulation.
4. If the attachment plug is not a dead-front type, replace it.
5. Check the operation of ground fault circuit interrupters if so equipped.
6. Take the device out of service if any defects cannot be immediately remedied.

(b) Continuity Test. Steps 1, 2, and 3 do not apply to double-insulated tools.

1. Use a resistance meter (multi-meter) set on the R x 1 scale.
2. Attach one lead to the ground prong of the attachment plug, and the other lead to an exposed metal part of the device's housing.
3. The meter should read less than 10 ohms to pass.
4. Next attach one lead to each of the two flat line blades of the attachment plug.
5. The meter should read less than 10 ohms to pass.
6. If the unit fails either of these tests, take it out of service, and tag it for repair.

(c) Insulation Test. This test does not apply to double-insulated tools.

1. Attach one lead of the test meter to one of the flat line blades on the attachment plug, and the other lead to an exposed metal part of the device's housing.
2. The meter should read greater than 1 M Ω (1,000,000 ohms) to pass.
3. If the unit fails the test, take it out of service, and tag it for repair.

(d) Portable Hand Lamps. In addition to the three steps above, portable hand lamps will comply with the following test:

1. The wattage of the lamp (bulb) will not exceed the rating of the device.
2. The bulb guard must be complete, and in place as designed. The Continuity Test described in step 2 above must be performed on hand lamps with metal bulb guards. To perform the test, one lead from the meter will be attached to the bulb guard, and the other lead to the ground prong of the attachment plug.
3. The meter will read less than 10 ohms to pass.
4. If the unit fails the test, take it out of service, and tag it for repair.
5. If the hand lamp is an approved explosion-proof type, the bulb guard, bulb cover, and gasket(s) will be inspected for damage or defects. If the device fails the inspection, it will be taken out of service, and repaired according to the manufacturer's requirements.

(e) Inspection Records. Records of inspections will be maintained. The record will include at least:

1. The identity of the device inspected.
2. The date of the inspection.
3. The inspector's name or employee number.
4. The inspection results (and date of return-to-service if repairs are made).
5. The due-date of the next inspection.

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39. Respiratory Protection

39.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to reduce concentrations of airborne contaminants and hazardous atmospheres through engineering controls, to adequately protect employees from airborne contaminants and hazardous atmospheres through the use of respiratory personal protective equipment (PPE), and to prevent health effects associated with airborne contaminants and hazardous atmospheres.

This procedure covers the general identification, evaluation, and control of employee exposure to airborne contaminants and hazardous atmospheres during construction operations. This procedure establishes general minimum performance requirements for the control of airborne contaminants and hazardous atmospheres as well as necessary measures to be taken to prevent employee overexposure as outlined in OSHA 29 CFR 1910, OSHA 29 CFR 1926, WAC 296-155-220, WAC 296-841, and WAC 296-842.

39.2 Definitions

Not applicable.

39.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

39.4 General Requirements

(a) Introduction. Exposure to airborne contaminants and hazardous atmospheres may be encountered during construction operations. During the planning process of all construction operations potential airborne contaminants and hazardous atmospheres will be identified in the Job Hazard Analysis. Upon identification of the potential respiratory hazards, it will be brought to the attention the Contractor. The Contractor's Safety Manager will review the job process and make one of the following determinations:

1. Engineer the hazard out.
2. Use a combination of engineering controls and respiratory protection.
3. Use respiratory protection because engineering controls are not feasible.

NOTE: It is important to understand that some airborne contaminants and hazardous atmospheres have specific guidelines (i.e., Lead, Asbestos, and Methylene Chloride) and that not all job processes fall under performance standard guidelines. Under these circumstances, the L&I specific guidelines will be stringently adhered to.

(b) Engineering Controls. For all construction operations, airborne contaminants and hazardous atmospheres will be kept to a minimum through engineering controls (eliminating the hazard). Misting with water, HEPA exhaust ventilation, fans, fresh-air ventilation, enclosure, and sweeping compound are all examples of effective means of controlling respiratory hazards.

NOTE: Engineering controls not feasible. Engineering controls are not always feasible during construction operations. When engineering controls are not feasible or not fully effective respiratory protection will be used in combination with, or alone to prevent employee overexposure.

(c) Respiratory Protection Guidelines. Upon reviewing the job processes and associated respiratory hazards, The Contractor's Safety Manager will make a respiratory protection determination. Respiratory protection will be either determined to be mandatory or non-mandatory. The determination will be based on:

1. OSHA respirator specifications for specific airborne contaminants or hazardous atmospheres;
2. Preliminary industrial hygiene assessments;
3. Or periodic/ongoing industrial hygiene assessments.

NOTE: If this cannot be done, the most stringent respiratory protection requirements will be imposed.

39.5 Implementation

(a) Medical Surveillance. When a respirator is mandatory as identified a medical evaluation will be performed as outlined in this section prior to the employee being fit-tested and required to wear a respirator in the workplace. The medical evaluation entails the following:

1. Use only Physician(s) and Licensed Health Care Practitioners (LHCP). Copy of Program - The physician or LHCP must be provided with a copy of the Contractor's written respiratory protection program.
2. The Medical Questionnaire (Attachment 26) may be amended upon review of a physician or LHCP. Employees who are required to wear a respirator will complete the respirator medical evaluation questionnaire.
    - The questionnaire will provide mandatory information necessary for the medical evaluation. Refer to Attachment 26, Medical Questionnaire.
    - The questionnaire will be administered confidentially during the employee's normal working hours or at a time convenient to the employee.
    - The questionnaire will be administered in a way that the employee fully understands.
3. Supplemental information to be provided to the physician or LHCP.
    - Type and weight of the respirator to be used by employee.
    - Duration and frequency of respirator use.
    - Expected physical work effort.
    - Additional protective clothing and equipment to be worn.
    - Temperature and humidity extremes to be encountered.
4. Medical Determination. The physician or LHCP must provide a written determination upon reviewing all items identified and a physical examination at his discretion. The written determination must include the following:
    - Limitations on respirator use relating to the employees medical condition.
    - Limitations on respirator use relating to workplace conditions.
    - Whether or not the employee is medically able to use the respirator.
    - If applicable, the need for a follow-up medical evaluation.
    - A statement that the physician or LHCP has provided the employee with a copy of the written determination.

(b) Follow-up Medical Surveillance. A yearly follow-up medical evaluation by the physician or LHCP is required. Also, a follow-up medical examination is required anytime one of the following conditions exist:

1. Medical signs or symptoms that are related to the ability to use a respirator that is reported by the employee.

2. A change occurs in workplace conditions (i.e. physical work effort, protective equipment, temperature extremes, etc.) results in a physiological burden to the employee.

(c) Respirator Training. Training will be conducted with each employee who is required to wear a respirator. Each employee will be trained and able to demonstrate knowledge in the following areas:

1. Employee training.

   - Why the respirator is necessary.
   - How improper fit, usage, and maintenance (if applicable) can compromise the protective effect of the respirator.
   - The limitations and capabilities of the respirator.
   - How to inspect, put on and remove, use, and check the seal(s) of the respirator.
   - Procedures for disposal, maintenance (if applicable), and storage (if applicable) of the respirator.
   - How to recognize signs and symptoms that may limit or prevent the effective use of the respirator.

2. Retraining. Annual retraining will be conducted to review items a. through f. identified in section H.1. above and when the following conditions occur:

   - Changes in the type of respirator used or required.
   - Changes in the work environment (i.e. temperature extremes, work load, amount of exposure, change of air contaminants, etc.)
   - Any situation that arises in which retraining becomes necessary to insure safe respirator use.

(d) Hazard Communications/Awareness Training. Employees will be trained/educated in accordance with the Contractor's hazard communications program.

(e) Fit Testing. A qualitative fit-test (QLFT) will be done prior to initial use of the respirator, whenever a different respirator is used, and at least annually thereafter. Additional fit tests will be conducted when the employee reports, or an observation is made of, changes in the employee's physical condition that could affect the respirator fit. Changes in physical condition include, but are not limited to facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

A record of the qualitative fit-test must be kept and filed by the Contractor's Safety Manual.

(f) Use of Respirators.

1. Face piece seal protection and user seal-check guidelines for the proper use of respirators are as follows:

   - Face piece seal protection - Respirators will not be worn by employees who have:
     - Facial hair that comes between the sealing surface of the face piece and the face or that interferes with the valve function.
     - Any condition that interferes with face-to-face-piece seal or valve function. An example is corrective glasses or goggles.
   - User seal-check - Each time an employee dons a respirator he/she must perform a user seal check as per the manufacturers specifications.

(g) Maintenance and Care of Respirators. This section only applies to respirators other than dust respirators. It outlines requirements for cleaning and disinfecting, storage, inspection, and repair of respirators.

1. Cleaning and disinfecting. Respirators will be cleaned in accordance with manufacturers specifications, and at the following intervals:

   - Respirators issued for the exclusive use of one employee must be cleaned and disinfected as necessary to be maintained in a sanitary condition.
   - Respirators issued to more than one employee must be cleaned and disinfected prior to being worn by each individual employee.
   - Respirators used for training and fit testing will be cleaned and disinfected after each use.

2. Storage. Respirators must be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and also packed or stored to prevent deformation of facepiece and exhalation valve.
3. Inspection. All respirators used in routine situations must be inspected before each use and during cleaning. The inspection will include the following.
    - A check of respirator function.
    - Tightness of connections.
    - Condition of various parts including but not limited to, facepiece, head straps, valves, connecting tube, cartridges, canisters, or filters.
    - A check for pliability and deterioration.
4. Repairs. Respirators that fail an inspection or are otherwise found to be defective are to be removed from service and discarded. Depending on cost feasibility, it is strongly recommended that a new respirator be used. If it is determined that repair will be made the distributor or manufacturer may only repair the respirator and re-certify for use.

39.6 Exhibits/Attachments

Respirator Medical Evaluation Questionnaire, Attachment 21

Attachment 21. Respirator Medical Evaluation Questionnaire

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Regulations (Standards - 29 CFR) - Table of Contents

- **Part Number:** 1910
- **Part Title:** Occupational Safety and Health Standards
- **Subpart:** I
- **Subpart Title:** Personal Protective Equipment
- **Standard Number:** 1910.134 App C
- **Title:** OSHA Respirator Medical Evaluation Questionnaire (Mandatory).
- **GPO Source:** e-CFR

Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date:_____

2. Your name:_____

3. Your age (to nearest year):_____

4. Sex (circle one): Male/Female

5. Your height: _____ ft. _____ in.

6. Your weight: _____ lbs.

7. Your job title:_____

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____

9. The best time to phone you at this number: _____

10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No

11. Check the type of respirator you will use (you can check more than one category):
a. _____ N, R, or P disposable respirator (filter-mask, non-cartridge type only).
b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes/No

If "yes," what type(s):_____
_____

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please

1. Do you *currently* smoke tobacco, or have you smoked tobacco in the last month: Yes/No

2. Have you *ever had* any of the following conditions?

a. Seizures: Yes/No

b. Diabetes (sugar disease): Yes/No

c. Allergic reactions that interfere with your breathing: Yes/No

d. Claustrophobia (fear of closed-in places): Yes/No

e. Trouble smelling odors: Yes/No

3. Have you *ever had* any of the following pulmonary or lung problems?

a. Asbestosis: Yes/No

b. Asthma: Yes/No

c. Chronic bronchitis: Yes/No

d. Emphysema: Yes/No

e. Pneumonia: Yes/No

f. Tuberculosis: Yes/No

g. Silicosis: Yes/No

h. Pneumothorax (collapsed lung): Yes/No

i. Lung cancer: Yes/No

j. Broken ribs: Yes/No

k. Any chest injuries or surgeries: Yes/No

l. Any other lung problem that you've been told about: Yes/No

4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?

a. Shortness of breath: Yes/No

b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No

c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No

d. Have to stop for breath when walking at your own pace on level ground: Yes/No

e. Shortness of breath when washing or dressing yourself: Yes/No

f. Shortness of breath that interferes with your job: Yes/No

g. Coughing that produces phlegm (thick sputum): Yes/No

h. Coughing that wakes you early in the morning: Yes/No

i. Coughing that occurs mostly when you are lying down: Yes/No

j. Coughing up blood in the last month: Yes/No

k. Wheezing: Yes/No

l. Wheezing that interferes with your job: Yes/No

m. Chest pain when you breathe deeply: Yes/No

n. Any other symptoms that you think may be related to lung problems: Yes/No

5. Have you *ever had* any of the following cardiovascular or heart problems?

a. Heart attack: Yes/No

b. Stroke: Yes/No

c. Angina: Yes/No

d. Heart failure: Yes/No

e. Swelling in your legs or feet (not caused by walking): Yes/No

f. Heart arrhythmia (heart beating irregularly): Yes/No

g. High blood pressure: Yes/No

h. Any other heart problem that you've been told about: Yes/No

6. Have you *ever had* any of the following cardiovascular or heart symptoms?

a. Frequent pain or tightness in your chest: Yes/No

b. Pain or tightness in your chest during physical activity: Yes/No

c. Pain or tightness in your chest that interferes with your job: Yes/No

d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No

e. Heartburn or indigestion that is not related to eating: Yes/No

d. Any other symptoms that you think may be related to heart or circulation problems: Yes/No

7. Do you *currently* take medication for any of the following problems?

a. Breathing or lung problems: Yes/No

b. Heart trouble: Yes/No

c. Blood pressure: Yes/No

d. Seizures: Yes/No

8. If you've used a respirator, have you *ever had* any of the following problems? (If you've never used a respirator, check the following space and go to question 9:)

a. Eye irritation: Yes/No

b. Skin allergies or rashes: Yes/No

c. Anxiety: Yes/No

d. General weakness or fatigue: Yes/No

e. Any other problem that interferes with your use of a respirator: Yes/No

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes/No

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you *ever lost* vision in either eye (temporarily or permanently): Yes/No

11. Do you *currently* have any of the following vision problems?

a. Wear contact lenses: Yes/No

c. Color blind: Yes/No

d. Any other eye or vision problem: Yes/No

12. Have you *ever had* an injury to your ears, including a broken ear drum: Yes/No

13. Do you *currently* have any of the following hearing problems?

a. Difficulty hearing: Yes/No

b. Wear a hearing aid: Yes/No

c. Any other hearing or ear problem: Yes/No

14. Have you *ever had* a back injury: Yes/No

15. Do you *currently* have any of the following musculoskeletal problems?

a. Weakness in any of your arms, hands, legs, or feet: Yes/No

b. Back pain: Yes/No

c. Difficulty fully moving your arms and legs: Yes/No

d. Pain or stiffness when you lean forward or backward at the waist: Yes/No

e. Difficulty fully moving your head up or down: Yes/No

f. Difficulty fully moving your head side to side: Yes/No

g. Difficulty bending at your knees: Yes/No

h. Difficulty squatting to the ground: Yes/No

i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No

j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

Part B Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: Yes/No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes/No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes/No

If "yes," name the chemicals if you know them:_____

_____

_____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

a. Asbestos: Yes/No

b. Silica (*e.g.*, in sandblasting): Yes/No

c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No

d. Beryllium: Yes/No

e. Aluminum: Yes/No

f. Coal (for example, mining): Yes/No

h. Tin: Yes/No

i. Dusty environments: Yes/No

j. Any other hazardous exposures: Yes/No

If "yes," describe these exposures:_____
_____
_____

4. List any second jobs or side businesses you have:_____
_____

5. List your previous occupations:_____
_____

6. List your current and previous hobbies:_____
_____

7. Have you been in the military services? Yes/No

If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No

8. Have you ever worked on a HAZMAT team? Yes/No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes/No

If "yes," name the medications if you know them:_____

10. Will you be using any of the following items with your respirator(s)?

a. HEPA Filters: Yes/No

b. Canisters (for example, gas masks): Yes/No

c. Cartridges: Yes/No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:

a. Escape only (no rescue): Yes/No

b. Emergency rescue only: Yes/No

c. Less than 5 hours *per week:* Yes/No

d. Less than 2 hours *per day:* Yes/No

e. 2 to 4 hours per day: Yes/No

f. Over 4 hours per day: Yes/No

12. During the period you are using the respirator(s), is your work effort:

a. *Light* (less than 200 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of a light work effort are *sitting* while writing, typing, drafting, or performing light assembly work; or *standing* while operating a drill press (1-3 lbs.) or controlling machines.

b. *Moderate* (200 to 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of moderate work effort are *sitting* while nailing or filing; *driving* a truck or bus in urban traffic; *standing* while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; *walking* on a level surface about 2 mph or down a 5-degree grade about 3 mph; or *pushing*

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of heavy work are *lifting* a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; *shoveling; standing* while bricklaying or chipping castings; *walking* up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator: Yes/No

If "yes," describe this protective clothing and/or equipment:_____

_____

14. Will you be working under hot conditions (temperature exceeding 77 deg. F): Yes/No

15. Will you be working under humid conditions: Yes/No

16. Describe the work you'll be doing while you're using your respirator(s):

_____

_____

17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):

_____

_____

18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
Name of the second toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
Name of the third toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
The name of any other toxic substances that you'll be exposed to while using your respirator:

_____

_____

_____

19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

_____

[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998; 76 FR 33607, June 8, 2011; 77 FR 46949, Aug. 7, 2012]

Next Standard (1910.134 App D)

Regulations (Standards - 29 CFR) - Table of Contents

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40. Safety and Health Audit

40.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to orient and familiarize all subcontractors with the safety program.

40.2 Definitions

Not applicable.

40.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

40.4 General Requirements

(a) Each Project Manager/Superintendent is required to formally inspect his or her project on a monthly basis following the Safety and Health Audit format (Attachment 27). It is recommended that the Project Manager utilize additional expertise available on the project when performing these audits. The Safety Manager and Superintendent will also conduct weekly Safety and Health Audits. Additional safety related items only requiring monthly check or monitoring must be documented on the Safety and Health Audit form.

(b) Correction of Deficiencies. Any unsafe condition or act discovered should be corrected on the spot, if possible, by direction to the supervisor or Site Superintendent responsible for the work. If an unsafe condition or act could result in an injury, the work should be stopped until the situation is resolved. All employees exposed to injury should be removed from the exposure and only those required to correct the problem allowed to remain – with appropriate protection for the circumstances.

(c) Any unsafe conditions or acts discovered are to be documented on the audit forms along with the corrective action taken to resolve them.

(d) Subcontractors. A senior supervisor for each subcontractor should accompany the Safety Manager/Superintendent during the weekly audit of the subcontractor's work area.

(e) Distribution. Forms for the weekly and monthly audit and a checklist can be found at the end of this section. The checklist is provided only as a guide. Auditing every item on the checklist every week is not the intention and is not required. Copies of the completed audits are to be sent to the Safety and Health Department and Regional Safety Manager once each month.

40.5 Implementation

Not applicable.

40.6 Exhibits/Attachments

Safety and Health Audit, Attachment 22

Attachment 22. Safety and Health Audit

SAFETY AND HEALTH AUDIT

A completed audit is to be submitted to the Contractor Safety and the Regional Safety Director at the end of each month. This audit is to be used as a guide to self-inspect your project.

Project Name _____ Job No. _____ Month/Year _____

Person(s) making the audit _____

Dates weekly inspections or observations were made.

1st week _____ 3rd week _____ 5th week _____

2nd week _____ 4th week _____

==========

		OK	Def	N/A
1.	Housekeeping	☐	☐	☐
2.	Fire protection	☐	☐	☐
3.	Personal protective equipment	☐	☐	☐
4.	Scaffolds	☐	☐	☐
5.	Scissor lifts, articulating boom lifts, man lifts, and elevators	☐	☐	☐
6.	Cranes and hoists	☐	☐	☐
7.	Excavations	☐	☐	☐
8.	Project electrical	☐	☐	☐
9.	Small tools/equipment	☐	☐	☐
10.	Motor vehicles, including pickups/sedans	☐	☐	☐
11.	Heavy equipment	☐	☐	☐
12.	Water work	☐	☐	☐
13.	Blasting	☐	☐	☐
14.	Site security/public protection	☐	☐	☐
15.	Confined spaces	☐	☐	☐
16.	Fuel/gas/oxygen storage	☐	☐	☐
17.	Ladders derricks (subs included)	☐	☐	☐
18.	Pressure vessels	☐	☐	☐
19.	Pneumatic tools/hoses/compressors	☐	☐	☐
20.	Hazardous material storage/waste	☐	☐	☐
21.	Underground	☐	☐	☐
22.	Lighting	☐	☐	☐
23.	Overall site conditions	☐	☐	☐

1. Action taken for deficiencies _____

2. Special safety activities this week _____

3. Injuries reported and investigated this week _____

Signature _____

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41. Safety Orientation

41.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for safety orientation.

41.2 Definitions

Not applicable.

41.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

41.4 General Requirements

(a) Employees will be trained to perform assigned job duties. Training is to address required knowledge and skills.

(b) Employee training and information programs required by OSHA and L&I will be provided for all employees prior to the employee's initial assignment to a project or task.

41.5 Implementation

(a) Initial Employee Safety Orientation.

1. All project employees must receive a safety orientation prior to starting project work activities.
2. Subcontractors may give orientation training to their employees, however, the training must be done by a competent person and must meet or exceed the orientation requirements set by the Contractor. Documentation of training must be forwarded to the Contractor's Project Safety Manager.
3. The depth of training will be commensurate with the job function(s) to be performed.
4. Items to be covered in the orientation should include:

    - Emergency procedures.
    - Project work rules.
    - Accident investigation.
    - First Aid/Accident reporting.
    - Fitness for duty.
    - Lost time injury management policy.
    - Fall protection policy.
    - Discipline policy.
    - Actions to be expected for failure to comply with safety requirements.
    - Parking and site security procedures and regulations.
    - Public protection.

- Scaffold program and standards.
- Hazard communication.
- Hazardous Chemical Inventory List.
- All MSDSs on site and submitted before product is used.
- Safety incentive program.
- Ladder safety.
- Specific licensing requirements.
- Subcontractor's safety audits.
- Our written safety program.
- Contractual obligation to comply with our safety program.
- Respiratory protection program or requirements.
- Fire protection.
- Confined spaces/Permits.
- Job hazard analysis.
- Safety meetings and documentation
- Hazard abatement.
- Housekeeping.
- Project specific safety plan.
- Designated safety representative.
- Chain of command within the company.
- Notification of OSHA visits.
- Personal protective equipment policy (safety glasses mandatory).
- Personal protective equipment use (including demonstration as necessary)
- Owner imposed safety requirements.
- First aid provider identification.
- First aid kit location and contents with physician approval.
- Footwear/clothing/Jewelry/Hair policy.
- Trenches and excavations.
- Competent person identification.
- Barricade/Barricade Tape (Yellow tape is cautionary; Red tape is mandatory).
- Lock Out/Tag Out.
- Hot Work Permits.
- Live Railroad requirements

(b) "Take Five" Safety Meetings.

1. "Take Five" safety meetings will be conducted on a daily basis by the employee's immediate supervisor.
2. The purpose of these meetings is to allow the project employees an opportunity to maintain a high degree of safety awareness through timely safety education. This training will be used to discuss specific safety topics and to obtain employee feedback.
3. Field safety and health staff will periodically monitor "Take Five" safety meetings to assure that subject matter is properly presented.
4. Topics to be discussed will include safety hazards noted during the week and explanation of job safety procedures unique to the project/work assignment.
5. Other items open for discussion may include, but are not limited to:

- Use of employee personnel protective equipment.
- Project safety rules.
- Employee accidents due to specific, repeated unsafe acts.
- Unsafe acts.

(c) "Safety Talk" Training Sessions.

1. "Safety talk" training sessions will be developed by the project Safety Manager and conducted by the immediate supervisors. "Safety Talk" subjects may be obtained from Contractor's Safety Manager.

2. The sessions may be presented in conjunction with the weekly or monthly safety meetings and/or circulated through each department on a read-and-route basis.
3. The sessions will cover various and timely topics as furnished by the Project Safety Manager and/or requested by line management.

(d) Other Training. Other ongoing safety training for specific job functions will be conducted on an as-needed basis. Such training may be performed by the field safety and health staff of by the employee's immediate supervisor.

(e) Attendance Documentation. Records of attendance for all employee safety orientation and training provided as part of this procedure will be documented on the training attendance record.

41.6 Visitors

Any person entering the Contractor's worksite for the purpose of observing, meeting, or performing non-work (hands off) activities, including the Contractor's employees from other sites is deemed a "visitor".

- Before entering the jobsite or commencing work, each individual must be approved to do so by completing the Visitor Safety orientation meeting.
- There will be training for individuals who are making deliveries, but not performing other work on site.
- Visitors will be escorted by a Project Team member or by suitably qualified contractor personnel at all times. The Visitor Orientation program is provided by the project Safety Manager.
- The use of the Escort Policy must not be used to circumvent training requirements.
- Authorization for escort training and the authority to escort Project visitors is provided in writing by the Project Safety Manager.
- A sign-in/sign-out sheet must be signed by all visitors.
- Safety cards or stickers for hard hats will be given to the individuals who have completed the visitor orientation.
- Visitors must present cards or sticker at point of entry (guard station).

A visitor safety orientation will include, but not limited to, the following.

- A list of the proper PPE for the job scope.
- A list of potential hazards, including chemical spills and live rail lines on jobsite.
- A discussion on current contractor activities on site.
- Guidelines and procedure for a potential immediate evacuation.
- An emergency list of names and phone numbers.
- Railroad safety, including railroad flagger awareness.

41.7 Exhibits/Attachments

(a) Safety and Health Meeting Summary Report, Attachment 23

(b) Safety Orientation Attendance Record, Attachment 24

The Safety and Health Meeting Summary Report (Attachment 23) and Safety Orientation Attendance Record (Attachment 24) should be used for documenting employee attendance and the orientation and training activities associated with this procedure. Requirements for record distribution, retention, and maintenance will be established within applicable project planning documents.

Attachment 23. Safety and Health Summary Report

SAFETY AND HEALTH MEETING SUMMARY REPORT

Work Location _____

Date of Meeting _____ Time _____ until _____

Location of Meeting _____ Speaker _____

Topics Discussed _____

_____

_____

_____

Name (Print)	Signature	Company Name

Attachment 24. Safety Orientation Attendance Record

SAFETY ORIENTATION ATTENDANCE RECORD

This is to acknowledge and document that the following individuals attended a safety orientation training session where the Project Safety Rules as well as other important safety related information was given to each individual whose name and signature appears below.

The signature of each individual is evidence of their commitment to work safely and abide by the project safety and health regulations for this project. They understand that they have the right and obligation to report unsafe acts and conditions to their supervisor or a project safety manager as part of their role in the overall safety of the project.

Date _____ Project Name and Number _____

Employee Name	Social Security No.	Signature

42. Scaffold Use, Assembly, and Dismantling

42.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to safely use, assemble, and dismantle scaffolds. Specific criteria for design, dimensions, capacities, etc., can be found in the federal OSHA Standards 29 CFR 1926, Sections 450 through 454, and L&I regulations found at WAC 296-874.

NOTE: There is no such thing as a temporary scaffold. All scaffolding must be erected and maintained to conform to established standards.

42.2 Definitions

(a) Competent Person. One who is capable of identifying existing and predictable hazards and authorized to take prompt corrective measures to eliminate them.

(b) Qualified Person. One who is recognized by a degree, certificate or professional standing, or possesses extensive knowledge, training and experience.

42.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

42.4 Competent/Qualified Person

(a) The scaffold must be designed by a qualified person and constructed and loaded in accordance with that design. A competent person must supervise the erection, movement, alteration, and disassembly of the scaffold. Scaffold manufacturer's recommendations must be reviewed. All aspects of scaffolding, supervision and inspection by a competent person are crucial.

(b) Every employee who performs work on a scaffold will be trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and the procedures to control or minimize those hazards.

(c) Every employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold must be trained by a competent person. Each employee must be trained to recognize the nature of scaffold hazards, correct procedures for handling scaffolds, design criteria, maximum intended load capacity and intended use.

(d) Scaffold components manufactured by different manufacturers will not be intermixed unless components fit together and a competent person approves the procedure.

(e) Scaffolds and scaffold components will be inspected for visible defects by a competent person before each shift, and after any occurrence that could affect a scaffold's structural integrity. Daily inspections will be recorded on tags attached to scaffolds.

(f) Fall protection must be provided for employees erecting or dismantling scaffolds where the installation and use of protection is feasible and does not create a greater hazard. A competent person will determine the feasibility and safety of providing fall protection.

(g) A safe means of access will be provided for each employee erecting or dismantling a scaffold where the provision of safe access is feasible and does not create a greater hazard. A competent person will determine whether it is feasible or would pose a greater hazard to provide, and have employees use a safe means of access. This determination will be based on site conditions and type of scaffold being erected or dismantled.

(h) Work on or from scaffolds is prohibited during storms or high winds unless a competent person has determined that it is safe for employees to be on the scaffold and those employees are protected by a personal fall arrest system or wind screens. Windscreens will not be used unless the scaffold is secured against the anticipated wind forces imposed.

42.5 Training Requirements

(a) Each employee who performs work while on a scaffold must be trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training will include the following areas, as applicable:

1. The nature of any electrical hazards, fall hazards and falling object hazards in the work area.
2. The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used.
3. The proper use of the scaffold, and the proper handling of materials on the scaffold.
4. The maximum intended load and the load carrying capacities of the scaffolds used.

(b) Employees involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold will be trained by a competent person to recognize any hazards associated with the work in question. The training will include the following topics, as applicable:

1. The nature of scaffold hazards.
2. The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold being used.
3. The design criteria, maximum intended load carrying capacity, and intended use of the scaffold.

(c) When there is reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, each such employee will be retrained. Retraining is required in at least the following situations:

1. Where changes at the worksite present a hazard about which the employee has not been previously trained.
2. Where changes in the types of scaffolds, fall protection, or other equipment present a hazard about which an employee has not been previously trained.
3. Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the information required.

42.6 General Requirements

(a) Capacity.

1. Each scaffold and scaffold component will be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

2. Scaffolds will be designed by a qualified person and will be constructed and loaded in accordance with that design.
3. Scaffold Platform Construction. Each platform on all working levels of scaffolds will be fully planked or decked between the front uprights and the guardrail supports as follows:

    - Each platform unit (scaffold plank, fabricated plank, fabricated deck, or fabricated platform) will be installed so that the space between adjacent units is no more than 1 inch wide, except where the employer can demonstrate that a wider space is necessary (for example, to fit around uprights when side brackets are used to extend the width of the platform).
    - Platforms will be planked or decked as fully as possible and the remaining open space between the platform and the uprights will not exceed 9 ½ inches.
    - Platforms used solely as walkways or solely by employees performing scaffold erection or dismantling are not required to be fully planked or decked as long as it will provide safe working conditions.

4. Each scaffold platform and walkway will be at least 18 inches wide.

    - Each ladder jack scaffold, top plate bracket scaffold, roof bracket scaffold, and pump jack scaffold will be at least 12 inches wide. There is no minimum width requirement for boatswains' chairs.
    - Where scaffolds must be in areas where platforms and walkways cannot at least be 18 inches wide, such platforms and walkways will be as wide as feasible, and employees on those platforms and walkways will be protected from fall hazards by the use of guardrails and/or personal fall arrest systems.

5. The front edge of all platforms will not be more than 14 inches from the face of the work, unless guardrail systems are erected along the front edge and/or personal fall arrest systems are used.

    - The maximum distance from the face for outrigger scaffolds will be 3 inches.
    - The maximum distance from the face for plastering and lathing operations will be 18 inches.

6. Each end of a platform, unless cleated or otherwise restrained by hooks or equivalent means, will extend over the centerline of its support at least 6 inches.
7. Each end of a platform 10 feet or less in length will not extend over its support more than 12 inches, unless the platform is designed and installed so that the cantilevered portion of the platform is able to support employees and/or materials without tipping, or has guardrails which block employees access to the cantilevered end.
8. Each end of a platform greater than 10 feet in length will not extend over its support more than 18 inches unless it is designed and installed so that the cantilevered portion of the platform is able to support employees without tipping, or has guardrails which block employee access to the cantilevered end.
9. On scaffolds where scaffold planks are abutted to create a long platform, each abutted end will rest on a separate support surface. This provision does not preclude the use of common support members, such as "T" sections, to support abutting planks, or hook on platforms designed to rest on common supports.
10. On scaffolds where platforms are overlapped to create a long platform, the overlap will occur only over supports, and will not be less than 12 inches unless the platforms are nailed together or otherwise restrained to prevent movement.
11. At all points of a scaffold where the platform changes direction, such as turning a corner, any platform that rests on a bearer at an angle other than a right angle will be laid first, and platforms which rest at right angles over the same bearer will be laid second, on top of the first platform.
12. Wood platforms will not be covered with opaque finishes, except that platform edges may be covered or marked for identification. Platforms may be coated periodically with wood preservatives, fire-retardant finishes, and slip resistant finishes; however, the coating may not obscure the top or bottom wood surfaces.
13. Scaffold components manufactured by different manufacturers will not be intermixed unless the components fit together without force and the scaffold's structural integrity is maintained by the user. Scaffold components manufactured by different manufacturers will not be modified in order to intermix them unless a competent person determines the resulting scaffold is structurally sound.
14. Scaffold components made of dissimilar metals will not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component.

(b) Criteria for Supported Scaffolds.

1. Supported scaffolds with a height to base width (including outrigger supports, if used) ratio of more than four to one will be restrained from tipping by guying, tying, bracing, or equivalent means, as follows:

- Guys, ties, and braces will be installed at locations where horizontal members support both inner and outer legs.
- Guys, ties, and braces will be installed according to the scaffold manufacturer's recommendations or at the closet horizontal member to the 4:1 height and be repeated vertically at locations of horizontal members every 20 feet or less thereafter for scaffolds 3 feet wide or less, and every 26 feet or less thereafter for scaffolds greater than 3 feet wide. The top guy, tie or brace of completed scaffolds will be placed no further than 4:1 (height from the top. Such guys, ties and braces will be installed at each end of the scaffold and at the horizontal intervals not to exceed 30 feet (measured from one end [not both] towards the other).
- Ties, guys, braces, or outriggers will be used to prevent the tipping of supported scaffolds in all circumstances where an eccentric load, such as a cantilevered work platform, is applied or is transmitted to the scaffold.

2. Supported scaffold poles, legs, posts, frames, and uprights will bear on base plates and mud sills or other adequate firm foundation.

- Adequate mud sills or other rigid footing, capable of withstanding the maximum intended load, must be used. All stationary metal scaffold legs, including those of outriggers, will rest upon base plates available from the manufacturer for this service. When the scaffold or outrigger is resting on earth or soft material, the base plates will rest on and be secured to the equivalent of a 2-inch by 10-inch by 10-inch wooden base.
- Unstable objects will not be used to support scaffolds or platform units.
- Unstable objects will not be used as working platforms.
- Front-end loaders and similar pieces of equipment will not be used to support scaffold platforms unless they have been specifically designed by the manufacturer for such use.
- Forklifts will not be used to support scaffold platforms unless the entire platform is attached to the forks and the forklift is not moved horizontally while the platform is occupied.

3. Supported scaffold legs, poles, posts, frames, and uprights will be plumb and braced to prevent swaying and displacement.

(c) Access.

1. When scaffold platforms are more than 2 feet above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers, stairway-type ladders (such as ladder stands), ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface will be used. Cross braces will not be used as means of access.
2. Portable, hook-on, and attachable ladders will be positioned so as not to tip the scaffold.

- Hook-on and attachable ladders will be positioned so that their bottom rung is not more than 24 inches above the scaffold supporting level.
- When hook-on and attachable ladders are used on a supported scaffold more than 35 feet high, they will have rest platforms at 35-foot maximum vertical intervals.
- Hook-on and attachable ladders will be specifically designed for use with the type of scaffold used.
- Hook-on and attachable ladders will have a minimum rung length of 11 ½ inches.
- Hook-on and attachable ladders will have uniformly spaced rungs with a maximum spacing between rungs of 16 3/4 inches.

3. Stairway-type ladders will be positioned such that their bottom step is not more than 24 inches above the scaffold supporting level.

- Stairway-type ladders will be provided with rest platforms at 12-foot maximum vertical intervals.
- Stairway-type ladders will have a minimum step width of 16 inches, except that mobile scaffold stairway-type ladders will have a minimum step width of 11 ½ inches
- All stairway-type ladders will have slip-resistant treads on all steps and landings.

4. Stair towers will be positioned such that their bottom step is not more than 24 inches above the scaffolding support.

- A stair rail consisting of a top rail and a midrail will be provided on each side of each scaffold stairway.

- The top rail of each scaffold system will also be capable of serving as a handrail, unless a separate handrail is provided.
- Handrails and top rails that serve as handrails will provide an adequate handhold for employees grasping them to avoid falling.
- Stair rail systems and handrails will be surfaced to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.
- The ends of stair rail systems and handrails will be constructed so that they do not constitute a projection hazard.
- Handrails and top rails that are used as handrails will be at least 3 inches from other objects.
- Stair rails will be not less than 28 inches or more than 37 inches from the upper surface of the stair rail to the surface of the tread.
- A landing platform at least 18 inches wide by at least 18 inches long will be provided at each level.
- Guardrails will be provided on the open sides and ends of each landing.
- Riser height will be uniform for each flight of stairs. Greater variations in riser height are allowed for the top and the bottom steps of the entire system, not for each flight of stairs.
- Tread depth will be uniform for each flight of stairs.

5. Ramps and walkways 6 feet or more above lower levels will have guardrail systems that comply with the Fall Protection section of this program.

    - No ramp or walkway will be inclined more than a slope of one (1) vertical to three (3) horizontally (20 degrees above the horizontal).
    - If the slope of a ramp or walkway is steeper than one (1) vertical in eight (8) horizontal, the ramp or walkway will have cleats not more than fourteen (14) inches apart which are securely fastened to the planks to provide footing.

6. Integrated prefabricated scaffold access frames will be specifically designed and constructed for use as ladder rungs.

    - They should have a rung length of at least 8 inches.
    - Be uniformly spaced within each frame section.
    - Be provided with rest platforms at 35-foot maximum vertical intervals on all supported scaffolds more than 35 feet high.

7. Steps and rungs of ladder and stairway type access will line up vertically with each other between rest platforms.
8. Direct access to or from another surface will be used only when the scaffold is not more than 14 inches horizontally and not more than 24 inches vertically from the outer surface.
9. Access for employees erecting or dismantling supported scaffolds will be in accordance with the following:

    - A safe means of access will be provided for each employee erecting or dismantling a scaffold where the provision of safe access is feasible and does not create a greater hazard. A competent person will determine whether it is feasible or would pose a greater hazard to provide, and have employees use a safe means of access. This determination will be based on site conditions and the type of scaffold being erected or dismantled.
    - Hook-on or attachable ladders will be installed as soon as scaffold erection has progressed to a point that permits safe installation and use.
    - When erecting and dismantling tubular welded frame scaffolds, (end) frames, with horizontal members that are parallel, level and are not more than 22 inches apart vertically may be used as climbing devices for access, provided they are erected in a manner that creates a usable ladder and provides good hand hold and foot space.
    - Cross braces on tubular welded frame scaffolds will not be used as a means of access or egress.

(d) Use.

1. Scaffolds and scaffold components will not be loaded in excess of their maximum intended loads or rated capacities, whichever is less.
2. The use of shore or lean-to scaffolds is prohibited.

3. Scaffolds and scaffold components will be inspected for visible defects by a competent person before each work shift, and after any occurrence that could affect a scaffold's structural integrity.
4. Any part of a scaffold damaged or weakened will be immediately repaired, replaced, or removed from service until repaired.
5. Scaffolds will not be moved horizontally while employees are on them, unless they have been designed by a registered professional engineer specifically for such movement.
6. The clearance between scaffolds and power lines will be as follows: Scaffolds will not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than as follows:

Insulated Lines, Voltage	Minimum Distance	Alternatives
Less than 300 volts 300 - 50 kv More than 50 kv	3 feet 10 feet 10 feet plus 4 inches for each 1 kv > 50 kv	Two times the length of the line insulator, but never less than 10 feet
Uninsulated Lines, Voltage	**Minimum Distance**	**Alternatives**
Less than 50 kv More than 50 kv	10 feet 10 feet plus 4 inches for each 1 kv over 50 kv	Two times the length of the line insulator, but never less than 10 feet

EXCEPTIONS: Scaffolds and materials may be closer to power lines than specified above where such clearance is necessary for performance of work, but only after the utility company, or electrical system operator, has been notified of the need to work closer and the utility company or electrical system operator has de-energized the lines, relocated the lines, or installed protective coverings to prevent accidental contact with the lines.

7. Scaffolds will be erected, moved, dismantled, or altered only under the supervision and direction of a competent person qualified in scaffold erection, moving, dismantling or alteration. Only experienced and trained employees selected for such work by the competent person will perform such activities.
8. Employees will be prohibited from working on scaffolds covered with snow, ice, or other slippery material except as necessary for removal of such materials.
9. Where swinging loads are being hoisted onto or near scaffolds such that the loads might contact the scaffold, tag lines or equivalent measures to control the loads will be used.
10. Suspension ropes supporting adjustable suspension scaffolds will be of a diameter large enough to provide sufficient surface area for the functioning of brake and hoist mechanisms.
11. Suspension ropes will be shielded from heat-producing processes. When acids or other corrosive substances are used on a scaffold, the ropes will be shielded, treated to protect against the corrosive substances, or will be of a material that will not be damaged by the substance being used.
12. Work on or from scaffolds is prohibited during storms or high winds unless a competent person has determined that it is safe for employees to be on the scaffold and those employees are protected by a personal fall arrest system or wind screens. Wind screens will not be used unless the scaffold is secured against the anticipated wind forces imposed.
13. Debris will not be allowed to accumulate on platforms.
14. Makeshift devices, such as but not limited to boxes and barrels, will not be used on top of scaffold platforms to increase the working level height of employees.
15. Ladders will not be used on scaffolds to increase the working level height of employees, except on large area scaffolds where the following criteria are satisfied:
    - When the ladder is placed against a structure that is not a part of the scaffold, the scaffold will be secured against the sideways thrust exerted by the ladder.
    - The platform units will be secured to the scaffold to prevent movement.
    - The ladder legs will be on the same platform or other means will be provided to stabilize the ladder against unequal platform deflection, and the ladder legs will be secured to prevent slipping or being pushed off the platform.
16. Platforms will not deflect more than 1/60 of the span when loaded.

17. To reduce the possibility of welding current arcing through the suspension wire rope when performing welding from suspended scaffolds, the following precautions will be taken, as applicable:

    - An insulated thimble will be used to attach each suspension wire rope to its hanging support such as an outrigger. Excess suspension wire rope and any additional independent lines from grounding will be insulated.
    - The suspension wire rope will be covered with insulated material extending at least feet above the hoist. If there is a tail line below the hoist, it will be insulated to prevent contact with the platform. The portion of the tail line that hangs free below the scaffold will be guided or retained, or both, so that it does not become grounded.
    - Each hoist will be covered with insulated protective covers.
    - In addition to a work lead attachment required by the welding process, a grounding conductor will be connected from the scaffold to the structure. The size of this conductor will be at least the size of the welding process work lead, and this conductor will not be in series with the welding process or the work piece.
    - If the scaffold grounding lead is disconnected at any time, the welding machine will be shut off.
    - An active-welding rod or uninsulated welding lead will not be allowed to contact the scaffold or its suspension system.

(e) Fall protection

1. Each employee on a scaffold more than 6 feet above a lower level will be protected from falling to that lower level. Listed below are the types of fall protection provided to employees on each type of scaffold:

    - Each employee on a boatswain's chair, catenary scaffold, float scaffold, needle beam scaffold, or ladder jack scaffold will be protected by a fall arrest system.
    - Each employee on a single-point or two-point adjustable suspension scaffold will be protected by both a personal fall arrest system and guardrail system.
    - Each employee on a crawling board (chicken ladder) will be protected by a personal fall arrest system, a guardrail system (with minimum 200 pound top rail capacity), or by a three-quarter inch diameter grabline or equivalent handhold securely fastened beside each crawling board.
    - Each employee on a self-contained adjustable scaffold will be protected by a guardrail system (with minimum 200 pound top rail capacity) when the platform is supported by the frame structure, and by both a personal fall arrest system and a guardrail system (with minimum 200 pound top rail capacity) when the platform is supported by ropes.
    - Each employee on a walkway located within a scaffold will be protected by a guardrail system (with minimum 200 pound top rail capacity) installed within 9-1/2 inches of and along at least one side of the walkway.
    - Each employee performing overhand bricklaying operations from a supported scaffold will be protected from falling from all open sides and ends of the scaffold (except at the side next to the wall being laid) by the use of a personal fall arrest system or guardrail system (with minimum 200 pound top rail capacity).
    - For other scaffolds not mentioned above, the use of fall arrest systems or guardrail systems will be used.

2. A competent person will determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Fall protection is required for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.
3. Personal fall arrest systems used on scaffolds will be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structure member. Vertical lifelines will not be used when overhead components, such as overhead protection or additional platform levels, are part of a single-point or two-point adjustable suspension scaffold.

    - When vertical lifelines are used, they will be fastened to a fixed safe point of anchorage, will be independent of the scaffold, and will be protected from sharp edges and abrasions. Safe points of anchorage include structural members of buildings, but do not include standpipes, vents, other piping systems, electrical conduit, outrigger beams, or counterweights.
    - When horizontal lifelines are used, they will be secured to two or more structural members of the scaffold, or they may be looped around both suspension and independent suspension lines (on scaffolds so equipped) above the hoist and brake attached to the end of the scaffold. Horizontal lifelines will not be attached only to the suspension ropes.

- When lanyards are connected to horizontal lifelines or structural members on a single-point or two-point adjustable suspension scaffold, the scaffold will be equipped with additional independent support lines and automatic locking devices capable of stopping the fall of the scaffold in the event one or both of the suspension ropes fail. The independent support lines will be equal in number and strength to the suspension ropes.
- Vertical lifelines, independent support lines, and suspension ropes will not be attached to each other, nor will they be attached to or use the same point of anchorage, nor will they be attached to the same point on the scaffold or personal fall arrest system.

4. Guardrail systems will be installed along all open sides and ends of platforms. Guardrail systems will be installed before the scaffold is released for use by employees other than erection/dismantling crews.

- The top edge height of top rails on supported scaffolds and on all suspended scaffolds where both a guardrail and a personal fall arrest system are required to be between 39 inches and 45 inches.
- When midrails, screens, mesh, intermediate vertical members, solid panels, or equivalent structural members are used, they will be installed between the top edge of the guardrail system and the scaffold platform
- When midrails are used, they will be installed at a height approximately midway between the top edge of the guardrail system and the platform surface.
- When screens and mesh are used, they will extend from the top edge of the guardrail system to the scaffold platform, and along the entire opening between the supports.
- When intermediate members are used, they will not be more than 19 inches apart.
- Each top rail or equivalent member of a guardrail system will be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along its top edge of at least 100 pounds for guardrail systems installed on single-point adjustable suspension scaffolds or two-point adjustable suspension scaffolds, and at least 200 pounds for guardrail systems installed on all other scaffolds.
- Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members of a guardrail system will be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along the midrail or other member of at least 75 pounds for guardrail systems with a minimum 100 pound top rail capacity, and at least 150 pounds for guardrail systems with a minimum 200 pound top rail capacity.
- Suspension scaffold hoists and non-walk-through stirrups may be used as end guardrails, if the space between the hoist or stirrup and the side guardrail or structure does not allow passage of an employee to the end of the scaffold.
- Guardrails will be surfaced to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.
- The ends of guardrails will not overhang the terminal posts except when such overhang does not constitute a projection hazard to employees.
- Steel or plastic banding will not be used as a top rail or midrail.
- Manila or plastic (or other synthetic) rope being used for top rails or midrails will be inspected by a competent person as frequently as necessary to ensure that it continues to meet the strength requirements.
- Cross bracing is acceptable in place of a midrail when the crossing point of two braces is between 20 inches and 30 inches above the work platform or as a top rail when crossing points of two braces is between 38 inches and 48 inches above the work platform. The end points at each upright will be no more than 48 inches apart.

(f) Falling Object Protection.

1. In addition to wearing hard hats, each employee on a scaffold will be provided with additional protection from falling hand tools, debris, and other small objects through the installation of toeboards, screens, or guardrail systems, or through the erection of debris nets, catch platforms, or canopy structures that contain or deflect the falling objects. When the falling objects are too large, heavy or massive to be contained or deflected by any of the above listed measures, such potential falling objects will be placed away from the edge of the surface from which they could fall and secured as necessary to prevent their falling.
2. Where there is danger of tools, materials, or equipment falling from a scaffold and striking employees below, the following provisions will apply:

- The area below the scaffold to which objects can fall will be barricaded, and employees will not be permitted to enter the hazard area, or
- A toeboard will be erected along the edge of platforms more than 10 feet above lower levels for a distance sufficient to protect employees below, except on float (ship) scaffolds where an edging of 3/4- by 1-1/2-in. wood or equivalent may be used in lieu of toeboards.
- Where tools, material or equipment are piled to a height higher than the top edge of the toeboard, paneling or screening extending from the toeboard or platform to the top of the guardrail will be erected for a distance sufficient to protect employees below.
- A guardrail system will be installed with openings small enough to prevent passage of potential falling objects.
- A canopy structure, debris net, or catch platform strong enough to withstand the impact forces of the potential falling objects will be erected over the employees below. Canopies when used for falling object protection, will comply with the following criteria:
  - Canopies will be installed between the falling object hazard and the employees.
  - When canopies are used on suspension scaffolds for falling object protection, the scaffold will be equipped with additional suspension ropes.
  - Independent support lines and suspension ropes will not be attached to the same points of anchorage.
- Where used, toeboards will be:
  - Capable of withstanding, without failure, a force of at least 50 pounds applied in any downward or horizontal direction at any point along the toeboard.
  - At least 3-1/2 inches high from the top edge of the toeboard to the level of the walking/working surface. Toeboards will be securely fastened in place at the outermost edge of the platform and have not more than 1/4-inch clearance above the walking/working surface. Toeboards will be solid or with openings not over 1 inch in the greatest dimension.

42.7 Additional Requirements Applicable to Specific Types of Scaffolds

(a) Tube and Coupler Scaffolds.

1. When platforms are being moved to the next level, the existing platform will be left undisturbed until the new bearers have been set in place and braced prior to receiving the new platforms.
2. Transverse bracing forming an “X” across the width of the scaffold will be installed at the scaffold ends and at least at every third set of posts horizontally and every fourth runner vertically. Bracing will extend diagonally from the inner or outer posts or runners upward to the next outer or inner posts or runners. Building ties will be installed at the bearer levels between the transverse bracing and will conform to the requirements of 1926.451(c)(1).
   On straight run scaffolds, longitudinal bracing across the inner and outer rows of posts will be installed diagonally in both directions, and will extend from the base of the end posts upward to the top of the scaffold at approximately a 45- degree angle. On scaffolds whose length is greater than their height, such bracing will be repeated beginning at least every fifth post. On scaffolds whose length is less than their height, such bracing will be installed from the base of the end posts upward to the opposite end posts, and then in alternating directions until reaching the top of the scaffold. Bracing will be installed as close as possible to the intersection of the bearer and post or runner and post.
   Where conditions preclude the attachment of bracing to posts, bracing will be attached to the runners as close to the post as possible.
   Bearers will be installed transversely between posts, and when coupled to the posts, will have the inboard coupler bear directly on the runner coupler. When the bearers are coupled to the runners, the couplers will be as close to the posts as possible.
   Bearers will extend beyond the posts and runners, and will provide full contact with the coupler.
   Runners will be installed along the length of the scaffold, located on both the inside and outside posts at level heights (when tube and coupler guardrails and midrails are used on outside posts, they may be used in lieu of outside runners).

Runners will be interlocked on straight runs to form continuous lengths, and will be coupled to each post. The bottom runners and bearers will be located as close to the base as possible.
Couplers will be of structural metal, such as dropforged steel, malleable iron, or structural grade aluminum. The use of gray cast iron is prohibited.
Tube and coupler scaffolds over 125 feet in height will be designed by a registered professional engineer, and will be constructed and loaded in accordance with such design.

(b) Fabricated Frame Scaffolds (Tubular Welded Frame Scaffolds).

1. When moving platforms to the next level, the existing platform will be left undisturbed until the new end frames have been set in place and braced prior to receiving the new platforms.
2. Frames and panels will be braced by cross, horizontal, or diagonal braces, or combination thereof, which secure vertical members together laterally. The cross braces will be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, level, and square. All brace connections will be secured.
3. Frames and panels will be joined together vertically by coupling or stacking pins or equivalent means.
4. Where uplift can occur which could displace scaffold end frames or panels, the frames or panels will be locked together vertically by pins or equivalent means.
5. Brackets used to support cantilevered loads will:
    - Be seated with side-brackets parallel to the frames and end-brackets at 90 degrees to the frames.
    - Not be bent or twisted from these positions.
    - Be used only to support personnel, unless the scaffold has been designed for other loads being placed on the bracket-supported section of the scaffold.
6. Scaffolds over 125 feet in height above their base plates will be designed by a registered professional engineer and will be constructed and loaded in accordance with such design.

(c) Mobile Scaffolds.

1. Scaffolds will be braced by cross, horizontal, or diagonal braces, or combination thereof, to prevent racking or collapse of the scaffold and to secure vertical members together laterally so as to automatically square and align the vertical members. Scaffolds will be plumb, level, and squared. All brace connections will be secured.
2. Scaffold casters and wheels will be locked with positive wheel and/or wheel and swivel locks, or equivalent means, to prevent movement of the scaffold while the scaffold is used in a stationary manner.
3. Manual force used to move the scaffold will be applied as close to the base as practical, but not more than 5 feet above the supporting surface.
4. Power systems used to propel mobile scaffolds will be designed for such use. Forklifts, trucks, similar motor vehicles or add-on motors will not be used to propel scaffolds unless the scaffold is designed for such propulsion systems.
5. Scaffolds will be stabilized to prevent tipping during movement.
6. Employees will not be allowed to ride on scaffolds unless the following conditions exist.
    - The surface on which the scaffold is being moved is within 3 degrees of level, and free of pits, holes, and obstructions.
    - The height to base width ratio of the scaffold during movement is two to one or less, unless the scaffold is designed and constructed to meet or exceed nationally recognized stability test requirements.
    - Outrigger frames, when used, are installed on both sides of the scaffold.
    - When power systems are used, the propelling force is applied directly to the wheels, and does not produce a speed in excess of 1 foot per second.
7. Platforms will not extend outward beyond the base supports of the scaffold unless outrigger frames or equivalent devices are used to ensure stability.
8. Where leveling of the scaffold is necessary, screw jacks or equivalent means will be used.
9. Caster stems and wheel stems will be pinned or otherwise secured in scaffold legs or adjustment screws.
10. Before a scaffold is moved, each employee will be made aware of the move.

42.8 Exhibits/Attachments

Scaffold Release Form, Attachment 25

Attachment 25. Scaffold Release Form

SCAFFOLD RELEASE FORM

TO: _____

In consideration of the permission granted to us by you for use of the scaffold erected by you or your Subcontractor at _____ located at_____.

We hereby assume the entire responsibility and liability for any and all damage or injury of any kind or nature whatsoever (including death resulting there from) to all persons, whether our employees or otherwise, and to all property caused by, resulting from, arising out of, or occurring in connection with our use or operation of the said scaffold while in our use or under our control or resulting from our use of the condition of the said scaffold or the ways, works or machinery. Except to the extent, if any, expressly prohibited by statute, should any claims for such damage or injury (including death resulting there from) be made or asserted, whether or not such claims are based upon _____ alleged active or passive negligence or participation in the wrong or upon any alleged breach of any statutory duty or obligation on the part of _____, we agree to indemnify and save harmless _____, its Officers, Agents, Servants and Employees from and against any and all such claims, and further from and against any and all loss, cost, expense, liability, damage or injury, including legal fees and disbursements, that _____, its Officers, Agents, Servants or Employees may directly or indirectly sustain, suffer or incur as a result thereof. We agree to and do hereby assume, on behalf of _____, its Officers, Agents, Servants and Employees, the defense of any action at law or in equity which may be brought against _____, its Officers, Agents, Servants and Employees upon or by reason of such claims and to pay on behalf of _____, its Officers, Agents, Servants and Employees, upon its demand, the amount of any judgment that may be entered against _____, its Officers, Agents, Servants and Employees in any such action.

We will also assume and pay the cost of any repairs to said scaffold which may be made necessary by our use or possession thereof. It is expressly agreed that such permission to use said scaffold shall in no way or manner affect the terms of any other contract between us.

Your permission may be revoked upon notice to us at our principal office or to our Superintendent or other representative at the project.

_____
Principal

Date _____

By _____
Authorized Representative

_____
Title

43. Severe Weather

43.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to protect their employees and projects in situations of severe weather conditions.

43.2 Definitions

Not applicable.

43.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

43.4 General Requirements

Not applicable.

43.5 Implementation

A contingency plan should be in place to deal with excessive rain, floods or high winds. The owner may want to be involved in the decision process when severe weather is forecast. Individual situations will vary but the guidelines below may be helpful:

(a) All winds over 30 mph. All rigging of forms or flat-sided materials should be discontinued until wind subsides.

(b) All winds over 35 mph. All crane operations should be stopped and not resumed until winds are below 30 mph.

(d) Flooding.

1. The Site Superintendent should establish a control station for operations.
2. Set gang boxes, safety skips, and miscellaneous items on trucks or move to higher elevations.
3. If possible, have all craft people remove their personal tools.
4. Tow mobile items such as welders and compressors out of the floodplain.
5. Remove equipment such as electric welding machines, gas driven pumps, and concrete vibrators.

6. Remove diesel and gasoline tanks, curing compound, and propane tanks, as well as other containers of petroleum products.
7. Make sure that life rings, life jackets and a motorized boat are available where appropriate.
8. Disconnect power to the area.

43.6 Exhibits/Attachments

Not applicable.

44. Emergency Procedures

44.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to implement procedures to respond emergencies at the construction site, in accordance with WAC 296-155-17309.

44.2 Definitions

Not applicable

44.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

44.4 General Requirements

Vancouver Energy, implements construction site emergency procedures tiered from its operations emergency response plan (see OP.02 Operations Safety Program, Section 3.1 – Emergency Response Plan [Operations ERP]). The Operations ERP identifies emergency situation which may occur not only during operations, but also during construction, including but not limited to:

- Evacuation procedures
- Fire and/or explosion
- Product spill
- Severe weather
- Earthquake or volcanic action
- Medical emergencies
- Communicable diseases, and epidemic/pandemic
- Security incidents
- Bomb and/or terrorism threats

A site-wide construction emergency plan is managed by the SHE&Q manager. Upon mobilization of each new contractor the plan is reviewed to ensure consistent emergency procedures are implemented throughout the site. It is the responsibility of each contractor (and subcontractor) to familiarize themselves with the elements of the plan and implement the plan's procedures.

A site evacuation procedure and site evacuation route maps (Attachment 26) is part of the contractor employee and visitor safety orientation plan and addressed in the daily/weekly safety meetings.

Upon final configuration of construction areas and updated as construction progresses, the evacuation route map should include (see sample Attachment 26).

- Your location “you are here”
- Site plan, with “North “ direction symbol
- Safe refuge/assembly areas
- Site evacuation route
- Rally/meeting point
- Emergency phone numbers/contacts
- Posted in permanent and temporary jobsite buildings

The jobsite has local emergency contact information posted. This information includes the telephone number of the local hospital, police and fire departments. Information is conspicuously posted at the job site, in all office and change trailers, and adjacent to telephones. The Site Superintendent is responsible in ensure this information is obtained and posted at designated locations under each contractor’s control prior to the start of construction activities.

Construction work is occurring within the Port where existing tenants conduct ongoing operations. Adjacent operations may be a source of hazard exposure, either resulting from intrinsic operations, or from tenant traffic within the Port relative to such operations. Constant awareness of the nearby facilities is maintained, and communication plans are in place to ensure the SHE&Q manager, and subsequently project managers and site superintendents are notified of an emergency situation at an adjacent Port tenant’s operation.

The SHE&Q manager arranges for additional training or drills as construction site conditions change through project completion. Additionally, the SHE&Q manager coordinates closely with the senior project manager and the Vancouver Energy Director of Operations when portions of the site transition to the operational phase to ensure appropriate notification of and response to emergencies when concurrent operations and construction activities are occurring.

44.5 Emergency Procedures

See - OP.02 Operations Safety Program, Section 3.1 – Emergency Response Plan (Operations ERP).

44.18 Temporary Barricades

Temporary barricades will be erected and maintained to warn or protect workers whenever hazards or processes such as those listed below are encountered on the project. This list includes, but is not limited to the following.

- Floor or wall openings
- Working above other workers
- Open excavations/trenches
- Unguarded equipment
- Overhead loads
- Closed stairwells
- Exposure to vehicular traffic
- Startup operations and testing of equipment/systems
- Process hazards such as discharges, open systems, etc.

When barricading is required, the following guidelines should be followed.

- **Yellow “Caution” tape** is used to limit the passage of workers through the barricaded area. This barricading should only be used to protect workers from hazards that are not severe or the potential for severe injury or death is unlikely.

- **Red “Danger” tape** is used to prohibit the passage of unauthorized workers through the barricaded area. This barricading should be used to protect workers from hazards that have the potential to cause serious injury or death. Red Danger tape is **NOT a substitute for a guard rail.** Danger tape is not to be used if the hazards cannot be eliminated or removed during a single work shift.
- **Rigid barricades** are used when protection is required beyond a work shift or longer. It will be used to protect workers from unguarded moving machinery/equipment, vehicular or heavy equipment traffic and low light conditions. Rigid barricading will consist of standard guardrail, temporary chain link fencing, and tube and coupler scaffold members with blue construction fencing attached and concrete.

When using “Caution” or “Danger” tape barricading:

- Install at least 15feet from excavations, trenches, holes, leading edges and floor or wall openings.
- Install a standard “Caution” or “Danger” sign that identifies the hazard at regular intervals around the barricaded area and the name and contact information that erected the barricade.
- Do not impede stairs, walkways, driveways or aisles without notifying and identifying alternative passageways.
- The barricade tag or signage will be approved by the site superintendent prior to posting on a barricade.

When using rigid barricading:

- Support and maintain construction fencing to prevent tipping or sagging.
- Install pins in concrete barriers whenever there is a danger of vehicles or heavy equipment striking them.
- Provide adequate access to the work area.

When work is complete and the hazard is eliminated, remove the barricading immediately. Workers who enter a “Danger” or “Radiation” barricaded work area without authorization will be subject to disciplinary action.

44.19 Exhibits/Attachments

(a) Evacuation Plan Samples, Attachment 26 (5 figures)

(b) Master Chemical and Substance Inventory List, Attachment 27

(c) Barricade Tag, Attachment 28

Attachment 26. Sample Evacuation Plan

(five figures)

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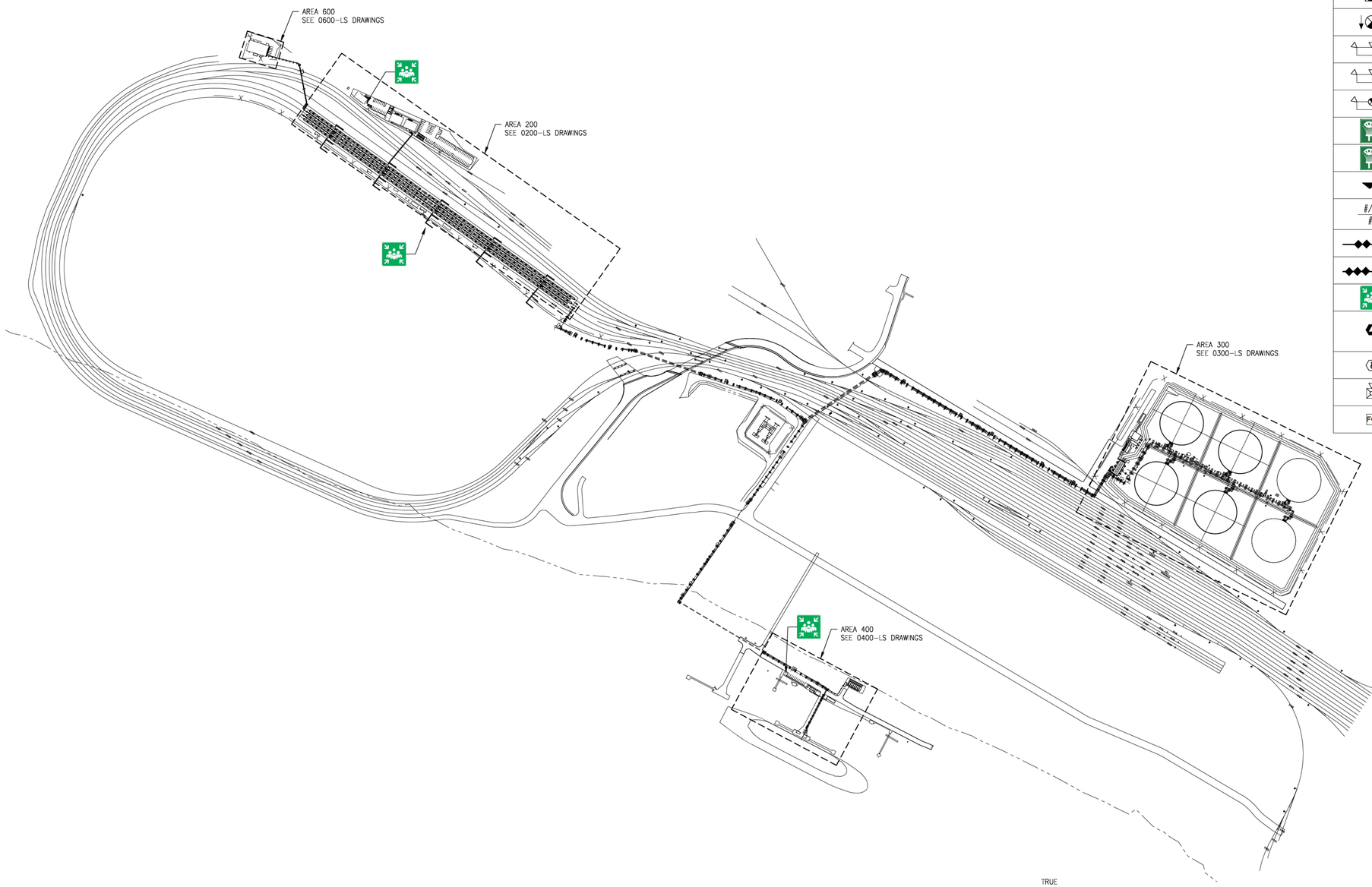
OFF-SITE EVACUTATION:
ALONG NW OLD LOWER RIVER
RD, APPROX. 500 FEET
NORTHWEST OF THE MAIN OFFICE



SYMBOLS LEGEND	DESCRIPTION	PROTECTIVE ELEMENTS
	DRY CHEMICAL EXTINGUISHER – ABC TYPE	
W	DRY CHEMICAL EXTINGUISHER – ABC TYPE – WHEELED	
	ILLUMINATED EXIT SIGN	
	EMERGENCY LIGHT – BATTERY POWERED	
EP	EMERGENCY LIGHT – BATTERY POWERED – EXPLOSION PROOF	
	COMBINED BATTERY POWERED EMERGENCY LIGHT AND ILLUMINATED EXIT SIGN	
	EYE WASH STATION – HEATED	
P	EYE WASH STATION – PORTABLE	
	EXIT – EXTERIOR	
#/#" #"	ACCUMULATED EXIT WIDTH AT REQUIRED EXIT (CLEAR WIDTH)	OCCUPANTS / REQUIRED WIDTH PROVIDED WIDTH (BASED ON MOST RESTRICTIVE EXIT COMPONENT)
	2 HOUR FIRE BARRIER	
	3 HOUR FIRE BARRIER	
	MUSTER POINT	
X	GAS DETECTOR	GAS DETECTOR SETTINGS: CH4: LOW/10%LEL HIGH/30%LEL H2S: LOW/10ppm HIGH/15ppm 02: LOW/19% HIGH/24%
	SMOKE DETECTOR	
	HORN/STROBE	
FO	FOAM RELEASE MANUAL SWITCH	

GENERAL NOTES:

1. THESE DRAWINGS ARE CONCEPTUAL IN NATURE AND ARE ONLY MEANT TO SHOW THE DESIGN INTENT.
2. THE EQUIPMENT PLACEMENT SHOWN IS FOR DIAGRAMMATIC PURPOSES ONLY. THE ENGINEER RESPONSIBLE FOR THE INSTALLATION SHALL MAKE ANY FINAL DETERMINATIONS ON DEVIATIONS FROM THIS LAYOUT.
3. ALL EQUIPMENT TO BE INSTALLED SHALL BE IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE (2012), INTERNATIONAL FIRE CODE (2012), NFPA 10 (2010), NFPA 30 (2012), ANSI Z358.1 (2009), AND OTHER APPLICABLE CODES AND STANDARDS, OR AS REQUIRED BY THE "AHJ".
4. EXTINGUISHERS LOCATED IN E-HOUSES ARE ALLOWED TO BE CO_2.
5. FIRE EXTINGUISHERS LOCATED OUTSIDE OR EXPOSED TO WEATHER SHALL BE PROTECTED BY AN ENCLOSURE OR PROTECTIVE COVER.

1 LIFE SAFETY SITE PLAN
SCALE: 1" = 300'

TRUE NORTH

0 300' 600'

Poole Fire Protection
19910 West 161st Street
Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

JOHN W. POOLE III
STATE OF WASHINGTON
14993
REGISTERED
PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

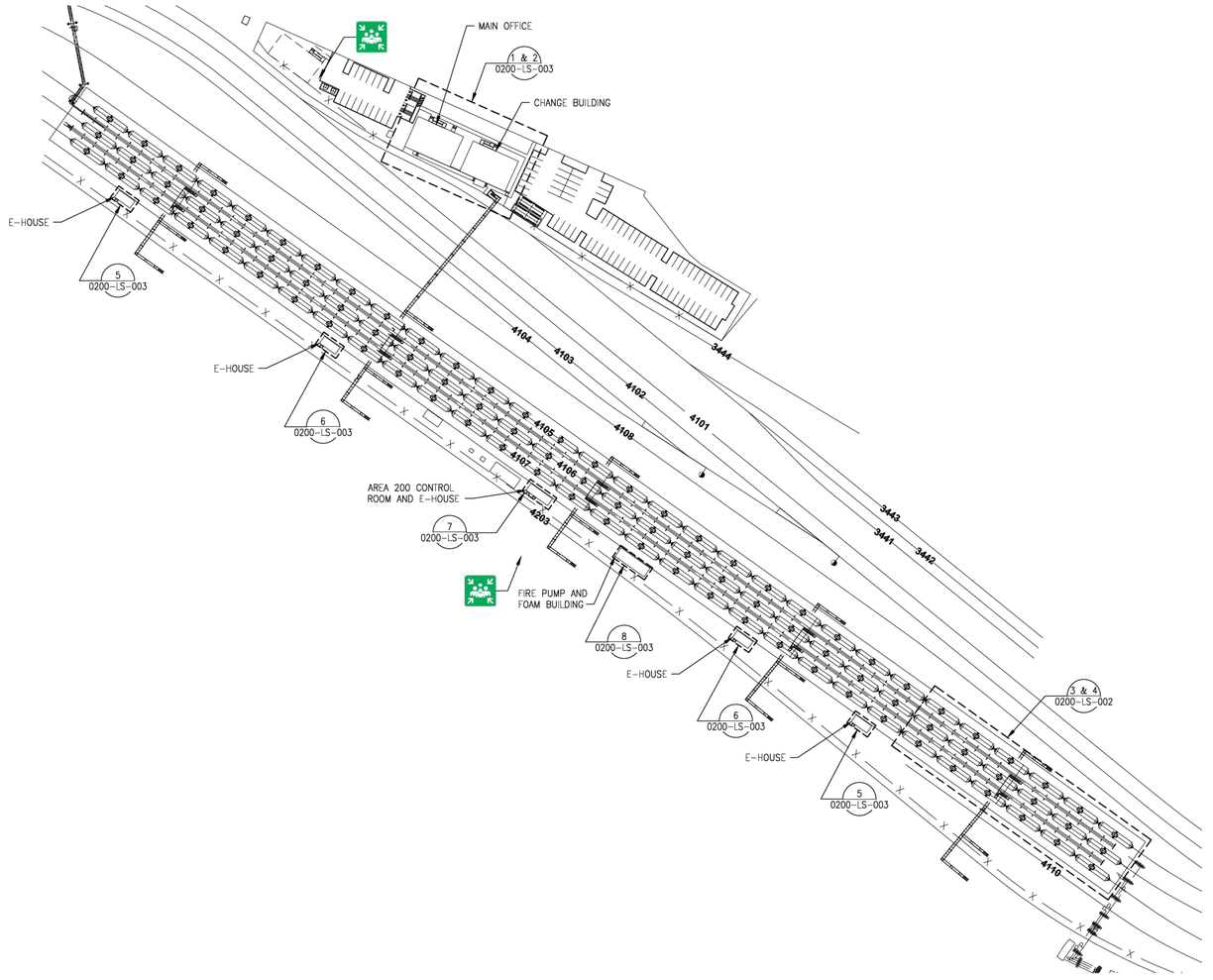
VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/31/2014	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0100-LS-001	1/1	A



1 AREA 200 – LIFE SAFETY SITE PLAN
SCALE: 1" = 100'

TRUE NORTH

0 100' 200'

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913.829.8650 office ▲ 913.829.8690 fax

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Tesoro Savage Petroleum Terminal LLC

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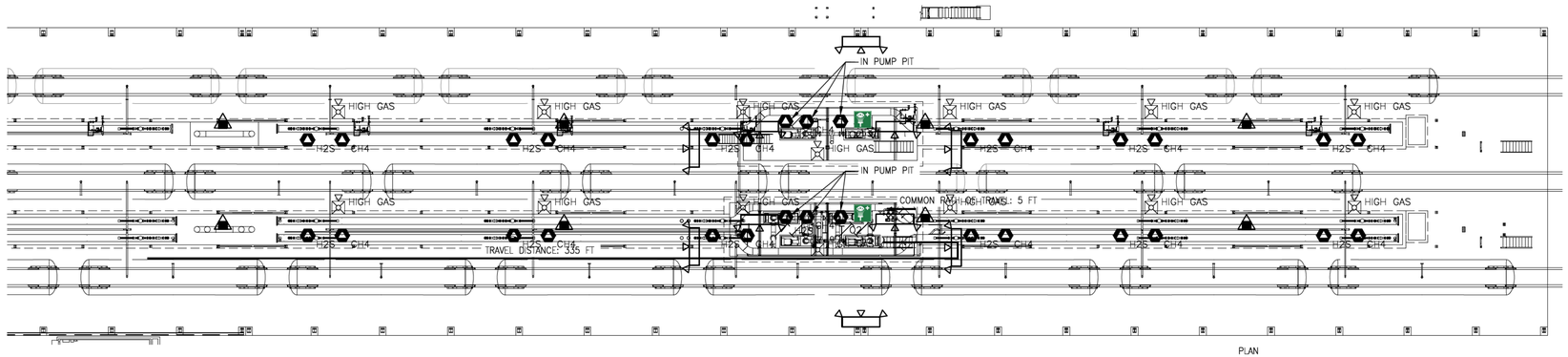
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0200-LS-001	1/1	A



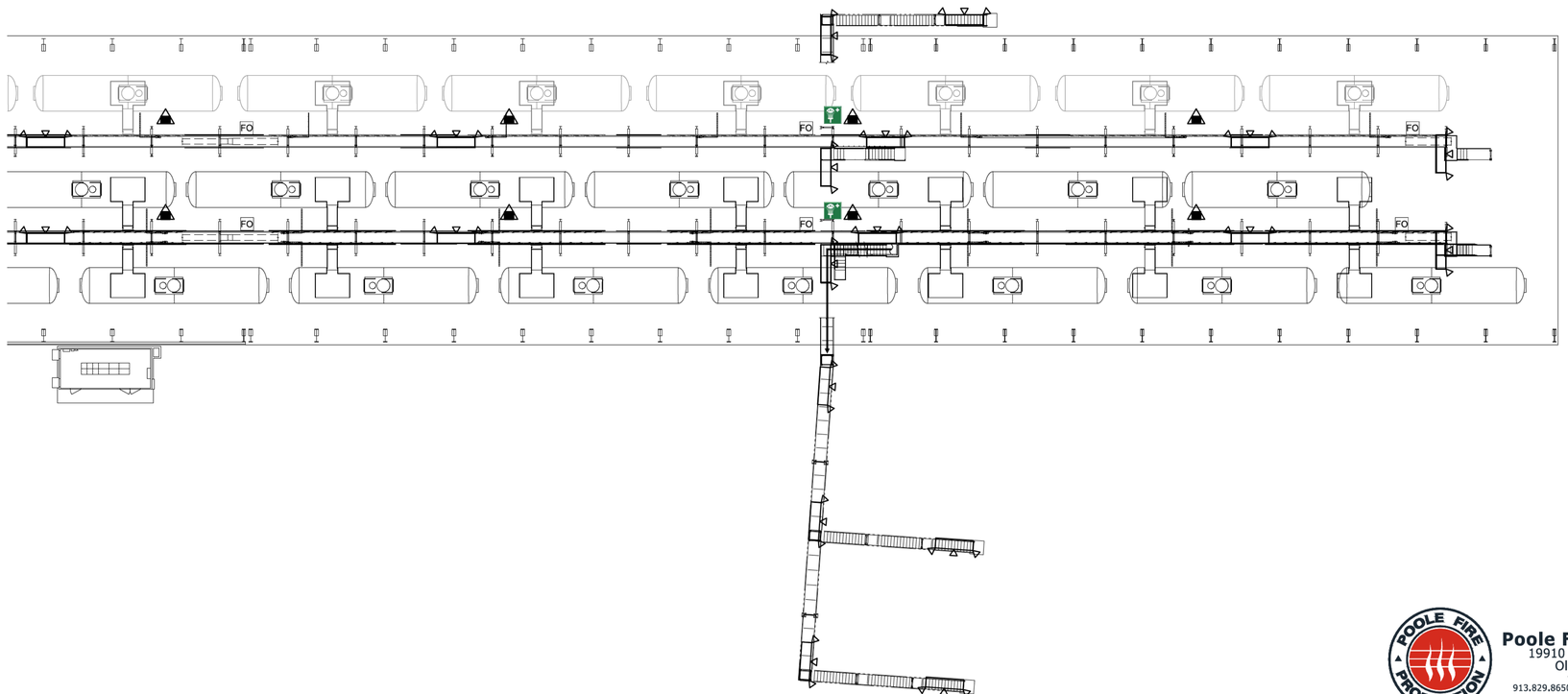
3 AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLAN @ T/RAIL EL 32'–6"

SCALE: 1" = 20'

0 20' 40'

PLAN TRUE NORTH

TRUE NORTH



4 AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLAN @ EL 57'–8"

SCALE: 1" = 20'

0 20' 40'

PLAN TRUE NORTH

TRUE NORTH

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19910 West 161st Street
Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

PERMIT SET
NOT FOR CONSTRUCTION

JOHN W. POOLE III — STATE OF WASHINGTON — 14992 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 200 – TYPICAL LIFE SAFETY UNLOADING BUILDING PLANS

DESIGN:	R. BENNETT	START DATE:	4/29/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0200-LS-002	1/1	A

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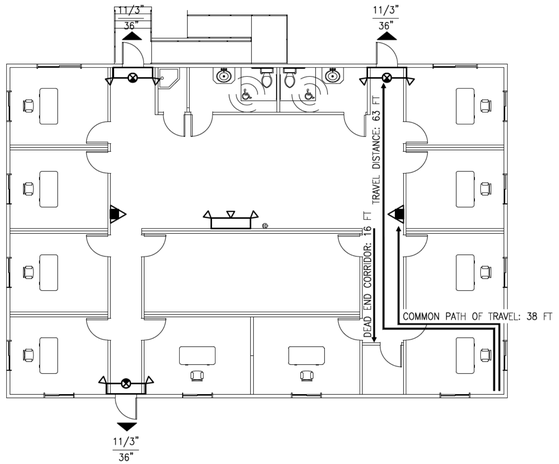
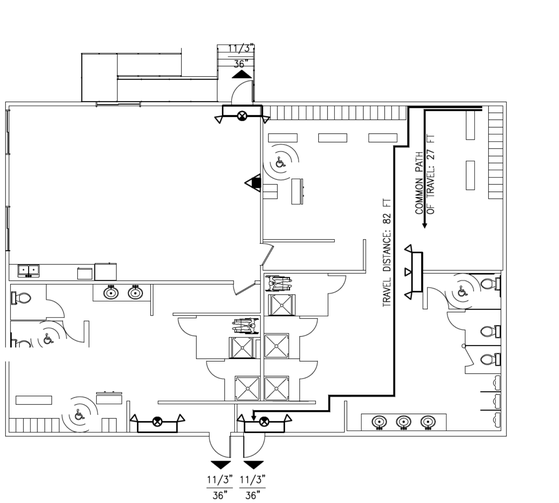
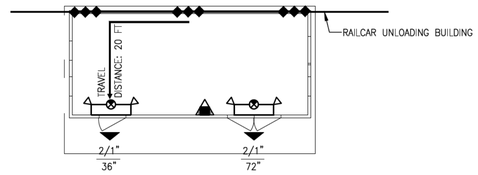


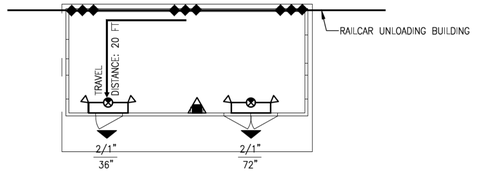
1 AREA 200 – LIFE SAFETY OFFICE BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN TRUE NORTH



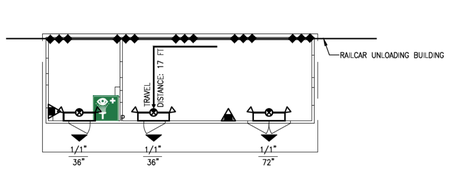
2 AREA 200 – LIFE SAFETY CHANGE BUILDING PLAN
SCALE: 1" = 10'
0 10' 20'
PLAN TRUE NORTH



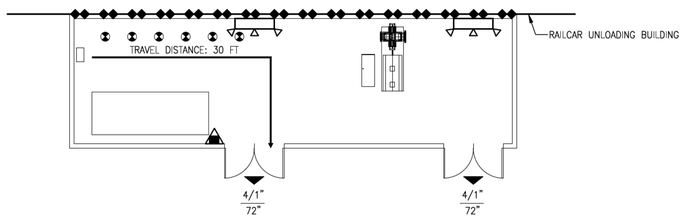
5 AREA 200 – LIFE SAFETY E-HOUSE 1 & 5 PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH



6 AREA 200 – LIFE SAFETY E-HOUSE 2 & 4 PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH



7 AREA 200 – LIFE SAFETY CONTROL ROOM/E-HOUSE 3 PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH



8 AREA 200 – LIFE SAFETY FIRE PUMP AND FOAM BUILDING PLAN
SCALE: 1/8" = 1'-0"
0 4' 8' 16'
PLAN TRUE NORTH

PERMIT SET
NOT FOR CONSTRUCTION

Poole Fire Protection
19910 West 161st Street
Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

JOHN W. POOLE III — STATE OF WASHINGTON — 14993 — REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

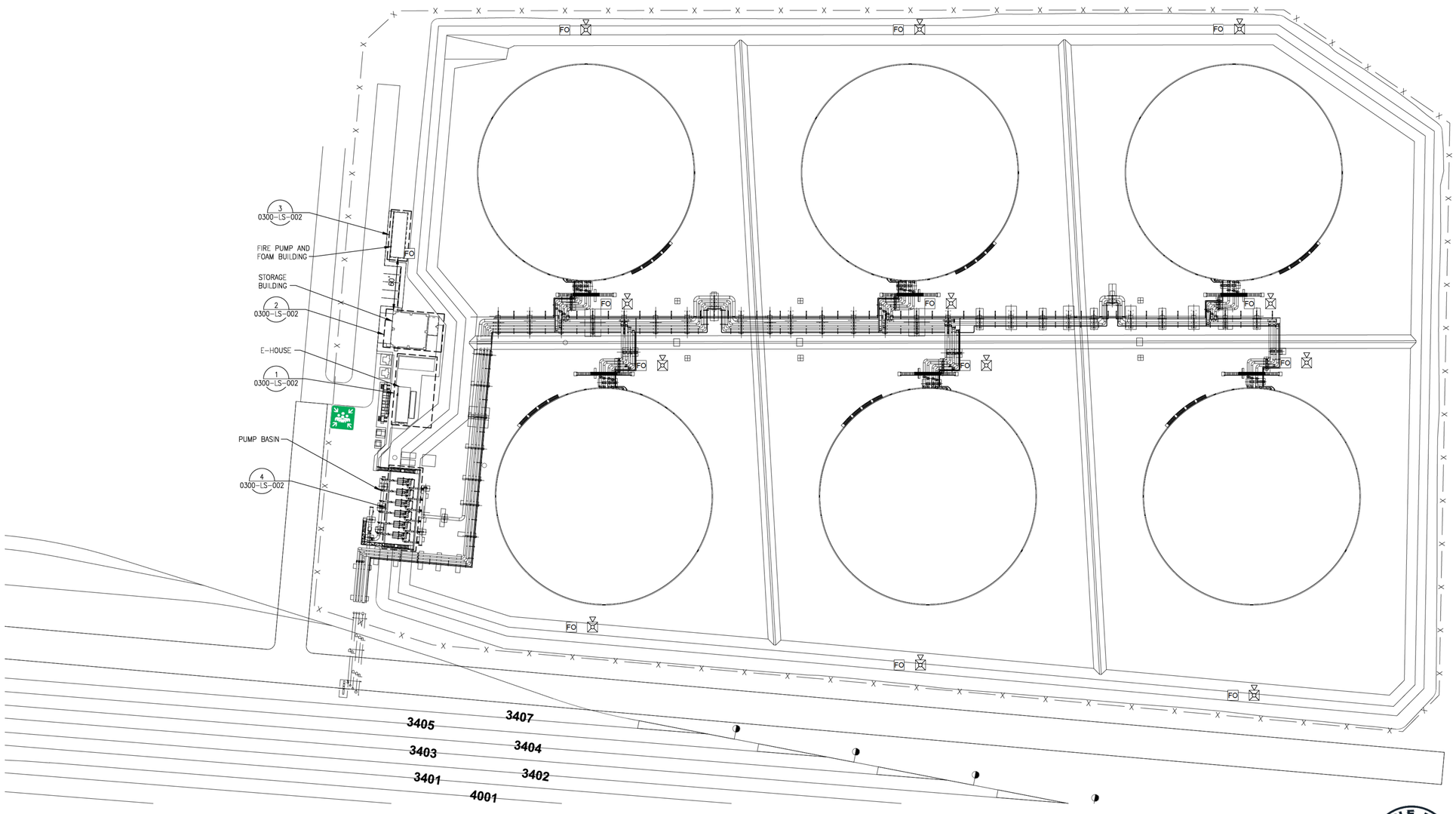
PROJECT: TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: AREA 200 – LIFE SAFETY PLANS

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER: 0200-LS-003 | SHEET: 1/1 | REV.: A

1 2 3 4 5 6 7 8 9



1 AREA 300 – LIFE SAFETY SITE PLAN
SCALE: 1" = 60'

PLAN NORTH
TRUE NORTH

0 60' 120'

Poole Fire Protection
19910 West 161st Street
Olathe, KS 66062
www.poolefire.com
913.829.8650 office ▲ 913.829.8690 fax

JOHN W. POOLE III
STATE OF WASHINGTON
14993
REGISTERED
PROFESSIONAL ENGINEER

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
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VANCOUVER ENERGY
Tesoro Savage Petroleum Terminal LLC

PROJECT:
TESORO SAVEAG VANCOUVER ENERGY DISTRIBUTION TERMINAL
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
AREA 300 – LIFE SAFETY SITE PLAN

DESIGN:	R. BENNETT	START DATE:	3/30/2015	SCALE:	AS NOTED
DRAWN:	D. FLAGOR	PRINT DATE:	04-30-2015	PROJECT MANAGER:	L. POOLE
CHECKED:	J. POOLE	APPROVED:	J. POOLE	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
0300-LS-001	1/1	A

Attachment 27. Master Chemical and Substance Inventory List

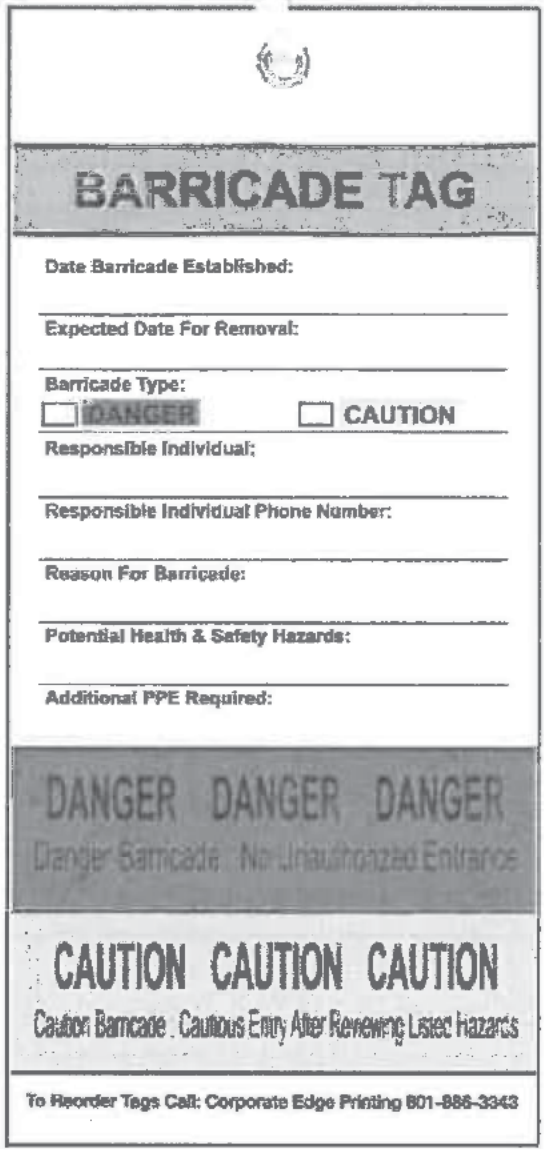
MASTER CHEMICAL AND SUBSTANCE INVENTORY LIST

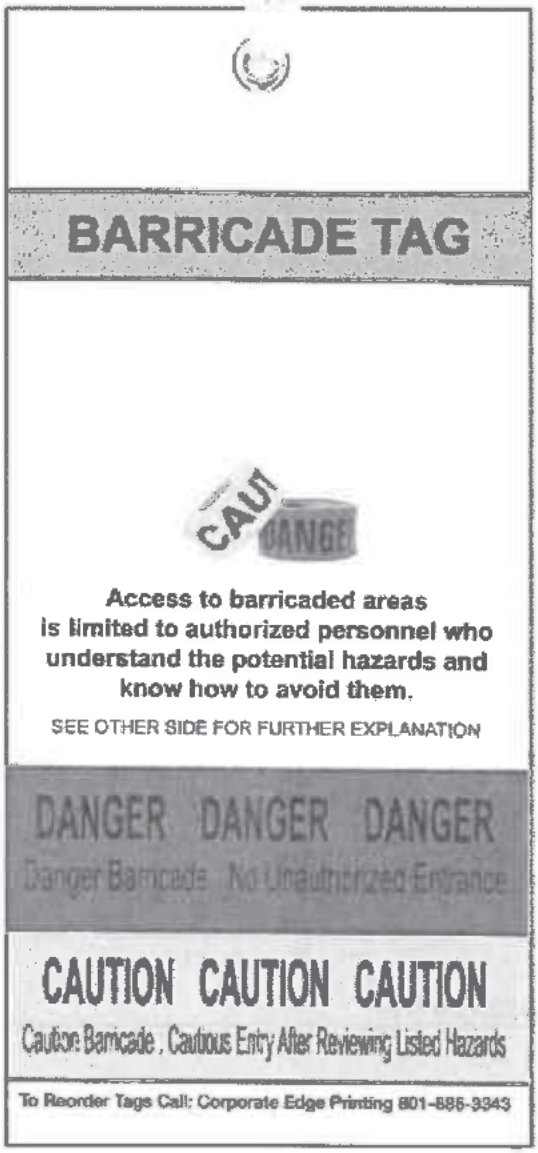
SUBCONTRACTOR: **DATE OF UPDATE:**

DATE	BRAND NAME	MANUFACTURER	CHEMICAL NAME

Attachment 28. Barricade Tag

BARRICADE TAG





45. Trenching and Excavation

45.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors for trenching and excavation.

45.2 Definitions

(a) Competent Person: A person who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

(b) Excavation: As any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal.

(c) Trench: A narrow underground excavation that is deeper than it is wide, and is no wider than 15 feet (4.5 meters).

45.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

45.4 General Requirements

(a) Prior to any ground disturbance, including trenching and excavation activities, utilities will be located in accordance with the requirements of RCW 19.22.

(b) Do not enter an unprotected trench.

(c) WISHA requires that trenches 4 feet deep or greater require a protective system unless the excavation is made entirely in stable rock. Trenches 20 feet deep or greater require that the protective system be designed by a registered professional engineer or be based on tabulated data prepared and/ or approved by a registered professional engineer. General requirements also include

- Keep heavy equipment away from trench edges.
- Keep surcharge loads at least 2 feet (0.6 meter) from trench edges.
- Know where underground utilities are located.
- Test for low oxygen, hazardous fumes and toxic gases.
- Inspect trenches at the start of each shift.
- Inspect trenches following a rainstorm.
- Do not work under raised loads.

45.5 Implementation

(a) Checklist. Prior to the start of any trench or excavation work over 5 feet in depth, a trench and excavation checklist must be completed. A sample trenching and excavation checklist is included in this section. The completed form must be maintained as part of the permanent project file and maintained by the Project Engineer or the designee.

(b) Competent Person.

1. The Competent Person has the authority to stop work when he or she deems the trench or excavation unsafe. A Competent Person must be designated whenever a trench or excavation is opened.
2. The Competent Person will perform required inspection of the trench or excavation using the form included in this section. The completed inspection form will be maintained as part of the permanent project file by the Project Engineer or the designee.
3. Prior to the start of a trench or excavation, unless designed by a registered professional engineer, the Competent Person will complete a Soil Analysis Checklist. A sample checklist is included in this section.

(c) Soil Classification and Protective Systems.

1. The soil must be classified by the competent person as stable rock, Type A, B, or C as defined in the WISHA regulations.
2. Once the soil is classified, the appropriate sloping, benching, shoring or shielding method can be selected. Situations that do not conform to those allowed must have a protective system designed by a registered professional engineer.

(d) Access and Egress.

1. Suitable means of access and egress (stairway, ladder, ramp or other safe means) must be located so as to require no more than 25 feet of lateral travel for employees.
2. A Competent Person must design structural ramps for people working in the trench.
3. A registered professional engineer must design structural ramps for equipment.

(e) Hazardous Atmospheres.

1. Where oxygen deficiency and/or a hazardous atmosphere could reasonably be expected to exist, the atmosphere in the excavation must be tested before employees are allowed to enter.

(f) Inspections.

1. When employee exposure can reasonably be anticipated, daily inspections must be made by a Competent Person for evidence of a situation that could result in:
    - Possible cave ins;
    - Failure of a protective system;
    - Hazardous atmospheres, or
    - Other hazardous conditions.
2. Inspections must be made after every rainstorm or other hazard-increasing occurrence.
3. If a hazard is indicated, the employees must be removed from the area until appropriate corrective measures have been taken.

(g) Walkways.

1. Where employees or equipment are required or allowed to cross over a ` trench, a walkway must be provided.
2. Where walkways are more than six feet above lower levels, guardrails must be included.

(h) Surface Protection.

1. Where people or equipment could fall into the excavation, adequate protection in the form of barricades or stop-logs must be put in place.
2. Excavated material must be piled at least two feet back from the edge.
3. Appropriate steps must be taken to protect the public from entry into excavations and trenches.

45.6 Exhibits/Attachments

(a) Soils Analysis Checklist, Attachment 29

(b) Excavation Checklist, Attachment 30

(c) OSHA Trench Inspection Report, Attachment 31

Attachment 29. Soils Analysis Checklist

SOILS ANALYSIS CHECKLIST

This checklist must be completed when soil analysis is made to determine the soil type(s) present in the excavation. A separate analysis must be performed if the excavation (trench) is stretched over a distance where soil type changes.

SITE LOCATION:		
DATE:	TIME:	COMPETENT PERSON:
WHERE WAS THE SAMPLE TAKEN FROM:		
SOIL CLASSIFICATION:	EXCAVATION DEPTH:	EXCAVATION WIDTH:

VISUAL TEST
Particle type: ☐ Fine grained (cohesive) ☐ Granular (sand/silt or gravel)
Water conditions: ☐ Dry ☐ Wet ☐ Seeping ☐ Water ☐ Surface water ☐ Submerged
Previously disturbed soils: ☐ Yes ☐ No
Underground utilities: ☐ Yes ☐ No If yes, what type?
Layered soils? ☐ Yes ☐ No NOTE: The least stable layer controls soil classification.
Layered soils dipping into excavation: ☐ Yes ☐ No ☐ Unknown
Excavation exposed to vibrations: ☐ Yes ☐ No If yes, from what?_____
Crack like openings or spalling observed: ☐ Yes ☐ No
Conditions that may create a hazardous atmosphere: ☐ Yes ☐ No If yes, identify condition and source:_____
Surface encumbrances: ☐ Yes ☐ No If yes, what type?_____
Work to be performed near vehicular traffic: ☐ Yes ☐ No
Possible confined space exposure: ☐ Yes ☐ No

MANUAL TEST
Plasticity: ☐ Cohesive ☐ Non-cohesive
Dry strength: ☐ Granular (crumbles easily) ☐ Cohesive (broken with difficulty)
Wet shake: Water at surface (granular material)_____ Surface remains dry (clay material)_____

NOTE: The following unconfined compressive strength tests should be performed on undisturbed soils. (Either the thumb test or the penetrometer/shearvane)

Thumb Test used to estimate unconfined compressive strength of cohesive soil:
Test performed: ☐ Yes ☐ No
☐ Type A -- soil indented by thumb with very great effort.
☐ Type B -- soil indented by thumb with some effort.
☐ Type C -- soil easily penetrated several inches by thumb with little or no effort. If soil is submerged, seeping water, subjected to surface water, runoff, exposed to wetting.
Penetrometer or Shearvane used to estimate unconfined compressive strength of cohesive soils:
Test performed: ☐ Yes ☐ No Device used:_____
☐ Type A -- soil with unconfined compressive strength of 1.5 tsf or greater.
☐ Type B -- soil with unconfined compressive strength greater than 0.5 tsf and less than 1.5 tsf.
☐ Type C -- soil with unconfined compressive strength of 0.5 tsf or less. If soil is submerged, seeping water, subjected to surface water, runoff, exposed to wetting.

NOTE: Type A - no soil is type A if soil is fissured, subject to vibration, previously disturbed, layered dipping into excavation on a slope of 4H:1V.

SOIL CLASSIFICATION			
☐ Stable Rock	☐ Type A	☐ Type B	☐ Type C

SELECTION OF PROTECTIVE SYSTEM	
Protective System:	☐ Sloping; specify angle _____
	☐ Timber shoring
	☐ Aluminum hydraulic shoring
	☐ Trench shield; maximum depth in this soil _____

NOTE: Although Federal OSHA will accept the above tests in most cases, some states will not. Check your state safety requirements for trenching regulations.

Attachment 30. Excavation Checklist

EXCAVATION CHECKLIST

SITE LOCATION:		
DATE:	TIME:	COMPETENT PERSON:
SOIL TYPE (see attached form):		
SOIL CLASSIFICATION:	EXCAVATION DEPTH:	EXCAVATION WIDTH:
TYPE OF PROTECTIVE SYSTEM USED:		

Indicate YES, NO, or N/A (for not applicable) for each item listed below.

General Inspection of Jobsite:	
Excavations, adjacent areas, and protective systems to be used inspected by a Competent Person daily prior to the start of work.	
Competent Person has the authority to remove employees from the excavation immediately.	
Surface encumbrances removed or supported.	
Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.	
Hard hats worn by all employees.	
Spoils, materials, and equipment set back at least 2 feet from the edge of the excavation.	
Barriers provided at all remotely located excavations, wells, pits, shafts, etc.	
Walkways and bridges over excavations 6 feet or more in depth are equipped with standard guardrails and toeboards.	
Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic.	
Employees required to stand away from vehicles being loaded or unloaded.	
Warning system established and utilized when mobile equipment is operating near the edge of the excavation.	
Employees prohibited from going under suspended loads.	
Employees prohibited from working on the faces of sloped or benched excavations above other employees.	
Utilities	
Utility companies contacted and/or utilities located.	
Exact location of utilities marked.	
Underground installations protected, supported, or removed when excavation is open.	
Means of Access and Egress	
Lateral travel to means of egress no greater than 25 feet in excavations 4 feet or more in depth.	
Ladders used in excavations secured and extended 3 feet above the edge of the trench.	
Structural ramps used by employees designed by a Competent Person.	
Structural ramps used for equipment designed by a registered professional engineer (RPE).	

Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with no-slip surface.	
Employees protected from cave-ins when entering or exiting the excavation.	
Wet Conditions	
Precautions taken to protect employees from the accumulation of water.	
Water removal equipment monitored by a Competent Person.	
Surface water or runoff diverted or controlled to prevent accumulation in the excavation.	
Inspections made after every rainstorm.	
Hazardous Atmosphere	
Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible, or other harmful contaminant exposing employees to a hazard.	
Adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or to other hazardous atmospheres.	
Ventilation provided to prevent employee exposure to an atmosphere containing flammable gas in excess of 10% of the lower explosive limit of the gas.	
Testing conducted to ensure that the atmosphere remains safe.	
Emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist.	
Employees trained to use personal protective and other rescue equipment.	
Safety harness and lifeline used and individually attended when entering bell bottom or other deep confined excavations.	
Support Systems	
Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads.	
Materials and equipment used for protective systems inspected and in good condition.	
Materials and equipment not in good condition have been removed from service.	
Damaged materials and equipment used for protective systems inspected after repairs and before being placed back into service.	
Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.	
Members of support system securely fastened to prevent failure.	
Support systems provided to insure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.	
Excavations below the level of the base or footing supported, approved by a registered professional engineer.	
Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure.	
Backfilling progresses with removal of support system.	
Excavation of material to a level no greater than 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.	
Shield system placed to prevent lateral movement.	
Employees are prohibited from remaining in shield system during vertical movement.	

CORRECTIVE ACTION AND REMARKS:

Attachment 31. OSHA Trench Inspection Report

OSHA TRENCH INSPECTION REPORT

DATE:	TIME:
PLACE:	

COMPLIANCE OFFICER'S NAME:
BADGE NUMBER:
OFFICER'S ADDRESS:

Did OSHA Compliance Officer wait for Manager? ☐ Yes ☐ No If yes, how long?_____
Was opening conference held? ☐ Yes ☐ No
Who was the Competent Person:_____
Depth of trench entered by employees:_____Width of trench:_____
Type of soil: ☐ Stable Rock ☐ Type A ☐ Type B ☐ Type C
Type of soil test taken: ☐ Pocket penetrometer ☐ Other
Employees in trench? ☐ Yes ☐ No
Water in trench? ☐ Yes ☐ No If yes, was it controlled? ☐ Yes ☐ No
Were pictures taken? ☐ Yes ☐ No If yes, how many?
Was spoil back two feet? ☐ Yes ☐ No
Did Competent Person do daily jobsite inspection prior to OSHA visit? ☐ Yes ☐ No If no, why not?_____
If the ditch was over 5 feet deep, was it: · Sloped? ☐ Yes ☐ No At what angle? _____ · Shored? ☐ Yes ☐ No Was it our system? ☐ Yes ☐ No · Other?
Was there a ladder? ☐ Yes ☐ No If no, why not? _____
Were all employees wearing hard hats? ☐ Yes ☐ No
Were barricades and signs used properly? ☐ Yes ☐ No

COMMENTS:

SIGNED (Competent Person):

46. Trucking Compliance

46.1 Purpose

To establish the minimum requirements for the Contractors and its subcontractors for the safe operation of all trucks, by providing all project employees, as well as the general public, with a safer environment by requiring operators of trucks that haul material/debris to and from the Contractor's Project sites to follow a set of standards that are based on Department of Transportation (DOT) and common sense safety standards. In addition, Contractors must conduct trucking operations in accordance with the Facility's Construction Traffic Plan.

46.2 Definitions

(a) All-In-Compliance (AIC) stickers. Supplied by the Contractor's Safety Department, these stickers are individually numbered and registered to each applicable Contractor's Project for placement on the windshield or passenger side window of any and all trucks operated on the project, and are intended to signify compliance with the Safe Trucking Standard of all trucks and their operators.

(b) Safe Trucking Standard. Set of standards set forth by the Contractor following WISHA set of standards.

46.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

46.4 General Requirements

(a) AIC stickers are to be displayed in the lower left corner of the passenger side window or the lower right corner of the vehicle's windshield.

(b) Subcontractors. All Contractor's subcontractors will be held accountable for the compliance of their lower tiered subcontractors. On-site subcontractor supervisors will be expected to monitor and ensure compliance and, from time to time, perform random checks for appropriate paper work and safety compliance.

46.5 Implementation

(a) Each subcontractor awarded a demolition or excavation subcontractor will be furnished, by the Contractor's Safety Department, a copy of the Safe Trucking Standard (Exhibit L) and a letter explaining the program requirements. An appropriate number of All-In-Compliance (AIC) stickers will be sent with the Safe Trucking Standard and requirements letter.

(b) Safe Trucking Standards are reviewed at new hire orientation.

(c) Any truck subject to this requirement that is found on the Facility construction site without the AIC sticker will be ordered to leave the project and will not be allowed to return until in compliance with the Safe Trucking Standard. If the truck in violation is owned by the Contractor, subcontractor, including any lower tiered subcontractor, the Contractor's subcontractor directly responsible for the truck or responsible for the lower tiered subcontractor will be required to certify to the Contractor, in writing, that their truck or that of their lower tiered subcontractor has met the requirements of the Standard.

(d) The Project Safety Managers will monitor and ensure the trucks' and their operator's compliance with the Safe Trucking Standard. Some of the items that Project Safety Managers will ensure include, but are not limited to:

1. Truck operators know the correct and approved haul route to and from the project.
2. Truck operators have in their possession a valid and current Commercial Driver License (CDL).
3. Truck's brakes keep the truck from moving forward or backward when the emergency brake is applied and the clutch is released while the transmission is in gear.
4. Truck's headlights, brake lights, turn signals, etc. function properly.
5. Truck's backup alarm functions and is sufficiently loud to be heard within the prescribed distance, as outlined in the Federal OSHA 1926 Standard.
6. Required paperwork, as described in the Safe Trucking Standard, is in the possession of the truck operator, such as current insurance certification card, registration, a recent DOT safety inspection certificate, etc.

(e) Failure to comply with any of the above items will subject the truck and/or operator to be banned from the Contractor's Project until the truck and/or operator is in compliance with the Safe Trucking Standard.

46.6 Exhibits/Attachments

Safe Trucking Standard, Exhibit L

Exhibit L. Safe Trucking Standard

In addition to this Subcontractor's own safety program, this Subcontractor will comply with the following:

1. Before any trucking company begins work at the construction site, the company must provide the following information to the Contractor by which they were hired:
    - Current documentation demonstrating that the trucking company has the level of liability insurance required by law in addition to Subcontractor insurance as required by this Subcontract;
    - Current documentation demonstrating that the trucking company has all licenses and permits required by law to authorize it to perform all of the work the trucking company is reasonably likely to perform, in each jurisdiction in which the trucking company is reasonably likely to perform such work, during the course of the project;
    - Current documentation demonstrating that a qualified inspector performed the last periodic inspection required by 49 U.S.C.§396.17 (or its legal equivalent) and any applicable state, city or county laws on each truck, including its brakes, and that each truck was found to be in proper working condition; and
    - Current documentation demonstrating that the trucking company has, and follows, a policy of not paying or reimbursing its drivers for any speeding tickets, in any circumstances.
2. During the term of the construction activity, the trucking company will submit new documentation of the types specified in paragraphs noted in Requirement No. 1 above, if any such documentation expires, becomes superseded, or becomes inapplicable, or if new information becomes available, or if new information is requested by the Contractor.
3. Prior to a trucking company beginning work on the construction site, the Contractor in charge of the company will provide to the trucking company a certification indicating that the trucking company has complied with Requirement No. 1, above, in its entirety. The trucking company is required to display such certification on the windshield of each truck used at the Facility construction site. The certification will also list each driver authorized to operate that truck in connection with the Facility construction site.
4. Prior to any truck driver beginning work on the Project, the contractor hiring the trucking company must inspect the driver's commercial driver's license (CDL) to confirm it is current and it permits the driver to perform all driving the driver will do in connection with the Project. Copies of these licenses should be retained.
5. The trucking company must conduct truck movements in conformance with the Facility Construction Traffic Management Plan. The trucking company must identify and communicate to the drivers all routes of the trucks from the Facility construction site to the unloading destination. These routes must conform to all local ordinances and regulations of the applicable jurisdiction.
6. The trucking company must not load any truck with a weight that would cause the truck to exceed the maximum weight allowed for the truck in any jurisdiction through which or into which will be driven.
7. The trucking company will take all other steps necessary to ensure that trucks are operated safely and in accordance with all applicable laws.

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47. Work at Elevated Locations (Fall Protection)

47.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to work at elevated locations, in accordance with the provisions of WAC 296-155-24601 through 24624, as applicable.

47.2 Definitions

Not applicable.

47.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

47.4 General Requirements

The fall protection standards can be found in WAC 296-155 Part C-1.

(a) Fall protection is required when employees are working more than 4 feet above lower/working levels. If the fall distance is less than 6 feet but the employee could fall into/onto dangerous equipment, fall protection must be provided.

(b) Unprotected sides and edges must be protected by use of a guardrail system, a safety net system, or a personal fall arrest system unless it can be demonstrated that it is infeasible or creates a greater hazard to use these systems. Federal OSHA defines infeasible as “impossible to perform the construction work using one of these fall protection systems, or that it is technologically impossible to use one of these three systems to provide fall protection.” The presumption is that it is feasible and will not create a greater hazard to implement at least one of the above fall protection systems.

47.5 Implementation

(a) Guardrail Systems. Guardrail systems are usually the first choice when the situation permits them. When used, they must meet the following requirements:

1. Top rails of guardrail systems must be 42 inches above the walking/working surface plus or minus 3 inches. Guardrail systems must be able to withstand a force of 200 pounds in any outward or downward direction at any point along the top edge without deflecting to a height less than 39 inches. If wire rope is used for top rails, it must be flagged at not more than six-foot intervals with high visibility material.
2. Midrails must be used between the top rail and the walking/working surface when there is no wall or parapet wall at least 21 inches high. Midrails must be able to withstand downward or outward pressure of 200 pounds.
3. When guardrail systems are used around holes that are used as points of access (such as ladder ways), they must be provided with a gate or be so offset that a person cannot walk directly into the hole.

4. For installation of wire rope guardrails, see Exhibit M at the end of this section.

(b) Safety Net Systems. Safety nets may be the only reasonable choice in some situations. They must meet the following requirements if used:

1. Safety nets must be installed as close as practicable under the walking/working surface but in no case more than 25 feet below.
2. They must extend outward from 8 to 13 feet depending on the vertical distance to the net.
3. Unless it is unreasonable to do so, they must be drop-tested after installation, relocation, major repair, and at six-month intervals if left in one place.
4. They must be inspected at least once a week for wear, damage, and other deterioration.
5. Materials, scrap pieces, equipment, or tools that fall into the net must be removed as soon as possible and at least before the next shift.

[Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds. If vertical lifelines are used, each employee must have a separate lifeline.]

6. Self-retracting lifelines and lanyards which automatically limit free-fall to two feet or less must have a minimum tensile strength of 5,000 pounds.
7. Personal anchorage must be independent of any anchorage being used to support or suspend platforms and must be capable of supporting 5,000 pounds.
8. Personal fall arrest systems must be rigged so that the employee can neither free fall more than six feet nor contact any lower level. If the combined tool and body weight exceeds 310 pounds, modification of the system may be necessary.
9. The attached point of the body harness must be located in the center of the wearer's back near shoulder level or above the wearer's head.
10. Personal fall arrest systems may not be attached to guardrail systems unless they are designed for that purpose by a competent person and capable of supporting 5,000 pounds for each person attached.
11. Positioning devices must be rigged so the employee cannot free-fall more than two feet. They must be secured to an anchorage capable of supporting 3,000 pounds.

(d) Fall Protection Plans. If it is determined that the work cannot be done by using one of the these conventional fall protection systems, i.e. (1) guard rails, (2) safety nets, or (3) personal fall arrest, then a written fall protection plan must be developed prior to performing the work. It must include the following:

A qualified person must write it and only a qualified person may make changes to it, which must also be in writing.

It must be developed specifically for the project/area of work where the work will be performed.

A copy of the plan must be maintained at the project.

It must be implemented under the supervision of a competent person.

It must document why the use of conventional fall protection methods are either infeasible or create a greater hazard.

It must include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard(s).

The plan must identify each location where conventional fall protection methods cannot be used. These locations must then be classified as Controlled Access Zones.

The plan must include the name or other method of identification for each employee who is designated to work in a Controlled Access Zone. No other employees may enter a Controlled Access Zone.

(e) Controlled Access Zones. Controlled Access Zones may only be used when a Fall Protection Plan has been developed as described above. They must meet the following criteria:

1. A control line must define them or some other method that restricts access.

2. The lines must be erected not less than 6 feet or more than 25 feet from the unprotected edge except when erecting pre-cast concrete members.
3. When erecting pre-cast concrete members, the control line must be not less than 6 feet nor more than 60 feet or half the length of the member being erected, whichever is less, from the leading edge.
4. The control line must extend along the entire length of the unprotected edge and approximately parallel to it.
5. The control line must be connected on each side to a guardrail system or wall.
6. For bricklaying, the line must be not less than 10 feet or more than 15 feet from the working edge.
7. Additional control lines must be placed at each end to enclose the Controlled Access Zone.
8. Control lines should consist of rope, wire, or comparable material. Each line must be flagged or clearly marked with high visibility material at not more than 6-foot intervals.
9. Each line must be rigged and supported in such a way that the lowest point, including sag, is not less than 39 inches and the highest point is not more than 45 inches above the walking/working surface.
10. Each line must have a minimum breaking strength of 200 pounds.
11. Under some circumstances, employees performing overhand bricklaying and related work may be allowed to use a Controlled Access Zone instead of a conventional fall protection system. However, use of a controlled access zone for any other situation must be in conjunction with a "Fall Protection Plan".

(f) Safety Monitoring Systems. These may only be used for work on low-sloped roofs in conjunction with a warning line system, pre-cast concrete erection work, or residential construction when it can be demonstrated that it is infeasible or it creates a greater hazard to use conventional fall protection equipment. If any of these situations exists, the safety monitoring system must meet the requirements of 1926.502(h).

1. A safety monitor must be designated to monitor the safety of employees working in a Controlled Access Zone. The safety monitor must meet the following requirements:

    - The monitor must be competent to recognize fall hazards.
    - The monitor must warn an employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner.
    - The monitor must be on the same walking/working surface in visual sight of each employee and close enough to communicate effectively with him or her.
    - The monitor must not have other responsibilities that could take that person's attention away from the monitoring function.
    - Each employee working in a Controlled Access Zone must be directed to comply promptly with fall hazard warnings from safety monitors.
    - Each employee working in the Controlled Access Zone will be limited to a fall exposure of no more than 15 feet.
    - The monitor will wear an orange vest or other highly visible apparel that easily sets them apart from the crew performing the work in the Controlled Access Zone.

(g) Warning Line Systems.

1. The warning line must be erected around all sides of the roof work area. When mechanical equipment is not being used, it must be erected not less than six feet from the roof edge. When mechanical equipment is being used, the warning line must be not less than six feet from the parallel edge and not less than ten feet from the perpendicular edge.
2. Warning lines must consist of ropes, wires or chains, and supporting stanchions erected as follows:

    - The rope, wire or chain must be flagged at not more than six-foot intervals with high visibility material.
    - Its lowest point, including sag, may be no less than 34 inches and the highest point not more than 39 inches.
    - Stanchions (after erected) must be able to withstand a force of 16 pounds applied horizontally against the stanchion 30 inches above the walking/working surface perpendicular to the warning line in the direction of the edge.
    - The rope, wire or chain must have a minimum tensile strength of 500 pounds.
    - The line must be attached to each stanchion such that pulling on the line in one section will not result in taking up slack in the adjacent section before the stanchion tips over.

(h) Holes and Falling Objects.

1. Holes in walking/working surfaces large enough to step in or trip in must be covered. Holes larger than 2 inches through which objects could fall on employees below must also be covered.
2. Covers for holes in floors, roofs or other walking/working surfaces must be capable of supporting at least twice the load of employees, materials or equipment that might be imposed on them at one time and must be secured in such a way as to prevent accidental displacement. All covers must be marked with the word "HOLE" or "COVER".

NOTE: Covers in roadways must be able to support twice the maximum axle load of the largest vehicle expected to cross them.

3. Employees walking or working below potential falling objects must be protected. Toeboards must be at least 3-1/2 inches high and able to withstand a downward or outward force of 50 pounds. When tools, materials or equipment are piled higher than the toeboards, other measures such as panels or screens must be used.

(i) Training. The training requirements are quite specific in the L&I standards as they relate to fall protection. If this Fall Protection Program is outlined with employees, it will sufficiently explain the OSHA standard. This training must be documented in the employee's training record.

1. The brands and types of fall protection equipment or devices that have been chosen for use on the project must be demonstrated to the employee. All employees will be taught to select the proper fall protection equipment or device for the task that they will perform. We must also include the donning, daily inspection for damage or wear, proper care and storage of all components. A stern directive, that if there is anything suspected to be wrong with any component of their fall protection system, it must not be used and is to be reported to their supervisor immediately for examination and determination. All defective components will be removed from service and either destroyed or repaired to manufacturer specifications.
2. All employees are to be instructed that they must use 100% fall protection when working 6 feet or higher as required under this program.
3. Employees must be reminded that if they are not sure how or where to tie off, to ask their supervisor. If new types, brands or systems are brought to the project, training must be updated and documented.

(j) Steel Erection. Steel erectors will be required to comply with this program and policy with the following exceptions:

1. Connectors will be allowed to work up to 2 stories or 30 feet above a lower level, whichever is less, without using fall protection devices when they are actively involved in making initial connections.
2. Connectors and their supervisor will be identified with a sticker or highly visible tape on their hardhat that makes them easily identifiable. Only designated Connectors and their supervisor will be authorized to wear the pre-agreed upon identifying sticker or tape.
3. Employees directly involved in the installation of decking may be exposed to a fall of up to two floors or 30 feet, whichever is less. They must have a written fall protection plan and must have established a Controlled Access Zone, as described in this program and policy.
4. All other ironworkers involved in the steel erection process will observe a trigger height of 15 feet for fall protection while working at elevations.

This policy meets or exceeds Federal OSHA Subpart R for Steel Erection. Where the requirements of this program differ from Federal, State, or Owner requirements or standards, the requirement that is most protective of worker safety will apply.

47.6 Exhibits/Attachments

(a) Wire Rope Rail Safety Requirements, Exhibit M

(b) Fall Protection Training Record, Attachment 32

(c) Fall Protection Training Update, Attachment 33

(d) Standard Form for Release of Floor or Stairs, Attachment 34

Exhibit M. Wire Rope Rail Safety Requirements

1. As a minimum, 3/8-inch-diameter cable (1/2-inch top wire rope when installed as part of the initial perimeter protection by the ironworking subcontractor) will be used.
2. Top rail (cable) will be installed 42 inches above the top of the finished slab elevation. The intermediate rail will be installed at the midpoint between the top of the finished slab and railing. High visibility material, such as construction tape, will be installed on the top rail at 6-foot intervals.
3. Cables are to be installed so that cable tension and cable supports (columns and intermediate posts) prevent cables from deflecting in excess of 3 inches when a 200-pound downward force is applied. Intermediate posts (approximately 8 inches on center) will be required.
4. Cables must be secured at the interior side of each structural column with nuts (no washers).
5. Eye splices must be used for cable splicing with a minimum of three wire rope J-type clips. No bypass or Molly Hogan splices are permitted.
6. Cables must be terminated with eye splices around each end support; no dead end terminations are permitted.
7. The 18-inch turnbuckles are to be installed every third bay or 100 inches, whichever is less.

Attachment 32. Fall Protection Training Record

FALL PROTECTION TRAINING RECORD

Employee Name _____ Date _____

Social Security Number _____ Badge Number _____

INITIAL TRAINING

- A copy of the Company Fall Protection Program is given to the employee.
- The program is explained either orally or through a video presentation.
- The equipment in use on this project at this time is demonstrated. Brands and equipment covered:

  _____

  _____
- The employee has been instructed in how to perform the daily inspection.
- The employee has also been instructed that if he/she suspects that anything is wrong or amiss with the equipment or system that they are asked to use, they immediately report to their supervisor and do not use that component until deemed safe to do so, replaced or repaired.
- If the employee ever has any questions or concerns about their safety to report the concerns to their supervisor, the project Safety Manager or to management.

Signature of Trainer _____ Date _____

Signature of Employee _____ Date _____

This document is to remain a part of the employee's permanent personnel file.

Attachment 33. Fall Protection Training Update

FALL PROTECTION TRAINING UPDATE

Employee Name	Date
Social Security Number	Badge Number
Signature of Trainer	Date
Signature of Employee	Date

Subject of Material Covered:

This document is to remain a part of the employee's permanent personnel file.

Attachment 34. Standard Form for Release of Floor or Stairs

STANDARD FORM FOR RELEASE OF FLOOR OR STAIRS

_____ will install and maintain all safety protective devices as necessary to protect its employees from hazards associated with steel erection. The AISC code of standard practice guidelines (7.2) will be followed, as well as OSHA Standards, including subpart R and subpart M as they relate to steel erection.

_____ will provide a means of safe access for its employees. These devices shall be used by _____ employees only, and their use by any other contractor, subcontractor, or their employees is prohibited.

As stated in CFR 1926.16(C) "the subcontractor only assumes responsibility for that portion of his own work in regards to safety. The prime contractor who assumes the entire responsibility for work being done, must instruct each subcontractor to provide equipment and training for the safety of their employees."

Safety devices, including guardrails, covers, and horizontal lifelines that are installed for the protection of those involved in steel erection, may or may not meet the standards required for use by employees of other subcontractors. _____ will not assume responsibility for any claims arising from the use of those devices by other contractors or their employees. Under current OSHA standards, guardrails may not be used for personal fall arrest unless they have been designed, rated, and tested for use as horizontal lifeline. (1926.502(d)(23) in part)

No employee shall enter or work in any area, including stairways, which has not been released by_____ in writing. Prior to release of any floor stairway by _____, the prime contractor, must inspect all safety devices in the area and agree to accept responsibility for the condition, maintenance and proper use of such devices by signing this form. _____ and _____ will not be held responsible for latent defects.

_____ may install additional safety devices upon request by the prime contractor only after the installer has been indemnified from liability for any injuries or accidents incurred through the use of the devices in writing. An additional cost shall be agreed upon prior to installation of safety devices, including, but not limited to, guardrails, lifelines, temporary covers, ladders, scaffolds, temporary work platforms, or any anchorages designated as permissible for use as part of an overall personal fall arrest system. _____ will not accept responsibility for maintenance after installation nor will it accept any other liability for the safety equipment installed once the prime contractor has accepted the floor or area.

The area or stairway described below has been released by _____ for use by the prime contractor. This area has been accepted according to the terms and conditions described above.

Level _____ bounded by Grid Lines _____ and _____

General Contractor _____

By _____ Title _____

Steel Erector _____ Title _____

By _____ Title _____

Date _____ Project Name _____

48. Proximity to Active Rail Lines

48.1 Purpose

To establish the minimum requirements for the Contractor and its subcontractors to work in proximity to active rail lines.

48.2 Definitions

Not applicable.

48.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

48.4 Implementation

(a) Port Training. Employees must complete the Port specific training regarding On Track Safety (OTS) along with any additional Port required training.

(b) Safety Barricades. Contractors operating equipment or conducting construction activities near the BNSF track should stay 150 feet from the nearest rail. Barricades should be put up off the BNSF right-of-way indicating where the contractors and their employees can work safely. Work within 150 feet of an existing rail will be performed in accordance with the requirements below

(c) BNSF Notification and Briefing

Prior to beginning work on live track, the contractor-in-charge must notify a BNSF representative of the need, and specifically the location where the work is done. A job briefing must be conducted with the railroad representative in accordance with 49 CFR 214.315 prior to fouling any track.

If contractors have to work within the BNSF right-of-way, contractor employees need to receive the following BNSF safety training.

- Rail Security Awareness Training
- Contractor Orientation Training

(d) Work Practices

Contractors must follow the following policy when working on or around live track.

- Green, Yellow/Red, and Red Flag Protection must be used on live tracks to warn train crews of men or equipment working on or around the track.
- Always be on alert to moving equipment. Contractor employees must always expect movement on any track, at any time, in either direction.

- Do not walk or step on the top of the rail or any other track components.
- In passing around the ends of standing cars, engines, roadway machines, or work equipment, leave a minimum of 25 feet between yourself and the end of the equipment. Do not go between equipment if opening is less than 50 feet.
- Before crossing over tracks, look in both directions.
- Do not sit on, lie under, or cross over between cars.
- No tools or equipment should be left close to any live track.
- All contractor employees must have and be wearing identification.
- All contractor employees must be wearing the proper PPE.

49. Work Near or Over Water

49.1 Purpose

The purpose of the following is to provide general safety guidelines for working over or near water. Work near or over water will comply with the provision of WAC 296-155-235.

49.2 Definitions

Not applicable.

49.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

49.4 Life Saving Equipment

Employees working over or near water, where the danger of drowning exists, will be provided with a U.S. Coast Guard approved life jacket or buoyant work vest. OSHA 1926.106(b)

If the deck of a barge or work platform is not equipped with an OSHA-compliant railing system, employees walking or working on deck must wear a U.S. Coast Guard approved life jacket or buoyant work vest, also called a life preserver or personal flotation device (PFD). These PFDs should be fully buckled, snapped, or zipped whenever there is a hazard of falling into the water, regardless of the size of the barge. While a PFD is not required to be worn while an employee is inside an enclosed cab or equipment compartment on a barge, each employee should have a PFD accessible to them at all times.

PFDs

- An approved and readily available PFD is required to be on board the vessel or barge for each individual on board. An immersion/exposure suit is considered to be an acceptable substitute for a PFD. All lifesaving equipment designed to be worn is required to be readily available and in serviceable condition.
- Each barge or vessel 26 feet or longer must have at least one approved ring life buoy which is immediately available. All lifesaving equipment designed to be thrown into the water is required to be immediately available and in serviceable condition.
- An approved light is required for all PFDs and immersion/exposure suits. Also, all PFDs must have approved retro reflective material installed.
- Employees will inspect buoyant work vests or life preservers for defects which could alter their strength or buoyancy prior to and after each use. Defective units will not be used.(OSHA 1926(b))

Have the necessary safety equipment to hand so it is ready for immediate use:

- Ring Lifebuoy
- 90-foot Buoyant Heaving Line
- Life Saving Skiff

Ring buoys will be provided and readily available for emergency rescue operations with at least 90 feet of line and the distance spaced between ring buoys may not exceed 200 feet. (OSHA 1926.106 (c))

At least one lifesaving skiff will be made immediately available when employees are working over or adjacent to water. Each skiff will be checked daily prior to work beginning to ensure the capability of the skiff to respond to an emergency. (OSHA 1926.106(d))

49.5 Slips, Trips, and Falls

(a) Minimizing Hazards on Deck

- Keep all walking and working surfaces clean, dry, and unobstructed.
- Keep all areas free of debris.
- Clean up and/or report any spill immediately.
- Stack materials in a stable manner.
- Secure gear and equipment that is not in use.
- Keep stairs, doorways, walkways, and gangways free of equipment and stowed materials.
- Secure ramps during loading and offloading operations.
- Repair leaks from hoses, pipelines, and valves immediately.
- Use non-skid protective deck compound and do not paint over the non-skid compound with standard paint.
- Have de-icing procedures in place when necessary.

(b) Wearing Appropriate Footgear

- Wear safety shoes or boots with slip-resistant soles as appropriate.
- Keep shoes clean of mud, snow, ice, spilled liquids, and debris.

(c) Man Overboard Prevention

- Employees are not permitted to work alone when performing work over or near water.
- Railing should be continuous around the deck. The ends should be secured with lashings or quick release slips so that you can cut or release them to recover a person from the water.
- Treat any slippery areas with either non-skid paint or stick on strips.
- Use harnesses in rough weather and at night. Ensure they are adjusted to a tight fit.
- Wear suitable protective clothing and a USCG approved lifejacket fitted with reflective tape and a light

In the event that an individual falls overboard, immediately throw a Type IV lifebuoy with attachment and raise the alarm by shouting “MAN OVERBOARD.” The work barge will have at least one tender/skiff available for in-water rescue if needed.

49.6 Hypothermia (Cold Water Exposure)

Hypothermia occurs when body heat is lost faster than it can be replaced and the normal body temperature (98.6°F) drops to less than 95°F. Hypothermia is most likely at very cold temperatures, but it can occur even at cool temperatures (above 40°F), if a person becomes chilled from rain, sweat, or *submersion in cold water*.

Symptoms of Hypothermia.

- Mild Symptoms
  - An exposed worker is alert.
  - He or she may begin to shiver and stomp the feet in order to generate heat.

- Moderate to Severe Symptoms
  - As the body temperature continues to fall, symptoms will worsen and shivering will stop.
  - The worker may lose coordination and fumble with items in the hand, become confused and disoriented
  - He or she may be unable to walk or stand, pupils become dilated, pulse and breathing become slowed, and loss of consciousness can occur. A person could die if help is not received immediately.

What can be done for a person suffering from hypothermia?

- Call 911 immediately in an emergency; otherwise seek medical assistance as soon as possible.
- Move the person to a warm, dry area.
- Remove wet clothes and replace with dry clothes, cover the body (including the head and neck) with layers of blankets; and with a vapor barrier (e.g. tarp, garbage bag). Do **not** cover the face.
- If medical help is more than 30 minutes away:
  - Give warm sweetened drinks if alert (no alcohol), to help increase the body temperature. Never try to give a drink to an unconscious person.
  - Place warm bottles or hot packs in armpits, sides of chest, and groin. Call 911 for additional rewarming instructions.
- If a person is not breathing or has no pulse:
  - Call 911 for emergency medical assistance immediately.
  - Treat the worker as per instructions for hypothermia, but be very careful and do not try to give an unconscious person fluids.
  - Check him/her for signs of breathing and for a pulse. Check for 60 seconds.
  - If after 60 seconds the affected worker is not breathing and does not have a pulse, trained workers may start rescue breaths for 3 minutes.
  - Recheck for breathing and pulse, check for 60 seconds.
  - If the worker is still not breathing and has no pulse, continue rescue breathing.
  - Only start chest compressions per the direction of the 911 operator or emergency medical services*
  - Reassess patient's physical status periodically.

49.7 Fire Hazards

- Store engine fuel tanks and compressed gas tanks properly, away from sources of ignition. Only keep onboard quantities of flammable and combustible materials that are necessary for operations and maintenance. Post appropriate danger signs.
- When dealing with work that is capable of providing a source of ignition through a flame or spark (hotwork), such as welding, cutting, burning, drilling, grinding, etc., follow these precautions:
  - Ensure the space is properly tested by a qualified or shipyard-competent person and deemed safe before work is begun. (See OSHA 29 CFR 1915.7 and 1915.15.).
  - Make sure that proper fire extinguishing equipment is near the work area and that it is maintained in a state of readiness for emergency use.
- Do not leave oxygen or acetylene hoses unattended.
- Consider where sparks will fall when doing hotwork and employ a fire watch.
- Shield fuel sources to protect them from ignition sources.
- Cover openings to prevent sparks from entering.
- Stop any hotwork if you smell fuel or gas until the source has been identified and the problem fixed.
- When welding or burning on the deck of a vessel, the space below should be inspected to ensure that no flammable atmosphere or combustible materials are present.
- Use good housekeeping practices to limit the amount of clutter, debris and combustible/flammable material.

Follow these safety measures to help prevent electrical fires:

- Make sure that electrical systems are installed by a qualified marine electrician and that electrical systems are inspected regularly.
- Regularly conduct visual inspections of connections, switches and wiring, which may be subject to corrosion and damage from use.

49.8 Winches

Operating or working near winches may potentially expose employees to hazards such as body parts caught in a winch drum, being struck by a broken line or cable, and tripping over a line or cable. To reduce hazards:

- Use a device or tool, never your hand, to keep the winch line spooling properly.
- Enclose the winch drum in a cage if practical.
- Stay off the deck unless you are part of the operation.
- Never stand in, on, over, or in line with lines or cables connected to winches when they are under tension. The danger zone lies within 15 degrees of either side of a line under tension.
- Never step on or walk over the winch drum.
- Inspect the winch system regularly for problems associated with general or localized deterioration, cracked welds, and other structural, mechanical, or electrical deficiencies.
- Inspect lines and cable systems regularly, including blocks, hooks, and associated components, for signs of damage or deterioration.
- A guard should be installed between the winch operator and the connected cables to protect the operator from potential whiplash.
- Never stand in the bight of a line.

49.9 Training

Employees working over or near water will be provided training on the hazards. Employees working over or near water must be adequately trained in their responsibilities and the safe work practices associated with this task and the identified hazard for the site and equipment they are working with.

Training will also be conducted on pre-task planning, hazard identification, tool box meetings, and daily equipment checks prior to beginning work.

Practice man overboard drills regularly.

49.10 Exhibits/Attachments

Not applicable.

50. Off-Site Monitoring Activities (Fieldwork)

50.1 Purpose

The purpose of the following is to provide general safety guidelines for persons conducting off-site environmental monitoring activities related to on-site Facility construction activities.

50.2 Definitions

Not applicable.

50.3 Responsibilities

(a) Activity supervisors, and as appropriate their corporate management, have overall responsibility for establishing and ensuring compliance with this procedure.

(b) Activity supervisors, in association with their site-specific or corporate health and safety support staff, are responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

(d) All incidents, investigations, reports, and corrective actions relative to this procedure must be documented and reported to the SHE&Q manager. Supervisors should also report activities resulting from this procedure to their management in accordance with established corporate procedures, and to the owner or prime contractor per contractual obligations.

50.4 General Requirements

(a) Employees and their supervisors must consider procedures identified in other sections above as appropriate to the activities being conducted at the off-site locations. Prior to departing for the off-site location prepare a fieldwork safety plan/task hazard analysis. Consider anticipated site conditions for hazards including but not limited to slips/Trips/Falls, In/Over water work, climatological conditions, and activities related the use of the site (agricultural, recreational, etc.) which may pose a hazard while conducting activities at the site. Prepare and bring an appropriate first aid kit.

(b) Identify the nearest locations where emergency assistance is available, including but not limited to: hospitals and medical clinics, fire and police departments. Assemble in writing travel directions reach such locations in the event of an emergency, and the means to contact such locations I the event of an emergency. Ensure all members of the field team have access to such information.

(c) File a daily work plan, to include monitoring activities and locations.

(d) Check in with the SHE&Q manager at start of day to ensure awareness that work is being conducted off site.

(e) Check in with the SHE&Q manager at end of field work to ensure awareness that employees are no longer working off site.

(f) Field teams will consist of two people.

(g) Appropriate PPE will be used, safety toe shoes/hard hat, safety vest, eye protection when on Vancouver Energy facility. Off-site PPE will include safety vest and appropriate footwear (boots/waders) for activity.

(h) Incidents must be reported in accordance with procedures described in other parts of this plan,

50.5 Exhibits/Attachments

Not applicable.

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Appendix D.14

Inadvertent Cultural Discovery Plan

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Vancouver Energy
Cultural Resources Inadvertent Discovery Plan

Plan No. C.06 | Revision 00

Approved by:

Name, Title: Kelly Flint, Senior Vice President and Corporate Counsel, Savage Companies
Designated Agent for EFSEC Application No. 2013-01
Date: 30 April 2015

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Vancouver Energy
Cultural Resources Inadvertent Discovery Plan

EFSEC Application for Site Certification No. 2013-01
Docket No. EF131590
30 April 2015

Prepared for

Tesoro Savage Petroleum Terminal LLC
5501 NW Old Lower River Road
Vancouver, Washington 98660

Prepared by

Archaeological Investigations Northwest, Inc.
3510 NE 122nd Avenue
Portland, OR 97230

AINW Report No. 3437
BergerABAM Job No. A13.0267.02

Revision Summary

No.	Date	Edits/Comments
00	30 April 2015	Submittal for Application Review

Vancouver Energy
Cultural Resources Inadvertent Discovery Plan

Table of Contents

Section

1. Introduction 3
1.1 Purpose of Plan 3
1.2 Regulatory Requirements 3
1.3 Related Documents 5
2. Previous Data Collection for Facility Site 5
3. Inadvertent Discovery of Archaeological Resources 7
4. Unanticipated Discovery of Human Remains 8
5. Documentation of Archaeological Materials 8
6. Monitoring of Operations and Emergency Response Activities 9
7. Summary of Protection Measures 10
8. References 10
9. Contact List 11
10. List of Acronyms and Abbreviations 13

List of Figures

Figure 1. Site Plan 4
Figure 2. Area of Potential Effect 6

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1. Introduction

Vancouver Energy (Facility) provides transloading services for pipeline quality crude oil from railcars to marine vessels. The Facility is located at 5501 NW Old Lower River Road, Vancouver, Washington; it is situated at the Port of Vancouver USA (Port) on the north bank of the Columbia River at approximately River Mile 103.5. The Facility site is approximately 47.4 acres in size and comprises elements within the following "area" groupings, as illustrated in Figure 1.

- Area 200 – Rail Unloading – located at Terminal 5 of the Port
- Area 300 – Storage – located at Parcel 1A of the Port
- Area 400 – Marine Terminal – located at berths 13 and 14 at the Port
- Area 500 – Transfer Pipelines – located in locations between areas 200, 300, and 400
- Rail Infrastructure – located at Terminal 5 of the Port

The Facility receives an average of four unit trains per day and unloads an average of 360,000 barrels (bbl) of crude oil per day. Six nominal capacity 400,000 bbl tanks are used to store crude oil on site. A transfer pipeline system is used to convey crude oil from Area 200 to Area 300 for storage, and from Area 300 to Area 400 for vessel loading. The transfer pipeline system can also be operated to move crude oil from Area 200 directly to Area 400. The Facility operates 24 hours per day, 7 days per week.

1.1 Purpose of Plan

This cultural resources inadvertent discovery plan (CRIDP) describes the procedures to be implemented in the event of the discovery of previously unidentified archaeological resources during construction of the Facility, and in the event ground disturbing activities are required in response to an emergency event during operations. The CRIDP also describes procedures to be implemented in the event of the discovery of human remains.

1.2 Regulatory Requirements

The proposed Facility is subject to the jurisdiction of the Washington State Energy Facility Site Evaluation Council (EFSEC). The Facility is also subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE) for in-water work related to the modification of existing berths 13 and 14 to be used by Vancouver Energy.

The Washington State Department of Archaeology and Historic Preservation (DAHP), acting as a reviewing agency during the Application for Site Certification (ASC) review by the Energy Facility Site Evaluation Council (EFSEC), requests that "an agreed upon professional archaeological monitoring plan during Facility Construction, Operations and Emergency Responses" be prepared (Bumpus, 2014). In the event of an inadvertent discovery of archaeological resources, procedures described in the plan will be conducted in accordance with the following statutes and regulations.

- Chapter 27.53 RCW: Archaeological Sites and Resources
- RCW 68.60.055: Skeletal Human Remains — Duty to notify — Ground disturbing activities — Coroner determination — Definitions.
- RCW 68.50: Human Remains
- Chapter 25-48 WAC: Archaeological Excavation and Removal Permit

The USACE also requests that a CRIDP be prepared. Construction activities at the Facility are subject to 36 CFR 800, as amended, referred to as Section 106 of the National Historic Preservation Act.

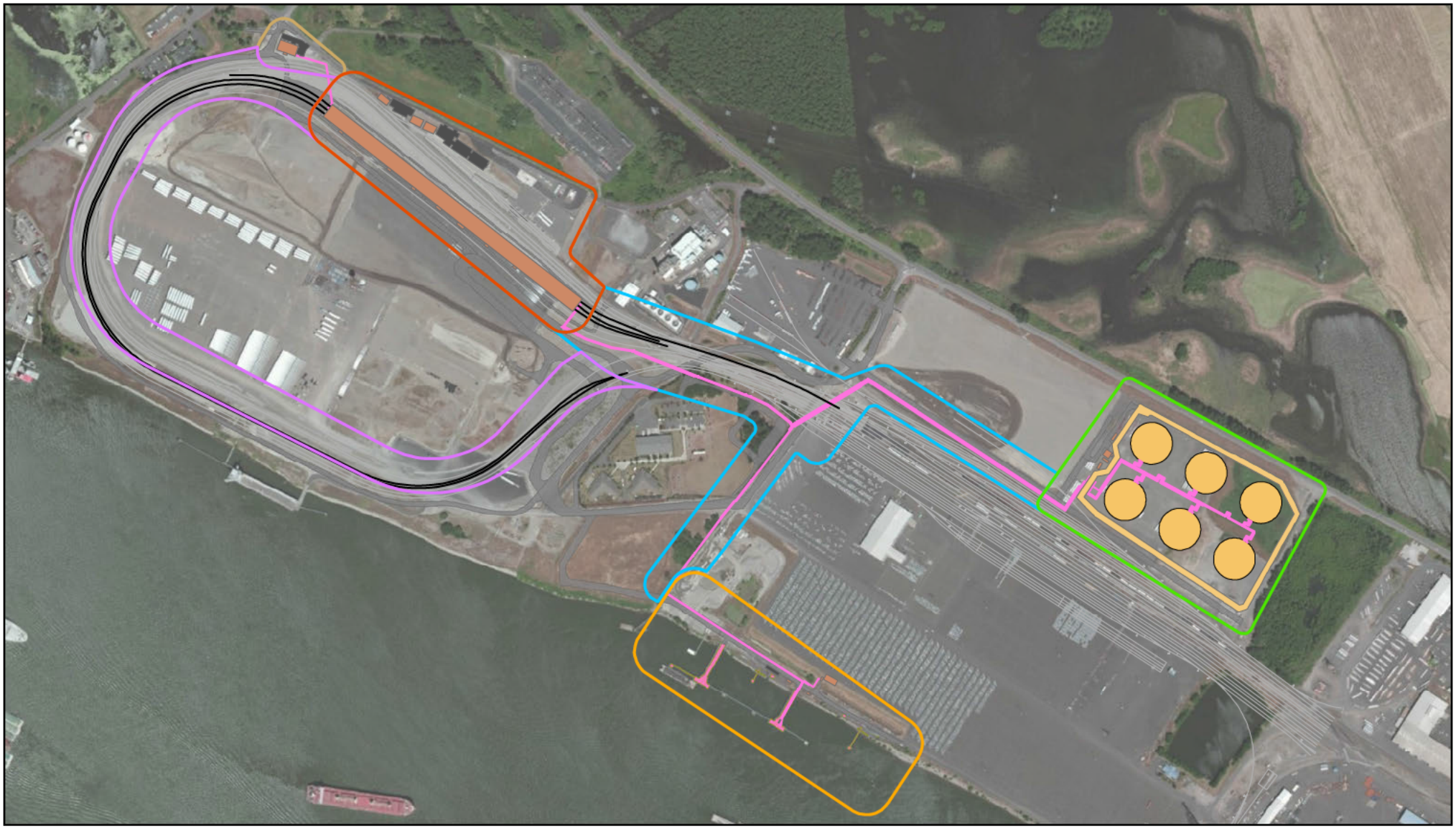

Figure 1 - Site Plan

Proposed Project Facilities

- Containment Berm
- Rail
- Parking
- Building
- Transfer Pipeline
- Storage Tank
- Roads
- Marine Terminal

TSPT Improvement Areas

- 200 - Unloading and Office
- 300 - Storage
- 400 - Marine Terminal
- 500 - Transfer Pipelines
- 600 - West Boiler
- Rail Infrastructure

0 250 500 1,000 Feet

N

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: March 2015

Map Notes: Aerial photo dated July 2010, courtesy of ESRI World Imagery service

For this project, the potentially affected Tribes include the following. See Section 9, Contact List.

- Cowlitz Indian Tribe
- Confederated Tribes of Grand Ronde Community
- Chinook Indian Tribe
- Confederated Tribes of the Chehalis Indian Reservation
- Yakama Indian Nation

1.3 Related Documents

This Plan is implemented in coordination with other Facility construction plans, including, but not limited to,

- Contaminated Media Management Plan – describing measures implemented to appropriately manage contaminated soils and groundwater during construction activities
- Construction Stormwater Pollution Prevention Plan – describing measures implemented to manage and protect construction stormwater
- Construction Spill Prevention, Control, and Countermeasures Plan – describing measures to prevent and respond to spills of petroleum products and hazardous materials used during construction activities
- Construction Safety and Health Manual – describing health and safety and emergency response procedures implemented during construction of the Facility

2. Previous Data Collection for Facility Site

The area of potential effect (APE) has been defined as the area where an undertaking may directly, through ground-disturbing activities, or indirectly cause changes in the character or use of historic properties. The proposed Facility APE is located within the Port at three locations: Terminal 5, Parcel 1A, and berths 13 and 14. The APE of the project is south of NW Lower River Road and is north of Columbia River (Figure 2). The western boundary of the proposed Facility APE is the western limit of the former Evergreen/ALCOA aluminum plant at Terminal 5. The irregular boundary of the APE stretches 2.23 kilometers (1.39 miles) to the east, where the northeastern edge is demarcated by a zone of undeveloped wetland. The eastern portion of the project, including berths 13 and 14, is in the Port's Terminal 4.

Archaeological Investigations Northwest, Inc. (AINW) prepared a report for submittal to the USACE (Fuld et al., 2013) and prepared sections regarding the cultural resources for the State Environmental Policy Act (SEPA) submittal to EFSEC (BergerABAM, 2014).

The DAHP provided both SEPA scoping comments and comments on the ASC submitted to EFSEC in August 2013, addressing construction impacts reaching native soils—soils that may be intact below a thick layer of fill—and the potential for native soils retaining evidence of an archaeological site (Kaehler, 2013; Bumpus, 2014).

Additional fieldwork was designed to address the issues raised by DAHP. The Facility construction techniques that are being used would largely preclude the ability to observe soils beneath the thick layer of fill during construction; specifically, construction by vibro-compacting (in-place) stone columns would not bring soils to the surface for observation by archaeological monitors. DAHP questioned whether monitoring would be sufficient to identify archaeological deposits deeply buried under fill. To address this question, AINW designed a systematic subsurface geoarchaeological survey that would test for cultural resources beneath the fill and identify the contours and origins of buried landforms.

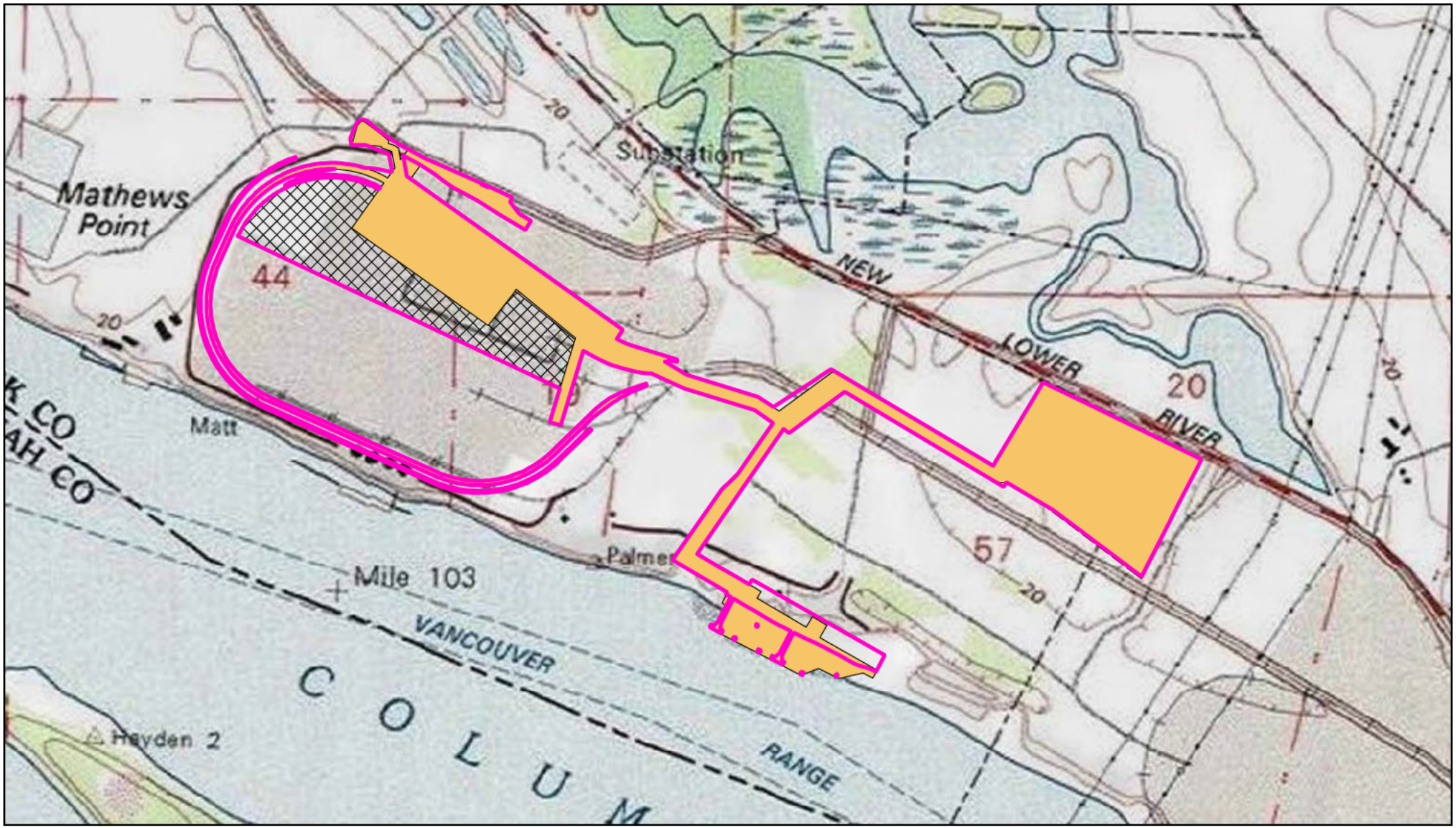

Figure 2 - Area of Potential Effect

Legend

- Lease Boundary
- Project APE
- Construction Laydown

Lease boundary includes construction laydown areas with existing gravel or paved surfaces. No ground disturbance is anticipated in these areas.

VANCOUVER ENERGY

Tesoro Savage Petroleum Terminal LLC

Date: April 2015

Map Notes: AUSGS 1:24k Topographic Maps. Vancouver Quadrangle

0 250 500 1,000

Feet

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AINW has completed the geoarchaeological survey of the Facility APE (Hulse and Reese, 2015). The survey identified sediments of an appropriate age to contain archaeological resources below a cap of recent fill and above a basal layer of water-laid Pleistocene gravel. Importantly, no archaeological resources were identified within the APE as a result of the geoarchaeological survey. The geoarchaeological borings revealed no basis to warrant having an archaeological monitor on site during construction for the project as currently designed. Therefore, no cultural resources monitoring of Facility construction activities will be conducted.

While it is very unlikely that archaeological remains would be unearthed during the construction process as inadvertent discoveries, this CRIDP describes the steps that will be taken in such an event.

3. Inadvertent Discovery of Archaeological Resources

This CRIDP describes the procedures the Facility senior project manager will follow, in accordance with federal and state laws, if certain archaeological materials and human remains are discovered within the Facility APE.

If any member of the construction workforce believes that he or she has encountered evidence of an archaeological resource, all work adjacent to the discovery will stop, and the shift supervisor and AINW will be notified (see Section 9, Contact List). The shift supervisor will also notify the senior project manager or his/her designee. An AINW archaeologist will be dispatched to examine the discovery. If human skeletal remains are involved, the procedure described in Section 4 will be followed. The area of work stoppage will be adequate to provide for the security and integrity of the discovery. Barriers will be placed around the area for protection of the find. Archaeological resource discoveries could consist of, but are not limited to, the following.

- an area of charcoal or charcoal-stained soil
- an arrowhead, stone tool, or stone chips
- a cluster of bones or burned rocks in association with stone tools or chips
- a cluster of tin cans or bottles older than 50 years

The archaeologist will determine whether the discovery is an archaeological resource. If the archaeologist determines that the discovery is not an archaeological resource, the archaeologist will advise the Facility senior project manager to remove the stop-work order. The archaeologist will follow-up with an e-mail summary, including photographs of the discovery site, at the level that is appropriate for the find. This documentation will be provided to the Facility senior project manager and will be provided to the other contacts if they have been alerted to the potential discovery.

If the archaeologist believes that the discovery is an archaeological resource, the archaeologist, in coordination with the Facility senior project manager, will take appropriate steps to ensure that the discovery site is protected. At a minimum, the immediate area of the discovery site will be flagged or barricaded, and vehicles and equipment will not be permitted to traverse the discovery site. The Facility senior project manager will then be responsible for promptly notifying the Port, EFSEC, the USACE, the DAHP, and the consulting Tribes by telephone, with written confirmation via e-mail and/or overnight mail. The contact list in Section 9 of this report will be used. Every effort will be made to ensure that notifications are made within 24 hours of the determination that an archaeological resource had been discovered. All notifications will be the responsibility of the Facility senior project manager, although this responsibility may be delegated to AINW.

The notifications to the Port, EFSEC, the USACE, DAHP, and the Tribes will either

- Explain why it is the archaeologist's opinion that the resource is not significant, and request permission for construction to recommence, or
- Indicate that a request for a site evaluation is being prepared and will be submitted as soon as possible.

If it is determined that archaeological test excavations or the collection of artifacts are necessary to evaluate the significance of a discovery or to assess project impacts (damage) to a discovery, AINW will prepare an archaeological testing or mitigation plan for review by the Port, EFSEC, the USACE, DAHP, and the Tribes. An application to the DAHP for an archaeological site excavation permit will be completed if the discovery occurs after construction is completed. During construction, no permit will be required as the project will be under the USACE's jurisdiction and the USACE will be responsible for any required procedures, review, and agency and tribal coordination.

4. Unanticipated Discovery of Human Remains

The procedures outlined in this section apply to all situations where (a) human remains are observed and (b) it is not obvious and immediately apparent that skeletal remains (e.g., articulated bones, teeth, or fragments), which are found are non-human in origin.

If any member of the construction workforce believes he or she has made an unanticipated discovery of human remains, all work at the location of the discovery will be stopped and AINW will be notified to determine if the remains are human. The Facility senior project manager will also be promptly notified. Until such time that AINW has performed the determination, the area of work stoppage will be adequate to provide for the security, protection, and integrity of the remains. At a minimum, the immediate area of the discovery will be flagged or barricaded, and vehicles and equipment will not be permitted to traverse the discovery site.

Any human remains that are discovered during construction will, at all times, be treated with dignity and respect. The remains will be covered with a tarp or other materials (not soil or rocks) for temporary protection in-place and to shield them from being photographed. Do not call 911 or speak with the media.

If the AINW archaeologist determines the remains are human, the Facility senior project manager will promptly call the Clark County coroner. EFSEC and the USACE will also be contacted. The coroner will examine the discovery and determine whether the remains are "forensic" and under the coroner's jurisdiction or "non-forensic," in which case, the coroner will notify the DAHP. If the remains are "forensic," work stoppage in the area will continue until such time that the coroner has secured and removed the remains from the discovery site and released control of the stoppage area back to the Certificate Holder.

Following RCW 27.44.055, RCW 68.50, and RCW 68.60, DAHP will have jurisdiction over non-forensic human remains. The DAHP's physical anthropologist will examine the remains and notify the affected American Indian Tribes of the results of the examination. The potentially affected Tribes are listed Section 9. Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in RCW 27.44.055, RCW 68.50, and RCW 68.60. Facility personnel will participate in consultation. When consultation and documentation activities are complete, construction in the discovery area will resume.

If the results of the evaluation indicate that the remains are not human and do not have an archaeological association, construction will be permitted to resume.

If it is determined that the remains are not human but have an archaeological association, the procedures for the inadvertent discovery of cultural resources outlined in Section 3 will be followed.

5. Documentation of Archaeological Materials

AINW will complete the proper documentation and assessment of the confirmed discovered archaeological deposits and features inadvertently discovered in cooperation with the Port, EFSEC, the USACE, DAHP, and affected Tribes.

Intact archaeological material discovered inadvertently during project construction will be recorded by a professional archaeologist. A State of Washington archaeological resource form will be submitted to DAHP. Discovered features and selected artifacts will be photographed. Stratigraphic profiles and soil/sediment descriptions of the newly discovered subsurface features will be prepared. Discovery locations will be documented on scaled site plans and site location maps.

Archaeological features and artifacts inadvertently discovered in buried sediments may require further excavation. An application to the DAHP for an archaeological site excavation permit will be completed if the discovery occurs after construction is completed. During construction, no permit will be required given that the project will be under the USACE's jurisdiction and the USACE will be responsible for any required procedures, review, and agency and tribal coordination.

After coordination on the appropriate procedures with EFSEC, the USACE, DAHP, and any affected Tribes, a test excavation unit or small trench may be used to determine if an intact occupation surface is present. The use of test units will assist in gathering information on the nature, extent, and integrity of the subsurface deposits. Test excavation units will be dug by hand in a controlled fashion to expose the feature, collect samples from undisturbed contexts, or assist in interpreting complex stratigraphy.

Spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of archaeological material, and depth to sterile soil, regolith, or bedrock will be recorded for each test unit on a standard form. Unit-level forms will be used, including plan maps for each excavated level, and recording data regarding material type, number, and vertical provenience (depth below surface and stratum association where applicable) for all subsurface artifacts and discovered features.

Sediments excavated from test units for the purposes of additional investigations of newly discovered archaeological deposits or features will be screened through 3.2-millimeter (mm) (1/8-inch [in.]) mesh.

All pre-contact (Native American) formed tools collected from the subsurface excavation test units will be analyzed, cataloged, and temporarily curated. Archaeological materials (with the exception of human remains, funerary items, and sacred objects) will be curated at the Burke Museum in Seattle, Washington, and copies of records will be curated at the Burke Museum in Seattle, Washington.

Within 90 days of concluding fieldwork, a technical report describing the results will be provided to the Port, EFSEC, the USACE, DAHP, and the affected Tribes.

If assessment activity exposes human remains (e.g., burials, isolated teeth, or bones), the process described in Section 4 will be followed.

6. Monitoring of Operations and Emergency Response Activities

Normal operation activities at the Facility will not involve ground disturbance. Therefore, cultural resources monitoring will not be conducted.

Emergency response activities may or may not require ground disturbance in immediate response to the emergency situation being addressed. Further, site access may not be possible pending active emergency response activities. In the event that emergency response actions have caused ground disturbance activities that may have the potential for inadvertent discovery of cultural resources, when such locations are deemed safe for entry of non-emergency response personnel, the Facility senior project manager will arrange for a site survey by a professional archaeologist to determine if any archaeological resources have been inadvertently discovered during the response activities. If any inadvertent discoveries of archaeological resources are made, the procedures described in Sections 3, 4, and 5 will be followed. If ground disturbance is required for post-emergency remediation, and implementation activities may result in inadvertent discovery of archaeological resources, the Facility

senior project manager will coordinate consultation with the Port, DAHP, EFSEC, USACE, and the Tribes prior to such activities taking place.

7. Summary of Protection Measures

1. Construction activities that may impact native soils will be halted in the immediate area if intact archaeological deposits, human remains (or potential human remains), funerary items, or sacred objects are encountered. Construction work at the location of the inadvertent discovery will not be resumed unless intact archaeological deposits can be completely avoided, or until the consulting parties agree on a course of action based on the unanticipated discovery protocol as outlined above. AINW will contact the Facility senior project manager if archaeological deposits are found. See Section 3 for details regarding all contacts and procedures.
2. If human remains are suspected, the Facility senior project manager will contact the Clark County coroner; other agency contacts may be needed. AINW will assist with the contacts and verification procedures. All work must stop in the area where human remains are found or are suspected, and the area is to be safe-guarded; work may continue after all consultation regarding the human remains has been completed and required procedures have been completed. See Section 4 for details regarding contacts and procedures.
3. AINW will prepare a summary report detailing any inadvertent discoveries and procedures followed as a result of a discovery, as outlined in this CRIDP. The report will identify any artifacts or features found, describe the findings, and summarize the results of data analysis. A copy of the report will be provided to the Port, the USACE, DAHP, and the Tribes. See Section 5 for details.

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Bumpus, Sonia. 2014. E-mail to Irina Makarow, Subject: Tesoro Savage ASC Technical Review - Technical Memo No. 4, January 2, 2014.

Fuld, Kristen A., Judith A. Chapman, and Jo Reese. 2013. *Cultural Resource Review for the Tesoro Savage Vancouver Energy Distribution Terminal Project, Vancouver, Clark County, Washington.* Archaeological Investigations Northwest, Inc. Report No. 3116. Prepared for BergerABAM, Vancouver, Washington.

Hulse, Eva, and Jo Reese. 2015. *Geoarchaeological Investigation of the Vancouver Energy Project, Vancouver, Clark County, Washington.* Archaeological Investigations Northwest, Inc. Report No. 3423. Prepared for BergerABAM, Vancouver, Washington.

Kaehler, Gretchen. 2013. Scoping letter to EFSEC from Gretchen Kaehler, DAHP, dated December 18, 2013.

9. Contact List

Vancouver Energy Project Manager (Tesoro Savage)	
Primary Contact: Jared Larrabee, VP and General Manager 5501 Northwest Lower River Road Vancouver, WA 98660 Phone: 801-944-6538 Cell: 801-830-3790 E-mail: JLarrabee@TSVEDT.com	Kelly Flint 901 West Legacy Center Way Midvale, UT 84047 Phone: 801-944-6600 E-mail: generalcounsel@savageservices.com
David Corpron 901 West Legacy Center Way Midvale, UT 84047 Phone: 801-944-6577 E-mail: davidcorpron@savageservices.com	Quentin Fox 901 West Legacy Center Way Midvale, UT 84047 Phone: 801-424-7281 E-mail: quentinfox@savageservices.com
Landowner: Port of Vancouver	
Primary Contact: Patty Boyden Director of Environmental Services 3103 NW Lower River Road Vancouver, WA 98660 Phone (direct): 360-992-1103 Cell: 360-518-2550 Fax: 360-735-1565 E-mail: PBoyden@Portvanusa.com	Alternate Contact: Matt Graves Environmental Manager 3103 NW Lower River Road Vancouver, WA 98660 Phone (direct): 360-992-1106 Cell: 360-518-4814 E-mail: mgraves@Portvanusa.com
Archaeological Investigations Northwest, Inc. (AINW)	
Primary Contact: Jo Reese, Senior Archaeologist, VP 3510 NE 122nd Avenue Portland, OR 97230 Phone: 503-761-6605 Cell: 971-409-6979 E-mail: Jo@ainw.com	Alternate Contact: Eva Hulse, Senior Geoarchaeologist 3510 NE 122nd Avenue Portland, OR 97230 Phone: 503-761-6605 Cell: 971-645-1939 E-mail: Eva@ainw.com
Clark County Medical Examiner	**Vancouver Police Department**
Dennis Wickham, MD Clark County Medical Examiner's Office 900 West 13th Street Vancouver, WA 98660 Phone: 360-397-8405 Fax: 360-397-6120 E-mail: dennis.wickham@clark.wa.gov	James McElvain, PhD, Police Chief 605 East Evergreen Boulevard Vancouver, WA 98661 Phone: 360-487-7400 Fax: 360-694-9646 E-mail: vanpd@cityofvancouver.us

Department of Archaeology and Historic Preservation (DAHP)	
Guy Tasa, PhD State Physical Anthropologist 1063 South Capitol Way, Suite 106 P.O. Box 48343 Olympia, WA 98504-48343 Phone: 360-586-3534 Cell: 360-790-1633 E-mail: Guy.Tasa@DAHP.wa.gov	Rob Whitlam, PhD State Historic Preservation Officer 1063 South Capitol Way, Suite 106 P.O. Box 48343 Olympia, WA 98504-48343 Phone: 360-586-3080 Cell: 360-890-2615 E-mail: Rob.Whitlam@DAHP.wa.gov
U.S. Army Corps of Engineers (USACE)	
Lance Lundquist Archaeologist USACE, Seattle District Regulatory Branch P.O. Box 3755 Seattle, WA 98124 Phone: 206-764-6909 E-mail: lance.a.lundquist@usace.army.mil	Steve Manlow Project Manager/Biologist USACE, Seattle District Vancouver Field Office 2108 Grand Boulevard Vancouver, WA 98661 Phone: 206-316-3047 E-mail: Steven.W.Manlow@usace.army.mil
Energy Facility Site Evaluation Council (EFSEC)	
Primary Contact: Sonia Bumpus, Siting Specialist P.O. Box 43172 Olympia, WA 98504-3172 1300 South Evergreen Park Drive SW Phone: 360-664-1363 E-mail: sbumpus@utc.wa.gov	Alternate Contact: Stephen Posner, EFSEC Manager P.O. Box 43172 Olympia, WA 98504-3172 1300 South Evergreen Park Drive SW Phone: 360-664-1903 E-mail: SPosner@utc.wa.gov
Tribal Contacts	
Cowlitz Indian Tribe	Confederated Tribes of Grand Ronde Community
dAVe burlingame Director, Cultural Resources P.O. Box 2547 Longview, WA 98632 Phone: 360-577-6962 Cell: 360-508-1677 Fax: 360-577-6207 E-mail: culture@cowlitz.org	David Harrelson, Program Manager, THPO 9615 Grand Ronde Road Grand Ronde, OR 97347 Phone: 503-879-1630 Cell: 503-879-2320 E-mail: THPO@grandronde.org
Chinook Indian Tribe	
Tony Johnson, Cultural Resources P.O. Box 368 Bay Center, WA 98527 Phone: 360-267-8212 E-mail: IKANIM25@gmail.com	Ray Gardner, Chair P.O. Box 368 Bay Center, WA 98527 Phone: 360-875-6670 via: office@chinooknation.org

Yakama Indian Nation	
Johnson Meninick, Program Manager Cultural Resources 401 Fort Road P.O. Box 151 Toppenish, WA 98948 Phone: 509-865-5121 Fax: 509-865-4664 E-mail: Johnson@yakama.com	Kate Valdez, THPO 401 Fort Road P.O. Box 151 Toppenish, WA 98948 Phone: 509-865-5121 Fax: 509-865-4664 E-mail: Kate@yakama.com
Confederated Tribes of The Chehalis Indian Reservation	
Richard Bellon, THPO P.O. Box 536 Oakville, WA 98568 Phone: 360-273-5911 Ext. 1304 E-mail: dee.bellon@comcast.net	

10. List of Acronyms and Abbreviations

AINW: Archaeological Investigations Northwest, Inc.

APE: area of potential effect

ASC: Application for Site Certification

CRIDP: cultural resources inadvertent discovery plan

DAHP: Washington State Department of Archaeology and Historic Preservation

EFSEC: Energy Facility Site Evaluation Council

Facility: Vancouver Energy

in.: inch

mm: millimeter

Port: Port of Vancouver USA

RCW: Revised Code of Washington

SEPA: State Environmental Policy Act

USACE: U.S. Army Corps of Engineers

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Appendix D.15

MFSA Vessel Response Plan

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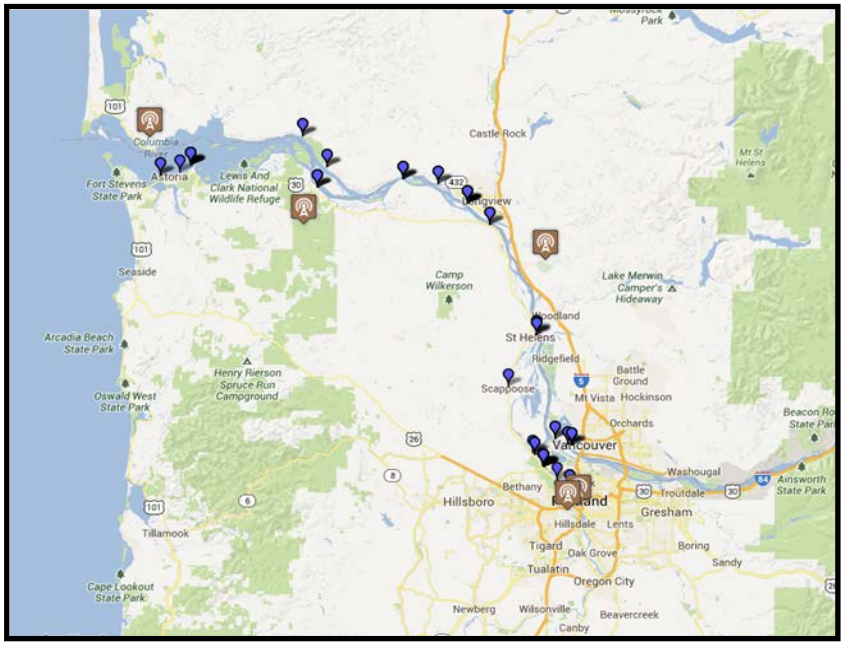
MFSA VESSEL RESPONSE PLAN

Umbrella Oil Spill Contingency Plan For Covered Vessels

Columbia and Willamette Rivers



Maritime Fire & Safety Association
200 SW Market Street, Suite 190
Portland OR 97201
503-220-2055

FRONT OF PLAN

i **Table of Contents**
ii **Record of Changes**
iii **Oregon Administrative Rules Contents**
iv **Washington Administrative Code Contents**
v **Plan Distribution List**

CHAPTER ONE INTRODUCTION AND GENERAL INFORMATION

1. Introduction

1.1. Regulatory Mandate

1.2. MFSA Contingency Plan

1.3. Procedures for Coverage Under the Plan
1.3.1. Vessel Details – MFSA Arrival Notice
1.3.2. Vessel Trip Fee
1.3.3. Field Guide
1.3.4. Authority to Implement Plan
1.3.5. Federal Vessel Response Plan ("Federal VRP") and Qualified Individual ("QI")

1.4. Relationship to Other Plans

1.5. Vessels Covered by the Plan

1.6. Area of Coverage
1.6.1 Ocean Zone

CHAPTER TWO NOTIFICATION PROCEDURES

2. Notification of Spill or Threat of Spill

2.1. Field Guide

2.2. Shipboard Required Notifications
2.2.1. Notification to MFSA
2.2.2. Notification to USCG
2.2.3. Notification to The States of Oregon and Washington

2.3. MFSA Notifications

2.4. Initial Oil Spill Report – Notification Form

2.5. Marking the Leading Edge of the Spill

2.6. **Estimating the Size of the Spill**

2.7. **Follow-up Information**

2.8. **Emergency Operations Flow Chart**

CHAPTER THREE SHORE-BASED RESPONSE ACTIVITIES

3. **Shore-Based Response Activities**

3.1. **MFSA's Responsibilities and Authority**

3.2. **Procedures for Transferring Responsibility of Directing Response Activities from the Vessel to MFSA**

3.3. **MFSA's Initial Actions**
- 3.3.1. Initial Response Activities
- 3.3.2. Response Action Checklist

3.4. **Establishing Unified Command ("UC")**

3.5. **Transition of Authority**

3.6. **National Incident Management System – Incident Command System ("ICS")**

3.7. **Functions of the Spill Management Team ("SMT")**
- 3.7.1. Vessel Master or Authorized Representative
- 3.7.2. Vessel's QI
  - 3.7.2.1 Ocean Zone Resource Activation
- 3.7.3. Incident Command or UC
  - 3.7.3.1. Command Staff –Information Officer
  - 3.7.3.2. Command Staff – Safety Officer
  - 3.7.3.3. Command Staff – Liaison Officer
- 3.7.4. General Staff
  - 3.7.4.1. Operations Section
  - 3.7.4.2. Planning Section
  - 3.7.4.3. Logistics Section
  - 3.7.4.4. Finance/Administrative Section

3.8. **The Planning Process**

3.9. **Night Operations**

3.10. **Wildlife**

3.11. **Decontamination**

3.12. **Disposal and Tracking of Recovered Volume**

3.12.1. Disposal
3.12.2. Tracking Recovered Volume

3.13. Shoreline Cleanup Operations

3.14. Dispersants

3.15. In Situ Burning

CHAPTER FOUR RESPONSE ACTION CHECKLIST

4. Response Action Checklist

4.1 Notifications

4.2. Steps to Control Discharge

4.3. Initial Assessment

4.4. Safety of Response Personnel

4.5. Initial Repsonse, Containment and Recovery

4.6. Additional Notifications

4.7. Continue Assessment, Containment and Recovery

4.8. Establish ICS Structure

4.9. Determine Recovery Equipment Requirements

4.10. Set Up Communications Network

4.11. Recovery Operations

4.12. Coordinate Interim and Permanent Disposal

4.13. Decontamination

4.14. Debrief

4.15. Transition of Authority

CHAPTER FIVE VESSEL INFORMATION AND LIST OF CONTACTS

5. List of Vessel Information and Emergency Contacts

5.1. Basic Vessel Information

5.2. **Detailed Vessel Information**

5.3. **Local Agent**

5.4. **SMT**
5.4.1. Contracted SMT
5.4.2. Public Affairs
5.4.3. Primary Resposne Contractor

5.5. **Salvage Fire Fighting and Lightering Resources**
5.5.1. Fire Fighting and Explosion
5.5.2. Commercial Salvage, Fire-fighting and Lightering Resources

5.6. **Other Emergency Contacts**
5.6.1. Search and Rescue
5.6.2. Site Access Control and Security
5.6.3. Wildlife Response

CHAPTER SIX PLANNING STANDARDS

6. **Planning Standards**

6.1. **Worst Case Discharge ("WCD"), and Types and Amounts of Oil**

6.2. **Planning Standards Based on WCD**

6.3. **Planning Standards for Response in the Ocean Zone**

6.4. **Boom**

6.5. **Minimum Recovery Rate**

6.6. **Storage**

6.7. **Transportation**

6.8. **Non-Dedicated Workboats**

6.9. **Aerial Surveillance**

6.10. **Equipment Maintenance**

6.11 **Group 5 Oils**

6.12 **Shoreline Cleanup**

CHAPTER SEVEN PERSONNEL TRAINING, HEALTH AND SAFETY

7. Personnel Training, Health and Safety

7.1. Training Requirements
7.1.1. General Training Requirements
7.1.2. Clean Rivers Cooperative Specific Training

7.2. Training Records

7.3. Health and Safety

7.4. Volunteers

7.5. Personnel Training and Qualification List

CHAPTER EIGHT EXERCISES

8. Exercises

8.1. Agency Required Exercises

8.2. Additional MFSA, CRC Exercises

CHAPTER NINE LOGISTICS

9. Logistics

9.1. Emergency Services

9.2. Communications

9.3. Command Posts and Accommodations

9.4. Security

9.5. River Access Points

9.6. Catering

9.7. Equipment Rental

9.8 Medical Facilities

CHAPTER TEN ADMINISTRATION

10. Administration

10.1 Implementation Strategy

10.2 Spill and Exercise Documentation and Review

10.3 Updates and Amendments

10.4 Periodic Reviews

APPENDICES

A Field Guide
B Transition of Authority
C Equipment
D Personnel
E Communications
F Wildlife Plan
G Decontamination
H Disposal
I [EMPTY]
J Contracts, Letters of Intent, Mutual Aid Agreements
K Glossary
L Up River Zone
M MFSA Binding Agreement
N Planning Standard Spreadsheets
O Acknowledgment Letters
P MFSA Emergency Call Sheet
Q Site Safety Forms
R Shipboard Response Actions

LIST OF FIGURES

1.a	1	1.4.	Relationship of Federal, State and local Oil Spill Contingency Plans
1.b	1	1.6.	Geographic Areas of Coverage
2.a	2	2.8.	Emergency Response Operation Flow Chart
3.a	3	3.5.	Transition of Authority During Typical Spill Response
3.b	3	3.6.	ICS Organization Chart
3.c	3	3.8.	The Planning Process
6.a	6	6.1	Products Handled
6.b	6	6.2.	Oregon Planning Standards
6.c	6.	6.2.	Washington Planning Standards
7.a	7	7.1.1	General Training Requirements
8.a	8	8.1.	Schedule of Exercises
9.a	9	9.3.	Command Post Locations
9.b	9	9.4.	Area Security Firms
9.c	9	9.5.	Area Catering Services
9.d	9	9.6.	Area Equipment Rental Services
A.1	A		Field Guide
A.2	A		Initial Oil Spill Report (Notification)
A.3	A		Estimating the Size of the Spill

A.4	A	Oil Classification
A.5	A	Substantial Threat of Spill Determination
A.6	A	Follow-up Report
A.7	A	IMO Vessel Oil Spill Incident Fax Reporting Form
B.1	B	Acknowledgement of Transfer or Relief
B.2	B	Transition Plan
C.1	C	Equipment List
D.1	D	SMT "Primary and Alternate" Roster
E.1	E	Communications Plan (ICS 205-OS Form)
G.1	G	Decontamination Kit Contents
G.2	G	Decontamination Station Layout
G.3	G	Site Work Zones
H.1	H	Disposal Matrix
J.1	J	Service Agreements
J.2	J	Letters of Intent
J.3	J	Mutual Aid Agreements
L1.a	L	NTVRP References
L1.b	L	Relationship of Contingency Plans
L2.a	L	Emergency Response Operations Flow Chart
L5.a	L	Basic Vessel Information
L6.a	L	Oregon Planning Standards
L6.b	L	Washington Planning Standards
L7.a	L	Tidewater Personnel – Health & Safety
L7.b	L	Tidewater Personnel – ICS Training
L9.a	L	Up River Command Post Options
L9.b	L	Area Security Firms
L9.c	L	Up River Catering Options
L9.d	L	Up River Equipment Rental Options
P.1	P	Emergency Call Sheet
P.2	P	Response Activation Call List

Section Revised	Date of Revision	Date DOE/DEQ Notified	Initials of Editor	Description of Revision:
Revision 06				
(ii)	02/16/2015	02/16/2015	HR	Updated Record of Changes
(v)	02/16/2015	02/16/2015	HR	Update plan distribution list
App D	02/16/2015	02/16/2015	HR	Update list of MFSA ISRCs
Revision 05				
(i)	07/14/2014	07/14/2014	HR	Updated TOC
(ii)	07/14/2014	07/14/2014	HR	Updated Record of Changes
(iv)	07/14/2014	07/14/2014	HR	Updated WAC to include HB1186 requirements and to reflect administrative changes
Ch 1	07/14/2014	6/23/2014 / 6/12/2014	HR	Language changes due to changes with P&I club practices and to reflect administrative changes.
Ch 5	07/14/2014	6/23/2014 / 6/12/2014	HR	Update contact information.
Ch 6	07/14/2014	6/23/2014 / 6/12/2014	HR	Correct errors, update CRC facility address and add language on Shoreline Cleanup.
Ch 10	07/14/2014	6/23/2014 / 7/14/2014	HR	Update plan distribution practices.
App C	07/14/2014	6/23/2014 / 6/12/2014	HR	Update WRRL list.
App D	07/14/2014	6/23/2014 / 6/12/2014	HR	Update information and clerical changes.
App H	07/14/2014	6/23/2014	HR	Update contact information.
App I	07/14/2014	6/23/2014 / 6/12/2014	HR	Remove.
App J	07/14/2014	6/23/2014 / 6/12/2014	HR	Update details on agreements and LOIs.
App K	07/14/2014	6/23/2014	HR	Update definitions and abbreviations.
App O	07/14/2014	6/23/2014 / 7/14/2014	HR	Update plan distribution practices.
Revision 04				
(v)	04/07/2014	03/31/20014	HR	Update plan distribution list
App D	04/07/2014	03/31/20014	HR	Update list of MFSA ISRCs

Section Revised	Date of Revision	Date DOE/DEQ Notified	Initials of Editor	Description of Revision:
Revision 03				
(v)	10/10/2013	10/2/2013	HR	Update plan distribution list
App D	10/10/2013	10/2/2013	HR	Update list of MFSA ISRCs
Revision 02				
(i)	07/14/2013	06/28/2013	HR	Updated TOC
(ii)	07/14/2013	06/28/2013	HR	Updated Record of Changes
(iv)	07/14/2013	06/28/2013	HR	Updated WAC to include HB1186 requirements
(v)	07/14/2013	06/28/2013	HR	NEW
Ch 1	07/14/2013	06/28/2013	HR	Addition of language on substantial threat of spill and inclusion of list of QIs.
Ch 2	07/14/2013	06/28/2013	HR	Clarification of Substantial Threat of Spill
Ch 3	07/14/2013	06/28/2013	HR	Clarification on Claims Process, clarification of role of MFSA ISRC as IC and clerical changes.
Ch 4	07/14/2013	06/28/2013	HR	Relocation of Vessel emergency scenarios to improve focus on ICs initial responses and clerical changes.
Ch 5	07/14/2013	06/28/2013	HR	Update information and clerical changes.
Ch 6	07/14/2013	06/28/2013	HR	Additional details on Products Handled, Aerial surveillance and Group 5 Oils.
Ch 9	07/14/2013	06/28/2013	HR	Update information and clerical changes.
App A	07/14/2013	06/28/2013	HR	Additional language on substantial threat of spill
App B	07/14/2013	06/28/2013	HR	Clerical changes
App D	07/14/2013	06/28/2013	HR	Update information and clerical changes.
App F	07/14/2013	06/28/2013	HR	Updated version of Wildlife Response Plan from NWACP
App I	07/14/2013	06/28/2013	HR	Modified to reflect updated binding agreement language
App J	07/14/2013	06/28/2013	HR	Updated information and clerical changes.
App K	07/14/2013	06/28/2013	HR	Added definition of Substantial Threat of Spill
App M	07/14/2013	06/28/2013	HR	Modified to reflect updated binding agreement language
App O	07/14/2013	06/28/2013	HR	Added list of QIs at Ecology's request.

Section Revised	Date of Revision	Date DOE/DEQ Notified	Initials of Editor	Description of Revision:
App P	07/14/2013	06/28/2013	HR	Clarification of Substantial Threat of Spill and clerical changes
App R	07/14/2013	06/28/2013	HR	New Appendix. Information on Vessel Emergencies formerly found in Chapter 4
Revision 01				
Apx I	10/26/11	10/26/11	MC	Addition of clarifying language.
Apx D	10/26/11	10/26/11	MC	Updates to response personnel.
(i)	10/26/11	10/26/11	MC	General updates to Table of Contents reflecting overall changes to Plan with updates.
Ch 1	10/26/11	10/26/11	MC	Clerical changes.
Ch 2	10/26/11	10/26/11	MC	Clerical changes.
Ch 4	10/26/11	10/26/11	MC	Clerical changes.
Ch 9	10/26/11	10/26/11	MC	Addition of medical service providers per DEQ request.
Apx A	7/25/11	10/26/11	MC	Addition of clarifying language addressing threat of a spill. Minor layout/clerical changes.
Apx M	10/26/11	10/26/11	MC	Addition of Submittal Agreement per DEQ request.
Apx O	7/29/11	10/26/11	MC	Addition of clarifying language to QI Acknowledgement Letter. ECY notified of change and reviewed during site visit 8/26/11.
Apx Q	10/26/11	10/26/11	MC	Addition of Appendix Q to include Toolbox Safety Meeting documents for response and vessel operations.

CROSS REFERENCE FOR OARs 340-141-0140		
340-141-140 Sub-chapter	**MFSA Plan Chapter**	**MFSA Plan Page**
(1) Submittal Agreement	Chapter 1.2 Appendix M	Ch 1, pg 1 Appendix M
(2) Amendments	Chapter 10.3	Ch 10, pg 2
(3) Table of Contents	Table of Contents	i
(4) Purpose & Scope	Chapter 1	Ch 1, pg 1
(5) Updates	Chapter 10.3	Ch 10, pg 2
(6) Implementation Strategy	Chapter 1.3.4	Ch 1, pg 3
(7) Spill Response System	Chapter 3.3 – 3.8	Ch 3, pg 1-13
(8) Contractor Identification	Chapter 5.4.3	Ch 5, pg 3
(9) Relationship to other plans	Chapter 1.4	Ch 1, pg 3-5
(10) Spill Detection	Appendix A	Appendix A
(11) Notifications	Appendix A	Appendix A
(12) Response Personnel	Appendix D	Appendix D
(13) Equipment & Response Resources	Appendix C	Appendix C
(14) Communications	Chapter 9.2 Appendix E	Ch 9, pg 1 Appendix E
(15) Response Operation Sites	Chapter 9.3	Ch 9, pg 1
(16) Response Flow Chart	Chapter 2.8, Figure 2.a	Ch 2, pg 4-5
(17) Authorities	Chapter 1.3.4	Ch 1, pg 3
(18) Damage Control	Chapter 4	Chapter 4
(19) Containment	Chapter 3.3 Chapter 4	Ch 3, pg 1-3 Chapter 4
(20) Response Time	Chapter 6	Ch 6, pg 1-3
(21) Chemical Agents	Chapter 3.14	Ch 3, pg 17
(22) In Situ Burning	Chapter 3.15	Ch 3, pg 17-18
(23) Environmental Protection	Chapter 3.3, 3.10, 3.13 Chapter 4 Appendix F	Ch 3, pg 1-3, 14, 16 Chapter 4 Appendix F
(24) Interim Storage	Chapter 6.6	Ch 6, pg 5
(25) Health and Safety	Chapter 7	Chapter 7
(26) Post Spill Review	Chapter 10.2	Ch 10, pg 1-2
(27) Drills and Exercises	Chapter 8	Chapter 8
(28) Risk Variables	Chapter 3.3, 3.10, 3.13 Chapter 4	Ch 3, pg 1-3, 14, 16 Chapter 4
(29) Environmental Variables	Chapter 3.3, 3.10, 3.13 Chapter 4	Ch 3, pg 1-3, 14, 16 Chapter 4
(30) Logistical Resources	Chapter 9	Chapter 9
(31) Response Strategy & Outline	Chapter 3	Chapter 3
(33) Technical Terms and Glossary	Appendix K	Appendix K

CROSS REFERENCE FOR WAC 173-182-110 to 730		
Subchapter	**MFSA Plan Chapter**	**MFSA Plan Page**
173-182-110 (4) - Authority to Submit contingency plan	Chapter 1.1, 1.2 & 1.3.4 Appendix M	Ch 1, pg 1 & 3 Appendix M
173-182-210 - Plan Format Requirements	Entire Plan	
173-182-220 - Binding Agreement	Appendix M	Appendix M
173-182-230 - Contingency Plan General Content		
3(a) Federal and State Requirements	Chapter 1.1	Ch 1, pg 1
3(b)(ii) Worst Case Discharge	Chapter 6.1	Ch. 6, pg 1
3(c) Log of Revisions	ii	ii
3(d) Cross Reference Table	ix	ix
3(e) Primary Response Contractor Info	Chapter 5.4.3	Ch 5, pg 3
3(f) Procedures to Track Spill Volume	Chapter 2.5 Chapter 3.12.2	Ch 2, pg 3 Ch 3, pg 15
4(a)-(c) Facility Plan Content	N/A	N/A
5(a) Name of Each Vessel	N/A	N/A
5(b) Name, Location, Address of Owner/Operator	N/A	N/A
5(c) Official Number or Call Sign	N/A	N/A
5(d) Country of Registry	N/A	N/A
5(e) Area of Operations	Chapter 1.6	Ch 1, pg 3
5(f) Type of Oil by Group	Chapter 6.1	ch 6, pg 2-3
5(g) Operations Covered by Plan	Chapter 1	Ch 1, pg 1-2
5(h) Vessel Diagrams	N/A	N/A
6(a) Umbrella Plan Member List	Chapter 1.3	Ch 1, pg 2-3
6(b) List of Types of Oils by Group & Volume	Chapter 1.3	ch1, pg 2-3
7 Claims Process	Chapter 3.7.4.4	Ch 3, pg 12
173-182-232 – Agreements for Supplemental Resources	Chapter 1.6.1 Chapter 6.3	Ch 1, pg 6 Ch 6, pg 5
173-182-240 - Field Document	Appendix A	Appendix A
173-182-242 – Additional Requirements for Neah Bay	N/A	N/A
173-182-250 – Initial response actions	Chapter 3.3	Ch 3, pg 1-3
173-182-260 - Notifications	Chapter 2 Appendix P	Chapter 2 Appendix P
173-182-262 - Substantial Threat of Spill		
173-182-264 – Facility Spill to Ground	N/A	N/A
173-182-270 – Maintenance records	Chapter 6.10	Ch. 6, pg 6
173-182-280 – Spill Mgt Teams	Chapter 3.6-3.8	Ch 3, pg 6-13

CROSS REFERENCE FOR WAC 173-182-110 to 730		
Subchapter	**MFSA Plan Chapter**	**MFSA Plan Page**
173-182-310-450 – Planning Standards	Chapter 6 Appendix N	Chapter 6 Appendix N
173-182-510 – Response and Protection Strategies	Chapter 3.3	Ch 3, pg 1-3
173-182-520 – Facility Planning standards for shoreline cleanup	N/A	N/A
173-182-522 – Vessel Planning Standards for shoreline cleanup	Chapter 6.12	Ch 6, pg 6
173-182-530 – Groundwater spills	N/A	N/A
173-182-540 – Planning standards for wildlife rescue and rehabilitation	Chapter 3.10 Appendix F	Ch 3, pg 14 Appendix F
173-182-610 - Plan Evaluation Criteria	Entire Plan	
173-182-620 - Alternative Method of Evaluating Planning Standards	N/A	
173-182-630 - Process for Plan Approval	Chapter 10.4	Ch. 10, pg. 2
173-182-700 - Drill Participation, Scheduling and Evaluation	Chapter 8.1, 8.2	Ch. 8, pg 1-3
173-182-710 - Type and Frequency of Drills	Chapter 8.2, Figure 8.a	Ch. 8, pg 1-2
173-182-720 - Evaluation Criteria	Chapter 8.1 Chapter 10.2	Ch. 8, pg 1 Ch 10, pg 1-2
173-182-730 - Other Ways to Get Drill Credit	Chapter 8.1	Ch. 8, pg 1

Plan Distribution List

Printed copies of this plan are distributed as indicated below. Copies of the plan are available at the MFSA website (www.mfsa.com).

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1. INTRODUCTION

1.1. REGULATORY MANDATE

This plan follows the requirements set forth in the Clean Waters Act as amended by the Oil Pollution Act of 1990; Oregon Revised Statute ("ORS") Chapter 468B, Division 300-400, Oregon Administrative Rules ("OAR") Chapter 340, Division 141; and Washington's Administrative Code ("WAC") Chapter 173, Division 182, Sections 010-930. These regulations require an oil spill response plan for vessels covered by the respective regulations that carry oil as fuel or cargo on the navigable waters of the states of Oregon and Washington.

1.2. MFSA CONTINGENCY PLAN

Maritime Fire & Safety Association ("MFSA") is the nonprofit corporation providing oil spill response and contingency planning coverage under this MFSA Vessel Response Plan (the "Plan"). The Plan is an umbrella plan for vessels entering the Columbia River that enroll for coverage under the Plan. As used in the Plan, "Covered Vessel" includes a vessel that enrolls for coverage under the Plan, its Owners and Operators (as defined in Appendix K), their successors-in-interest, and all other owners and/or operators receiving services on behalf of the enrolled vessel under the Plan. Upon enrolling under the Plan, through both the Enrollment Agreement (defined below) and the MFSA Arrival Notice (defined below), which form a part of the Plan, each Covered Vessel authorizes MFSA to enter into a binding agreement on behalf of the Covered Vessel as required by WAC 173-182-220 (the "Binding Agreement"). A copy of the Binding Agreement is located in Appendix (M).

The Plan provides detailed information including:

- Procedures for early detection and timely notification;
- Guidance for identifying a substantial threat of spill;
- Response personnel organization, capability, and training;
- Equipment characteristics, location, and capability;
- Procedures to stop or reduce spilling;
- Communications procedures;
- Environmental protection;
- Provisions for disposal of recovered oil, oily water and oily debris;
- Drills and other methods to evaluate readiness; and
- Identification of environmental sensitivity and spill risk variables.

1.3. PROCEDURES FOR COVERAGE UNDER THE PLAN

A Covered Vessel through an Authorized Representative enrolls for coverage under the Plan by (i) entering into either a direct Vessel Enrollment Agreement ("Vessel Enrollment Agreement") or a Blanket Enrollment Agreement ("Blanket Agreement") with MFSA (either, an "Enrollment Agreement"), (ii) following the other enrollment procedures specified in the Enrollment Agreement and (iii)

paying the applicable vessel Trip Fee (defined below) for coverage under the Plan. By enrolling for coverage under the Plan, the Covered Vessel and the Owner agree to all of the terms and conditions of the Enrollment Agreement and agree to follow the provisions of the Plan. The Vessel Enrollment Agreement and Blanket Agreement are available on the MFSA website at http://www.mfsa.com. Enrollment is completed with submission to MFSA of the MFSA Arrival Notice at least 96 hours prior to the arrival of the Covered Vessel into the Area of Coverage, which begins 3 nautical miles out from the mouth of the Columbia River (as defined in 1.6. of the Plan), or if the voyage time is less than 96 hours from the port of departure, then prior to departure.

Covered Vessel information is available through a secure log-on for State and Federal regulators online at http://www.mfsa.com. Historical information can be made available for review by State and Federal regulators upon request at the offices of the Merchants Exchange. Information is provided by enrolling vessels as part of the Arrival Notice.

1.3.1. VESSEL DETAILS – MFSA ARRIVAL NOTICE

To complete enrollment of a Covered Vessel under the Plan, the Owner or an Authorized Representative must file with MFSA (through the Merchants Exchange of Portland) the MFSA Arrival Notice on the MFSA approved form, accurately providing all requested vessel details. The MFSA Arrival Notice is to be filed with MFSA at least 96 hours prior to arrival of the Covered Vessel into the Area of Coverage, which begins 3 nautical miles out from the mouth of the Columbia River (as defined in 1.6. of the Plan), or if the voyage time is less than 96 hours from the port of departure, prior to departure. The MFSA Arrival Notice form can be found on the MFSA website at http://www.MFSA.com, or submitted online at http://www.pdxmex.com.

1.3.2. VESSEL TRIP FEE

Each Covered Vessel must pay the appropriate fee (“Trip Fee”) for each transit in the Area of Coverage. MFSA’s current fee schedule and payment instructions are available from MFSA at http://www.mfsa.com.

1.3.3. FIELD GUIDE

Each Covered Vessel must carry on board an MFSA Shipboard Field Guide - Emergency Procedures Checklist (“Field Guide”) which must be available for use at all times when the Covered Vessel is in the Area of Coverage. The Field Guide must be placed on board the Covered Vessel by the Owner (or Authorized Representative) prior to the Covered Vessel’s arrival in the Area of Coverage. The Field Guide is available upon request to MFSA or can be found on the MFSA website at http://www.MFSA.com and is located in Appendix (A) of this Plan.

1.3.4. AUTHORITY TO IMPLEMENT PLAN

MFSA is provided authority to Implement the Plan by (a) the Enrollment Agreement, and (b) the MFSA Arrival Notice. This authority allows MFSA to carry out response actions under the Plan. MFSA is authorized to act as a limited agent on behalf of the Covered Vessel to mobilize, dispatch, and direct equipment and personnel of (i) the Primary Response Contractor ("PRC") named in the Plan, and (ii) through the Qualified Individual ("QI") named in the Covered Vessel's Federal Vessel Response Plan ("Federal VRP") as listed in the MFSA Arrival Notice, the Covered Vessel's Ocean Zone Oil Spill Removal Organization ("Ocean Zone OSRO") named in the MFSA Arrival Notice as contracted by the Covered Vessel. This Authority to Implement the Plan is effective for up to the first 24 hours following MFSA receiving Notification, by which time a Transition of Authority must occur as defined in Chapter (3) and Appendix (B) of the Plan.

1.3.5. FEDERAL VESSEL RESPONSE PLAN AND QI

The Covered Vessel (or Authorized Representative) will identify its QI in the MFSA Arrival Notice. The Covered Vessel authorizes the QI, through the Enrollment Agreement, to coordinate with MFSA in the use of Ocean Zone Resources (as defined in 1.6.1 and Appendix K of the Plan) through the Ocean Zone OSRO. The QI also coordinates with MFSA for the Transition of Authority (as defined in Chapter 3 and Appendix K of the Plan).

Each participating QI, except those who have also signed Enrollment Agreements, must execute the Acknowledgement Letter found in Appendix (O), which details and acknowledges the coordination process in the call out of Ocean Zone Resources. A list of participating QIs can be found in Appendix (O), current as of date of plan submission.

1.4. RELATIONSHIP TO OTHER PLANS

MFSA and its PRCs use this Plan in conjunction with other applicable response plans during spill responses and cleanup operations. Figure 1.a depicts the relationship between the Plan and other federal, state, and local response plans.

The National Oil and Hazardous Substances Pollution Contingency Plan (the "National Contingency Plan" or "NCP") is the federal government's plan for

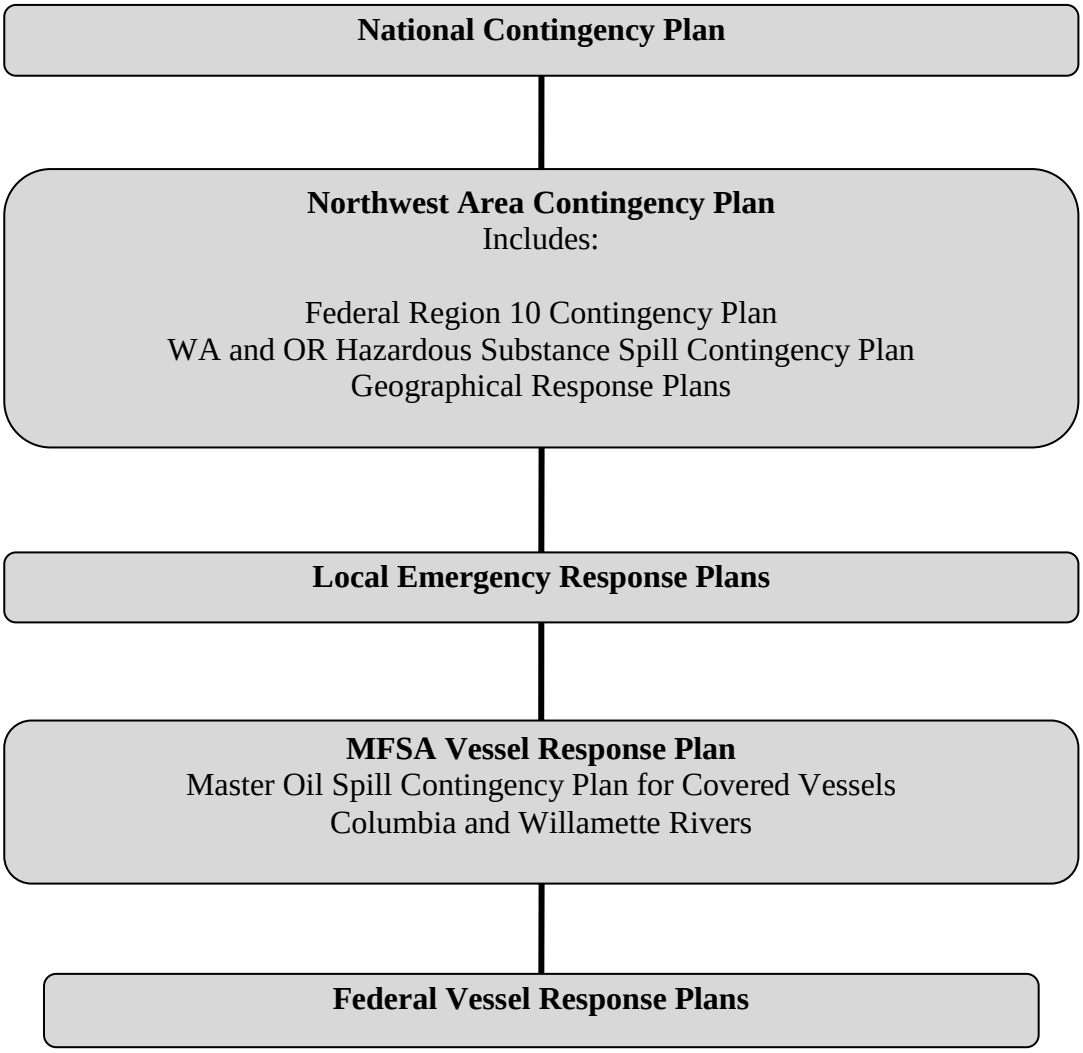
responding to oil spills and/or hazardous materials incidents. The NCP serves to promote overall coordination among the hierarchy of responders and contingency plans. It contains policies for Regional Response Teams ("RRT") such as the Region 10 RRT, and area contingency plans such as the Northwest Area Contingency Plan ("NWACP").

The NWACP contains response information and policies for the northwest region and includes guidance that state approved umbrella plans in the Northwest supersede Federal VRPs.

Local Emergency Planning Committees work closely with the RRT for consistency with the NWACP. In the event a spill involves a local emergency management agency, the local response plan will be referenced in conjuction with the NWACP.

Figure 1.a

RELATIONSHIP OF FEDERAL, STATE, AND LOCAL OIL SPILL CONTINGENCY PLANS



1.5. VESSELS COVERED BY THE PLAN

Tank vessels and tank barges of any size as well as cargo and passenger, vessels over 300 Gross Tons (domestic) calling at ports in Oregon and Washington on the Columbia and Willamette Rivers are eligible for coverage. Typical ports of call include Longview, Kalama and Vancouver, Washington; and Portland and Astoria, Oregon. Enrollment Agreements are kept on file with the official records at the offices of MFSA. Enrollment information is maintained on the MFSA website http://www.mfsa.com in a secure location which is available to State and Federal agencies. Voyage information for Covered Vessels is kept in an electronic database maintained by the Merchants Exchange of Portland. Vessel information is provided by the Covered Vessel (or Authorized Representative) to MFSA, in the form of the MFSA Arrival Notice, and to the USCG, in the form of the USCG Notice of Arrival, at least 96 hours prior to the Covered Vessels arrival into the Area of Coverage.

1.6. AREA OF COVERAGE

The geographic area covered by this Plan, as required under OAR 340-141-0140(4)(a) and WAC 317-10-050 (4)(a), consists of the Columbia River from its mouth (at river mile 0) up to the Glenn Jackson Bridge (I-205) at river mile 113, and the Willamette River from its confluence with the Columbia River up to Willamette Falls. Coverage may be extended to the Upper Columbia and Snake Rivers pursuant to separate Appendix to this Plan. The Area of Coverage also includes the area from the mouth of the river (at river mile 0) extending 3 miles into the Pacific Ocean (the “Ocean Zone”). Collectively, these areas are referred to as the “Area of Coverage,” Figure 1.b displays the Area of Coverage.

1.6.1. OCEAN ZONE

The response equipment contracted by MFSA under the Plan does not meet all regulatory spill response equipment requirements for the Ocean Zone. The Ocean Zone includes (a) Oregon State waters that require open water capable response resources to meet regulatory planning standard requirements of OAR 340-141-0150(3)(f) – Covered Vessels Operating in the Open Ocean Zone; and (b) Washington State waters that require open water capable response resources to meet regulatory planning standard requirements of WAC 173182-415 – Cathlamet Staging Area, WAC 173-182-450 – Planning Standards for the Washington Coast, WAC 173-182-325 – Planning Standards for Dispersants and WAC 173-182-330 – Planning Standards for In Situ Burning. In order to meet these requirements, the Covered Vessel must rely on the Ocean Zone OSRO.

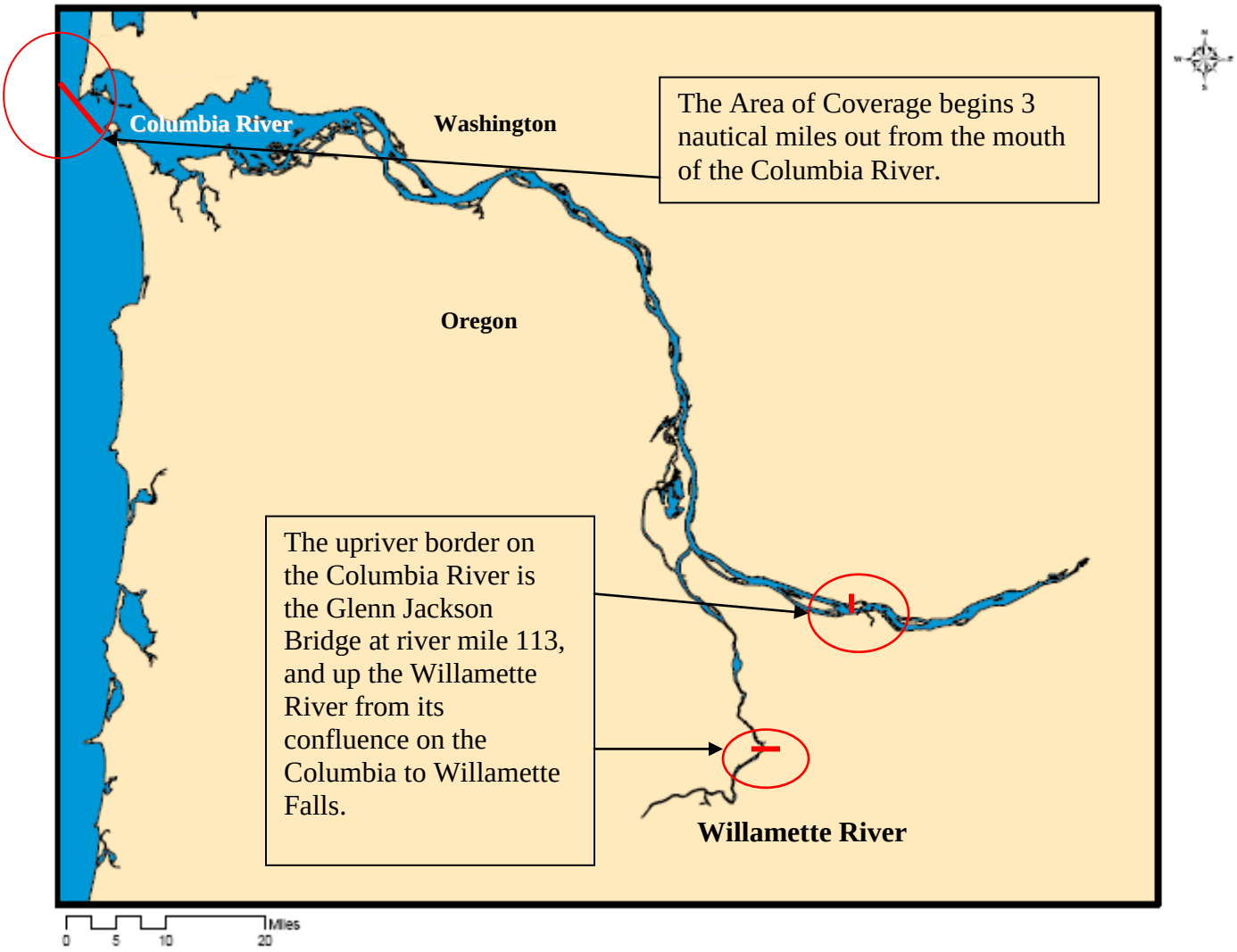
In order to comply with applicable regulations and complete enrollment, Covered Vessels must provide MFSA with the MFSA Arrival Notice for

each vessel call in the Area of Coverage. The MFSA Arrival Notice must specify the Covered Vessel's P&I Club, QI and the Ocean Zone OSRO. The Covered Vessel must rely on the response resources maintained by the Ocean Zone OSRO (the "Ocean Zone Resources") to meet the regulatory requirements for Oregon and Washington in response to spills in or affecting the Ocean Zone. The Covered Vessel's QI is an Authorized Representative with specific authority to call out Ocean Zone Resources. The QI will coordinate with the Spill Management Team to call out the Ocean Zone OSRO as depicted in Chapter (3) of the Plan.

If MFSA determines that the Ocean Zone OSRO does not satisfy the requirements for Ocean Zone Resources, MFSA will notify the vessel that enrollment in the Plan is denied and will advise the vessel of available courses of action, if any.

Figure 1.b

GEOGRAPHIC AREAS OF COVERAGE



2. NOTIFICATIONS OF SPILL OR SUBSTANTIAL THREAT OF SPILL

All spills or substantial threats of spills from a Covered Vessel into the Area of Coverage must be immediately reported to the States of Oregon and Washington as referenced in Chapter 1 of this Plan and in Section 2.2.3. below, in addition to the USCG in accordance with regulation 33 CFR 153.203 Procedures for the Notice of Discharge.

2.1. FIELD GUIDE

Each Covered Vessel must carry on board the Field Guide, which must be available for use at all times when the Covered Vessel is in the Area of Coverage. The Field Guide must be placed on board the Covered Vessel by the Owner (or Authorized Representative) prior to the Covered Vessel's arrival in the Area of Coverage. The Field Guide is available upon request to MFSA or can be found on the MFSA website at http://www.MFSA.com and is located in Appendix (A) of this Plan.

2.2. SHIPBOARD REQUIRED NOTIFICATIONS

In the event of a spill or substantial threat of a spill, the Covered Vessel (or Authorized Representative) is required to make the notifications as listed in the Field Guide (Appendix A, Figure A.1).

DO NOT DELAY INITIAL REPORT

If some items in the Field Guide spill reporting form are unknown, state in the report that this information will be provided when the facts are available.

2.2.1. NOTIFICATION TO MFSA

In the event of a spill or substantial threat of a spill from the Covered Vessel, the Covered Vessel (or Authorized Representative) is to notify MFSA as soon as possible. MFSA Communications Center staff will document information received and make follow-up notifications. Notwithstanding MFSA's follow-up notifications, the Covered Vessel (or Authorized Representative) is still required to make the notifications as listed on the Field Guide.

The communication by the Covered Vessel (or Authorized Representative) to report a spill or substantial threat of a spill from the Covered Vessel (the "Notification"), triggers MFSA's Authority to Implement the Plan. Implementation of the Plan is the initiation of and continuation of oil spill response actions under the Plan, once Notification has occurred. MFSA will furnish an Incident Commander ("IC") to investigate the spill and manage the response actions.

Substantial threat of a spill is defined in the Glossary (Appendix K). In the case of a vessel emergency where it is uncertain if a substantial threat of spill exists, the vessel representative should review the specific incident details with the MFSA Communication Center to determine if it meets the definition.

If MFSA receives telephonic, radio or other communication from any person who is not an Authorized Representative of a Covered Vessel (including regulatory agencies) of a spill or substantial threat of a spill from an MFSA Covered Vessel, MFSA will contact the Covered Vessel (or its Authorized Representative) to confirm the existence of a spill or substantial threat of a spill. Based on the information received MFSA will then take the following steps:

- If a spill or substantial threat of a spill is confirmed, this confirmation is deemed a Notification from the Covered Vessel or its Authorized Representative.
- If the report of a spill or substantial threat of a spill is not confirmed, or a spill is confirmed but is reported as not coming from the Covered Vessel, MFSA will notify DEQ, Ecology and the USCG, and detail what information was provided to MFSA.

Maritime Fire and Safety Association's
24-hour contact number is (503) 220-2055

2.2.2. NOTIFICATION TO USCG

Initial reports by the vessel on any oil spill must be **immediately** reported to the USCG National Response Center.

The USCG National Response Center will accept the *IMO Vessel Oil Spill Incident Fax Reporting Form* as an alternative to a voice notification to report an oil spill incident. However, if the initial report to the USCG National Response Center is done by fax, the Covered Vessel (or Authorized Representative) must call by telephone to confirm receipt of the faxed notification by the USCG within 15 minutes of sending the fax.

2.2.3. NOTIFICATION TO THE STATES OF OREGON AND WASHINGTON

The Covered Vessel (or Authorized Representative) must also report any spill or substantial threat of a spill into the waters of Oregon or Washington to the emergency response center for each state **immediately**, using the emergency response center numbers for each state listed in the Field Guide (Appendix A, Figure A.1).

2.3. MFSA NOTIFICATIONS

Upon Notification to MFSA of a spill or substantial threat of a spill from a Covered Vessel, the Communications Center will document the information received on the Emergency Call Sheet found in Appendix (P), Figure P.1 of the Plan. They will then use the Response Activation Call Sheet found in Appendix (P), Figure P.2 of the Plan to make the following notifications:

a) the on-duty IC who will lead response efforts as per the duties and responsibilities outlined in Chapter (3) of the Plan;
b) the on-duty Response Manager to provide incident information who will assess and make response recommendations to the IC;
c) the USCG National Response Center;
d) the States of Oregon and Washington;
e) the Covered Vessel's Agent and QI; and
f) the MFSA on-call representative.

The notifications to the USCG National Response Center and the States of Oregon and Washington are follow-up notifications only. The Covered Vessel is still required to make notifications as per the Field Guide. Follow-up notifications provide MFSA immediately with incident reporting numbers, and verify calls made and information exchanged.

2.4. INITIAL OIL SPILL REPORT - NOTIFICATION FORM

Upon the discovery of a spill or substantial threat of a spill there will be a demand for as much information as possible, as quickly as possible. There must be a balance of timeliness and thoroughness of the information. However, never delay reporting. Report as much information as possible and then follow up with additional information as it becomes available. Appendix (A) includes an initial notification form (Figure A.2) and should be filled out by the Covered Vessel (or Authorized Representative) as thoroughly as possible without delaying the information. The IC will collect the information recorded on this form when first contacting the Covered Vessel.

2.5. MARKING THE LEADING EDGE OF THE SPILL

The IC will, upon initial contact, assist the Covered Vessel in marking the leading edge of the spill. This may be achieved for example by throwing an absorbent pad or an orange into the water. MFSA can provide means for meeting this requirement once on-scene through the PRC, Clean Rivers Cooperative, Inc. ("CRC"). CRC maintains and trains in the use of tracking devices which can be deployed during the initial assessment phase of a spill. See PRC Application for additional information.

2.6. ESTIMATING THE SIZE OF THE SPILL

Estimating the size of the spill is as difficult as it is necessary. This information is critical during the initial Notification in order to determine the size of the response operation. The estimating will be performed immediately upon discovery by the Covered Vessel and/or by dispatched observation personnel. The size can be estimated by direct observations and through cargo operation transfer rates and/or soundings of the vessel's tanks. Use Figure A.3 in Appendix (A) to estimate the size of the spill and report the information as it is available.

2.7. FOLLOW UP INFORMATION

After the initial information has been reported there may be a need to provide additional details about the incident. This information may include additional details about the volume, type or spread of the incident. Other information that may be needed could include details on the status of the Covered Vessel and/or its crew.

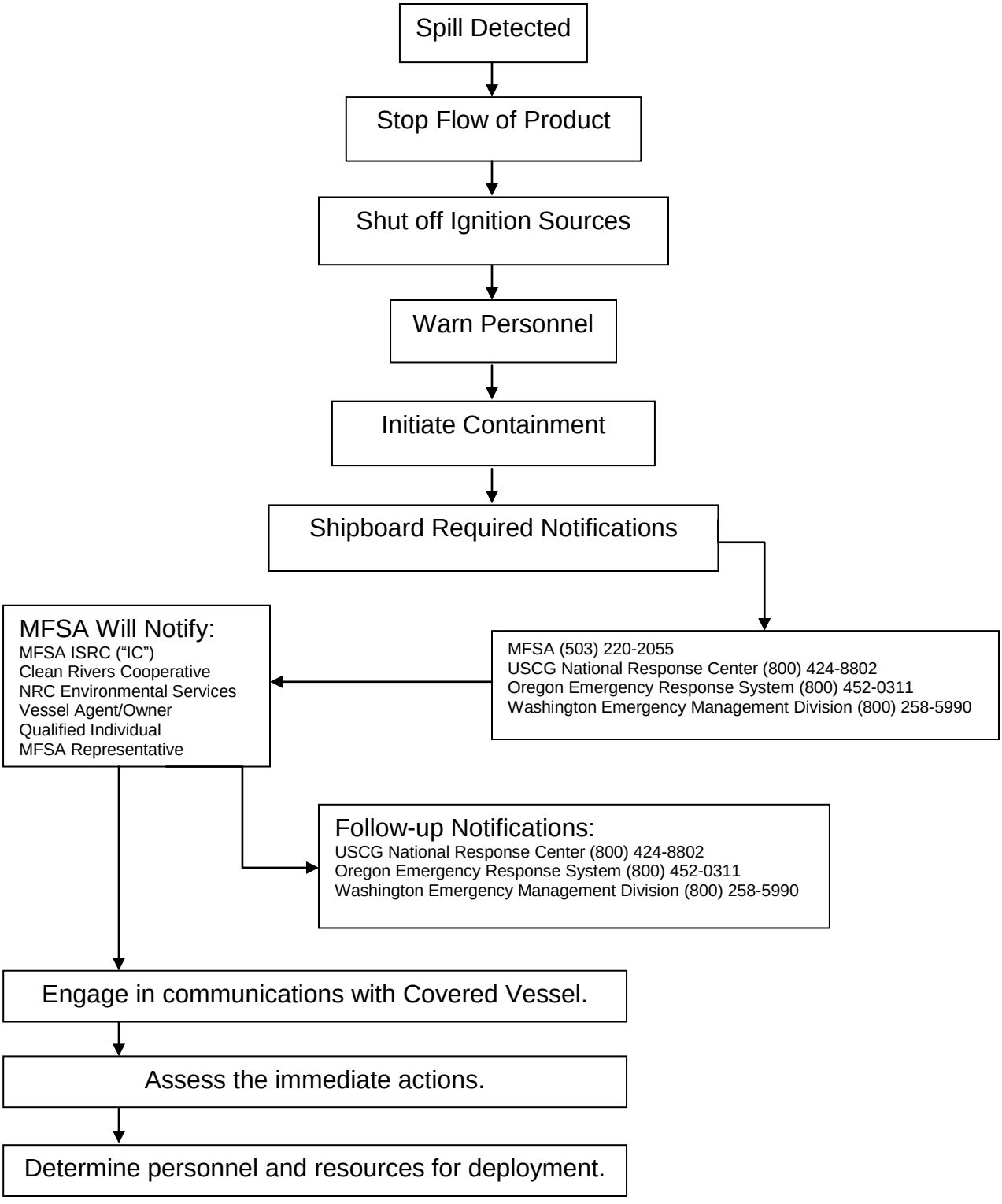
When significant changes to the initial information occur and a follow-up report is required, the IC should complete the Follow-up Report in Appendix (A), Figure A.5, and provide the updated information to the agencies notified on the Field Guide (see Appendix A, Figure A.1). The IC may discuss the contents of the Follow-up Report with the appropriate agencies onsite or by phone if applicable.

2.8. EMERGENCY OPERATIONS FLOW CHART

An efficient plan and a rapid response require all parties involved to know exactly how the operation will transpire. Figure 2.a depicts how the emergency response under this Plan will be managed.

FIGURE 2.a

EMERGENCY RESPONSE OPERATIONS FLOW CHART



3. SHORE-BASED RESPONSE ACTIVITIES

3.1. MFSA's RESPONSIBILITIES AND AUTHORITY

This Plan is the umbrella plan for Covered Vessels calling the Columbia and Willamette Rivers and outlines the cleanup and containment responsibilities, as brought about by the OPA 90 and Oregon's and Washington's 1991 Oil Spill Prevention Bills (SB 242-A and HB 1027, respectively), and required by OAR 340-141 and WAC 173.182.

Upon receiving Notification of a spill or substantial threat of a spill from a Covered Vessel, MFSA will provide an Interim Spill Response Coordinator (ISRC) to fill the role as Incident Commander (IC) for a period of up to 24 hours or until the Responsible Party's ("RP") QI assumes duties as the IC; whichever occurs first.

3.2. PROCEDURES FOR TRANSFERRING RESPONSIBILITY OF DIRECTING RESPONSE ACTIVITIES FROM THE VESSEL TO MFSA

The responsibility of spill response direction is transferred from the vessel to MFSA immediately upon Notification of a spill or substantial threat of a spill from a Covered Vessel.

3.3. MFSA's INITIAL ACTIONS

Upon Notification, MFSA will Implement the Plan. This is the responsibility of the once notified. Initial actions primarily include, but are not limited to, equipment and personnel deployment in accordance with the Geographical Response Plans ("GRP"s) of the NWACP for the area of concern. The NWACP and associated GRPs are incorporated by reference into this Plan, including all risk and environmental variables identified. Recognizing that the priorities for booming and other response activities may change or require additional response measures outside of the GRPs, these strategies will be implemented at the discretion of the Unified Command ("UC"). Examples could include among others, air monitoring, alternative booming strategies, assessment measures, on-water recovery operations, and over flights.

3.3.1. INITIAL RESPONSE ACTIVITIES

Upon Notification of a spill or substantial threat of a spill from a Covered Vessel, MFSA will assign an ISRC to act as IC to the incident. MFSA maintains a roster of ISRCs available for assignment to an incident as an IC who rotates through on-call duty status. Cellular phones and/or pagers are used to ensure that a constant stand-by status is maintained for assignment of an IC to an incident upon Notification. Current ISRCs are listed in Appendix (D), Figure D.1, of the Plan.

Upon Notification of a spill or substantial threat of a spill from a Covered Vessel, the IC will:

a) contact the vessel to confirm the status of the steps taken to ensure safety of the crew and the Covered Vessel, and the steps being taken to contain and mitigate the spill;
b) assess the immediate actions needed to be taken to maintain safety and to minimize environmental damage;
c) determine the personnel and resources needed for deployment to the incident, and order deployment of those resources; and
d) communicate and coordinate with State and Federal agencies.

The IC has authority to contract and utilize any resources necessary to accomplish these steps and to direct the spill response based on the IC's initial and follow up assessments.

The IC will strive to take the appropriate actions quickly on behalf of the Covered Vessel to minimize the incident's impact to safety, environment and economy. IC's are experienced in oil spill cleanup and will evaluate the spill and necessary cleanup actions. If the IC determines that the necessary actions are being taken to clean the spill or that the spill is not recoverable, the IC will not call in clean-up resources unnecessarily. However, if there is any doubt, the IC will take the prudent course of action, and call in response resources, including additional on-site assessment resources.

IC duties and responsibilities are described in Section 3.7.3. of the Plan.

The initial on-site assessment resources available to the IC, and the ones most commonly used by the IC, are the CRC's Response Manager, the Project Supervisor and the Response Crew.

- CRC's Response Manager – The On-Duty CRC Response Manager serves as the initial Operations Section Chief. The Response Manager can also provide a tracking device to mark the leading edge of the spill during low visibility situations.

- Project Supervisor – The Project Supervisor serves as the initial Division/Group Supervisor. The Project Supervisor works with the Operations Section Chief and directs assigned Strike Teams/Task Forces.

- Response Crew – The Response Crew serves as a Strike Team/Task Force or single resource. This crew, made up of two people, responds with a CRC response vessel equipped with a minimum of 1000 feet of oil spill containment boom.

When deployed to the incident, the IC, Response Manager and/or Project Supervisor will travel to the incident via landside with the response vessel traveling from the appropriate vessel moorage via water. Once on scene, on-site assessment will continue and the deployed personnel will begin initial containment and collection operations. The Response Manager and/or Project Supervisor will continue reporting to the IC who will determine the ongoing response needed. Additional equipment may be deployed as necessary depending on amount and type of product spilled or the ongoing level of threatened spill.

3.3.2. RESPONSE ACTION CHECKLIST

The Response Action Checklist in Chapter (4) will be used during the response to all spills and will be provided to both the IC and the CRC Response Manager. The Response Action Checklist is not intended to limit their decisions and actions in any way. It is provided as a guide, as to the generally accepted spill response practices, and as a reminder during the early phases of a spill response. The Field Guide document remains the vessel's tool for responding. In addition to the use of the Response Action Checklist, it is the IC's responsibility to document initial response objectives and actions taken on an ICS 201 Form for each spill response.

3.4. ESTABLISHING UNIFIED COMMAND

It is the IC's responsibility to establish contact with the Federal On-Scene Coordinator ("FOSC") and the State On-Scene Coordinator ("SOSC") to advise them or their designees of the proposed response. The IC, FOSC, and SOSC make up the initial Unified Command ("UC"). In addition, the IC will set up a schedule of update/strategy sessions with the FOSC and the SOSC either onsite or via conference call. These updates and strategy sessions will comply with common practices in accordance with the planning process established in the Incident Command System ("ICS"). Additional UC members will be identified and included in communications as necessary.

3.5. TRANSITION OF AUTHORITY

MFSA's response organization is arranged to Implement the Plan through the first 24 hours of a response, including the identification, coordination and management of the appropriate initial spill response resources necessary to rapidly and aggressively respond to a spill or substantial threat of a spill, and

insure a smooth Transition of Authority with the RP's Spill Management Team ("SMT").

MFSA plans to use personnel and contractor resources under the direction of the PRC, which is CRC, to fill response team member positions in the initial stages of the incident. MFSA may also utilize its contracted SMT, O'Brien's Response Management ("ORM"), to provide personnel to supplement staffing within the ICS. ORM has a diversity of personnel trained in the various disciplines of the ICS (Operations, Planning, Logistics, and Finance). These individuals will continue to function in their designated operations until the RP is able to mobilize its own SMT.

MFSA, the PRC and ORM will work with the incoming RP team members until a smooth and effective Transition of Authority can be assured. A diagram depicting the Transition of Authority during a typical spill is included in (Figure 3.a). The RP will relieve MFSA and their ISRC by completing the Acknowledgement of Transfer or Relief (Figure B.1) and the Transition Plan (Figure B.2) in Appendix (B). At that point, the RP will fill the role of IC. In the event the RP fails to relieve MFSA and the IC within 24 hours of Notification, MFSA will turn over responsibility to a governmental authority.

Figure 3.a

TRANSITION OF AUTHORITY DURING TYPICAL SPILL RESPONSE

POSITION	PROVIDER	RESPONSIBILITY
AUTHORIZED REPRESENTATIVE	AUTHORIZED REPRESENTATIVE	INITIAL RESPONSE ACTIONS: Safety of Personnel Stop the Flow Initial Assessment & Contain Notification to MFSA & Agencies

TURNS OVER INCIDENT COMMAND

VESSEL SECURED

INTERIM SPILL RESPONSE COORDINATOR (“ISRC”)	MARITIME FIRE & SAFETY ASSOCIATION (“MFSA”)	INITIAL RESPONSE: Contact Vessel to Assist with securing Vessel Continue Assessment Initiate containment, recovery and GRP’s Begin Incident Command Establish Unified Command

TRANSITION OF AUTHORITY FROM MFSA ISRC TO RP QI

INITIAL ASSESSMENT COORDINATION AND CLEANUP BEGUN

RESPONSIBLE PARTY (“RP”) or QUALIFIED INDIVIDUAL (“QI”)	RESPONSIBLE PARTY P & I CLUB	Continue Clean-up Damage assessment Decontamination Disposal Demobilization

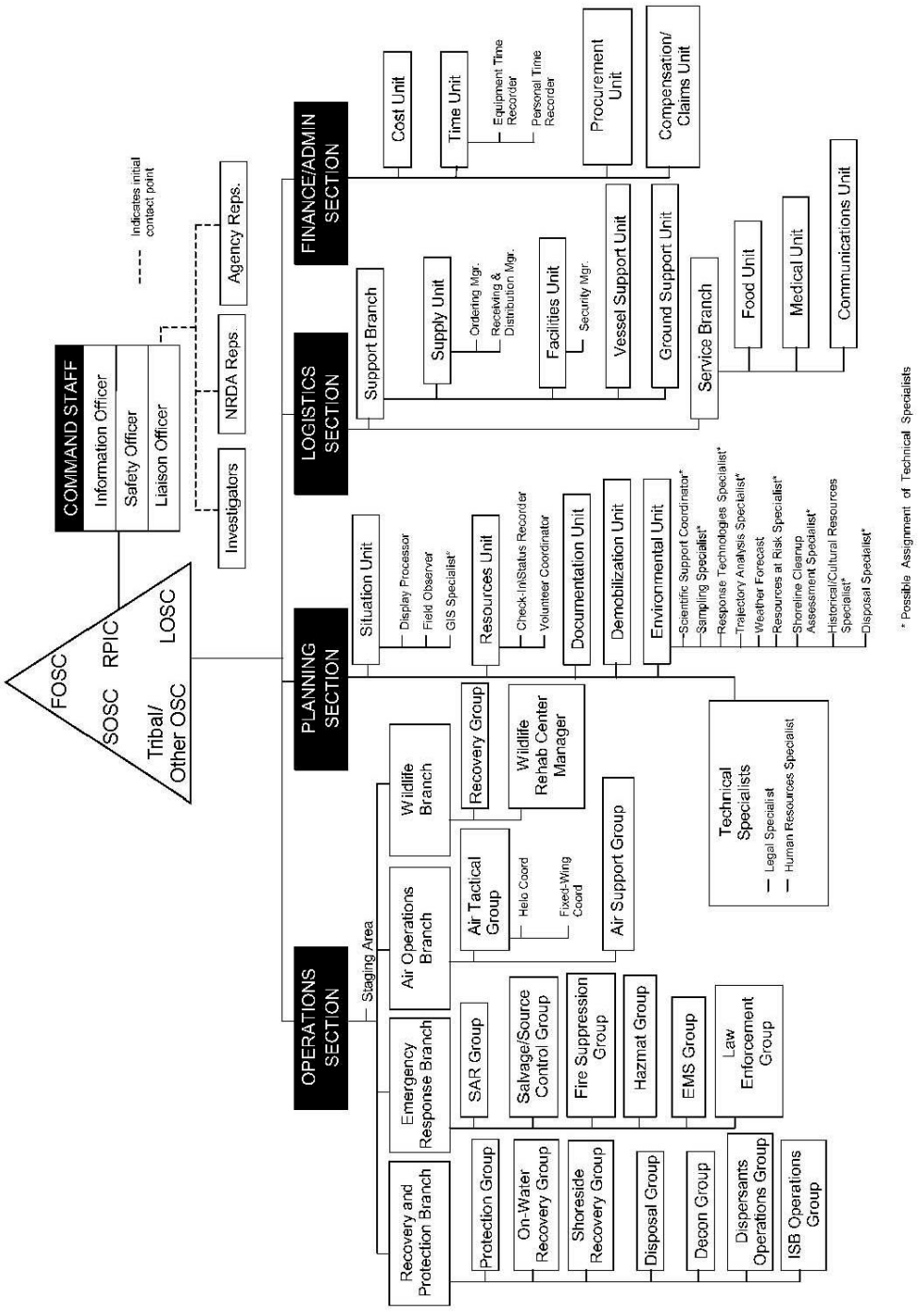
3.6. NATIONAL INCIDENT MANAGEMENT SYSTEM - ICS

The IC will implement the National Incident Management System (NIMS) ICS in all response situations. NIMS ICS is a standardized response management system. It is an "all hazard – all risk" approach to managing crisis response operations, as well as non-crisis events. It is organizationally flexible and capable of expanding and contracting to accommodate responses or events of varying size or complexity.

Figure 3.b indicates the ICS organization chart typically used during a response. Detailed staffing information can be found in Section 3.7 and Appendix (D) of the Plan.

Figure 3.b

INCIDENT COMMAND SYSTEM ORGANIZATION CHART



3.7. FUNCTIONS OF THE SPILL MANAGEMENT TEAM

The following is a brief description of the roles and responsibilities of the members of the SMT. The position descriptions and staffing policies are consistent with the NWACP. Spreadsheets detailing MFSA's SMT can be found in Appendix (D) of the Plan.

Note: More than one of the listed functions and responsibilities may be assigned to a single individual, especially in the event of a relatively small incident, but all functions and responsibilities must be addressed.

3.7.1. VESSEL'S MASTER OR AUTHORIZED REPRESENTATIVE

The Master (also known as the Vessel's Captain) or the Authorized Representative of a Covered Vessel is responsible for Notification to MFSA of a spill or substantial threat from a Covered Vessel. Notification to MFSA provides MFSA the Authority to Implement the Plan. The IC will keep the Master and/or the Authorized Representative apprised of response actions during the first 24 hours of a response.

3.7.2. VESSEL'S QUALIFIED INDIVIDUAL

The QI is the individual or organization designated by an Owner or Operator in the Covered Vessel's Federal VRP with the full authority to respond to an incident on the Covered Vessel's behalf. As per the NWACP, and as outlined in Chapter 1 of the Plan, MFSA will coordinate with the QI in the call-out of Ocean Zone Resources and in the Transition of Authority.

When the Transition of Authority occurs from MFSA to the RP, it is often the QI to whom MFSA will transition the IC role. During the response, the IC will regularly communicate with the QI to keep the QI, who is the RP's Authorized Representative, apprised of the response and to ensure a smooth and effective transition.

3.7.2.1. OCEAN ZONE RESOURCES ACTIVATION

When the IC determines that activation of Ocean Zone Resources is necessary, the IC will contact the QI and request that the QI call-out the Ocean Zone OSRO named in the Covered Vessel's Federal VRP. QI and Ocean Zone OSRO information is obtained on the MFSA Arrival Notice submitted by the Covered Vessel. The QI will immediately contact the Ocean Zone OSRO, designating MFSA as authorized to direct these resources, and facilitate contact between the Ocean Zone OSRO and the Operations Section

Chief and IC. This process conforms to ICS practices and has been confirmed by all participating QI organizations through the QI Acknowledgement Letter in Appendix (O) of the Plan as well as all approved Ocean Zone OSROs.

3.7.3. INCIDENT COMMANDER OR UNIFIED COMMAND

The IC or UC is responsible for all aspects of the response, including developing incident objectives and managing all incident operations. Unless specifically assigned to another member of the Command or General Staff, these responsibilities remain with the IC.

Some of the responsibilities include:

- Communicate with vessel to assist in implementing Field Guide to secure the vessel and stop the flow;
- Establish immediate priorities especially regarding the safety of responders, other emergency workers, bystanders, and people involved in the incident;
- Stabilize the incident by ensuring life safety.
- Manage resources efficiently and cost effectively;
- Determine incident objectives and strategy to achieve the objectives;
- Establish and monitor incident organization.
- Approve the implementation of the written or oral Incident Action Plan (”IAP”);
- Ensure adequate health and safety measures are in place; and
- Provide technical assistance to the QI in managing the spill response.

Although a single IC normally handles the command function, depending on the specifics of each event, the ICS organization may be expanded into a UC. The UC may be used whenever multiple jurisdictions are involved in a response effort. These jurisdictions could be represented by:

- Geographic boundaries (such as two states, tribal lands);
- Governmental levels (such as local, state, federal);
- Functional responsibilities (such as fire-fighting, oil spill, emergency medical services);
- Statutory responsibilities (such as federal land or resource managers, RP under OPA or CERCLA); or
- Some combination of the above.

3.7.3.1. COMMAND STAFF –INFORMATION OFFICER

The Information Officer ("IO") is responsible for developing and releasing information about the incident to the news media, to incident personnel, and to other appropriate agencies and organizations. MFSA currently maintains a letter of agreement with Hill & Knowlton for public affairs and IO services.

As per the NWACP, the position should be filled by a qualified representative of a Federal, State, Tribal or local agency, if available. If no such agency representative is initially available, qualified or willing to be the IO, the MFSA IO from Hill & Knowlton may, upon the UC's approval, fill that role. When selecting the IO, the UC should consider credibility with media and public, as well as previous experience in drills or spills, familiarity with the NWACP and policies, and with the Emergency Management Support Function.

3.7.3.2. COMMAND STAFF - INCIDENT SAFETY OFFICER

The Incident Safety Officer ("SO") works as a support officer for the Incident Commander. The SO may have assistants, as necessary, and the assistants may also represent assisting agencies or jurisdictions.

3.7.3.3. COMMAND STAFF - LIAISON OFFICER

The Liaison Officer's ("LO") role is to serve as the point of contact for assisting and coordinating activities between the UC and various agencies and groups. This may include local government officials and investigators arriving on the scene.

As per the NWACP, the position should be filled by a qualified representative of a Federal, State, Tribal or local agency, if available. If no such agency representative is initially available, qualified or willing to be the LO, upon the UC's approval, MFSA's contracted SMT may provide personnel to fill that role.

3.7.4. GENERAL STAFF

The General Staff includes Operations, Planning, Logistics, and Finance/Administrative responsibilities. These responsibilities are handled by the IC until they are assigned to another individual. When the Operations, Planning, Logistics or Finance/Administrative

responsibilities are established as separate functions under the IC, they are delegated to separate individuals and managed by a Section Chief and can be supported by other functional units.

3.7.4.1. OPERATIONS SECTION

The Operations Section is responsible for all operations directly applicable to the primary mission of the response. The Operations Section Chief ("OSC") activates and supervises organization elements in accordance with the IAP and directs its execution. The OSC also directs the preparation of the unit operational plans, requests or release resources, makes expedient changes to the IAP, as necessary, and reports such to the IC.

The Operations Section can be expanded as the incident warrants including adding the following branches and units:

- Staging Area(s) Manager
- Air Operations Branch
- Divisions/Groups Supervisor
- Strike Team/Task Force Leader

3.7.4.2. PLANNING SECTION

The Planning Section Chief ("PSC") is responsible for the collection, evaluation, dissemination and use of information about the development of the incident and the status of resources. Information is needed to:

- Understand the current situation;
- Predict the probable course of incident events; and
- Prepare alternative strategies for the incident.

The Planning Section can be expanded to include the following units:

- Resource Unit Leader
- Situation Unit Leader
- Documentation Unit Leader
- Demobilization Unit Leader
- Environmental Unit Leader (per the NWACP)
- Technical Specialists

3.7.4.3. LOGISTICS SECTION

The Logistics Section Chief ("LSC") is responsible for providing facilities, services, and material in support of the incident. The LSC participates in the development and

implementation of the IAP and activates and supervises the Branches and Units within the Logistics Section.

The Logistics Section can be expanded to include the following branches and units:

- Service Branch – Medical Unit and Food Unit.
- Support Branch –Distribution Unit, Facilities Unit, Ground Support Unit and Vessel Support Unit.

3.7.4.4. FINANCE/ADMINISTRATIVE SECTION

The Finance and Administrative Section is responsible for all financial, administrative, and cost analysis aspects of the incident including:

- Equipment and Personnel Time Recorder;
- Procurement Unit;
- Compensation/Claims Unit; and
- Cost Unit

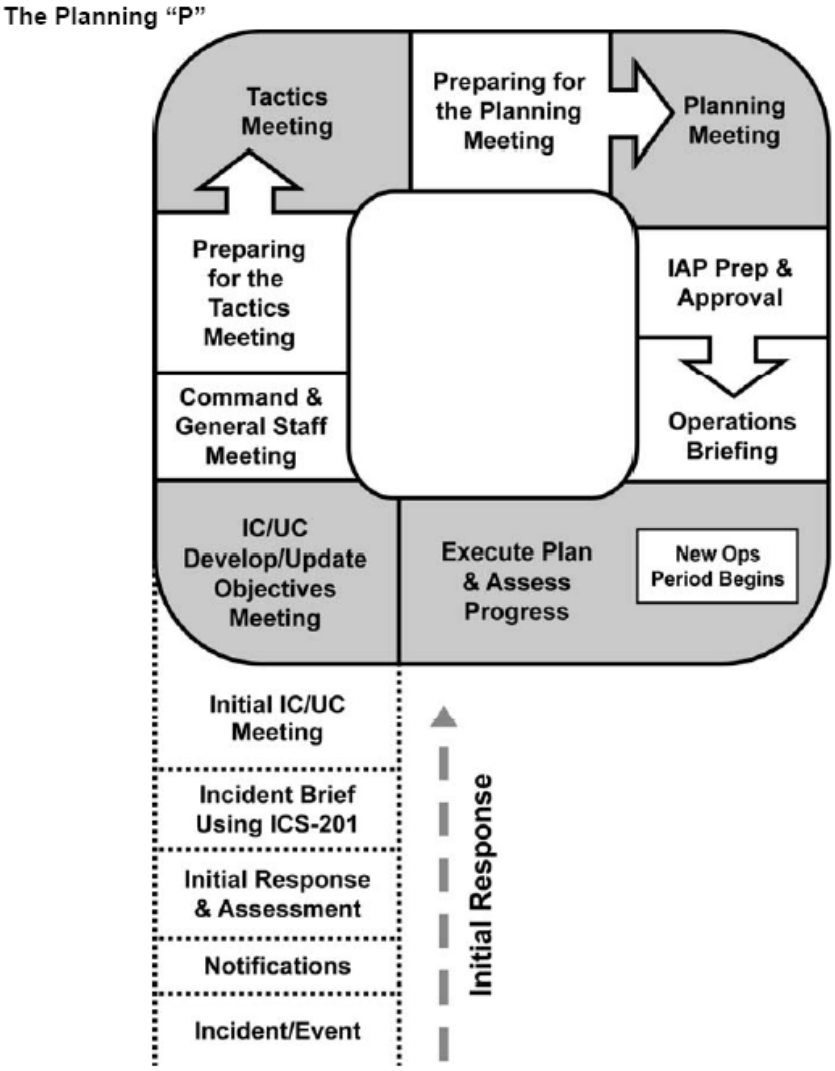
The Finance/Administration Section will immediately communicate with the RP to establish appropriate claims procedures and determine the need for a Compensation/ Claims Unit and staffing as necessary. The Unit will begin the process of tracking claims during the first 24 hours of an incident and will turn this information over to the QI who will formalize a claims process during the Transition of Authority.

3.8. THE PLANNING PROCESS

This Plan and the MFSA SMT will use the NIMS ICS Planning Process to ensure a safe, efficient and effective response. This planning process will allow the response organization to become proactive rather than reactive during the response and will provide the means to establish goals, objectives and tactics for future operational periods.

Figure 3.c

THE PLANNING PROCESS



3.9. NIGHT OPERATIONS

CRC and its contractors are prepared to respond at night to oil spills and to continue operations through hours of darkness. Operations will be modified as needed to preserve the safety of response personnel. Typical safety restrictions include limited shoreline operations to eliminate poor footing conditions. CRC response vessels are equipped with radar, GPS navigation, spot lights and deck lights to improve operation in low visibility conditions. CRC boat operators receive instruction specific to the navigation equipment on the vessels. All vessels are equipped with marine radios and have access to MFSA dedicated channels and towers along the lower Columbia and Willamette Rivers.

3.10. WILDLIFE

Every spill will be assessed for potential impacts to wildlife. The Wildlife Branch will be activated when the UC determines that an oil spill is in the vicinity of wildlife resources (mammals or birds), or has a trajectory that puts wildlife resources at risk. All responses to oiled wildlife shall be in accordance with the NWACP, Chapter 9310. This section of the NWACP is included in Appendix (F). CRC and MFSA maintain a contract with the International Bird Rescue ("IBR") for professional wildlife rehabilitation services that includes search and rescue, veterinarians, specialists, and the manning of our 100 bird capable mobile wildlife rehabilitation trailer and equipment. Mobile resources necessary to manage wildlife issues have the capability to arrive on-scene within 24 hours of a spill.

CRC also has an agreement with Marine Spill Response Corporation ("MSRC") for making mobile wildlife response equipment available to each entity on a pooled, mutual aid basis. The agreement specifies the shared equipment pool, usage requirements, staffing resources, costs, legal immunity issues, and other terms and conditions. This agreement automatically renews for one year periods unless either CRC or MSRC provide 120 day written notice to the contrary.

Contact information for call-out of these resources (IBR and MSRC) can be found in Chapter (5) of the Plan.

3.11. DECONTAMINATION

For all oil spill containment, recovery, and cleanup operations, the Operations Section Chief will monitor decontamination procedures to ensure compliance with 29 CFR 1910.120(k) standards.

A decontamination kit consisting of items listed in Appendix (G) will be made available by the PRC at each spill cleanup site. Appendix (G) also contains a

diagram which depicts a typical minimum decontamination layout and the delineation of site associated work zones. This model will be used to design all decontamination sites associated with a response.

3.12. DISPOSAL AND TRACKING RECOVERED VOLUME

3.12.1. DISPOSAL

All recovered oil, oily water, oily debris, oiled sorbents and oiled personnel protective equipment will be disposed in accordance with a UC approved incident Disposal Plan.

The Disposal Plan will be developed in accordance with Chapter 9405 of the NWACP and regulations established in 40 CFR 260 through 265 and 302, or by Oregon and/or Washington State regulations if more stringent.

Oil-contaminated wastes will be characterized with respect to federal and state waste management regulations. Characterization will include a determination of whether the waste is a Resource Conservation and Recovery Act ("RCRA") listed hazardous waste (40 CFR 261.30), a RCRA characteristic hazardous waste (40 CFR 261.20) or a non-hazardous waste.

All wastes generated will be placed in approved and secure storage, transported by approved haulers and disposed in an approved manner and with respect to each waste's respective characterization.

The PRC manages this disposal function of a response. Additional information on disposal, including a sample Disposal Plan, waste profile forms and a matrix of disposal, recycling and transport facilities can be found in Appendix (H).

3.12.2. TRACKING RECOVERED VOLUME

In addition to the method to determine the size of the spill in Appendix A, Figure A.1, a mass balance technique will be used on all recovered oil. This will include estimates of the amount of oil contained in recovered oily water mixtures, estimates of oil contained in absorbent material and estimates of oil on recovered debris and will be used to calculate the Washington State Recovery Credit on behalf of the Covered Vessel. These records will be available for review upon request at the offices of MFSA.

3.13. SHORELINE CLEANUP OPERATIONS

The ability to quickly mobilize the necessary resources to implement effective and timely shoreline cleanup operations is critical in successfully responding to oil spills in the Area of Coverage. Both Oregon and Washington shoreline planning standards are covered in Chapter 6. The response resources available to meet these standards are provided through CRC as the PRC and subcontractor NRC Environmental Services ("NRCES") (also a PRC). The Ocean Zone OSRO and other contracted resources are also available to provide additional shoreline cleanup resources in the event of a spill.

Specific equipment, personnel, materials and other response resources used for shoreline cleanup are described and identified in this Plan and the Appendices. Skimmers, boom, oil storage capacity, sorbent materials, decontamination materials, and other resources are staged at many locations along the river system for shoreline cleanup operations.

Shoreline clean-up operations will be incorporated into the ICS as necessary during response to an oil spill along the Columbia River in the following planning and operational areas:

- Safety Plans
- Incident Action Plans
- Waste Disposal Plans
- Personnel Resources
- Shoreline Containment & Recovery
- Oil Storage Recovery
- Staging areas/river access points
- Logistics
- Spill Monitoring & Tracking
- Shoreline Cleanup Assessment Techniques ("SCAT")
- Resource Tracking
- Decontamination
- Other

Spilled oil tends to move very quickly downstream, rapidly spreading with the currents and tides and impacting the shoreline. The IC and its response partners will swiftly mobilize shoreline response resources and initiate appropriate cleanup actions after a spill occurs to protect the public's health & safety and minimize potential environmental impacts. These actions include:

- Mobilize shoreline cleanup personnel, equipment, supplies and materials;
- Develop site safety plans;

- Deploy protection/response strategies as per Chapter 5 of the Lower Columbia River GRPs;
- Establish shoreline cleanup divisions;
- Identify shoreline types and appropriate cleanup techniques (see Environmental Sensitivity Index maps for the Columbia River);
- Deploy SCAT Teams to identify initial shoreline impacts and adequacy of cleanup, as necessary;
- Collect/recover/store/dispose of oil;
- Gain access to both public and private shorelines for cleanup purposes;
- Set up staging areas for response resources;
- Provide aerial surveillance/spill tracking; and
- Provide logistical support.

Response crews will be deployed geographically along the Columbia and Willamette Rivers based on the circumstances of each oil spill. Initial response actions are described in more detail earlier in this chapter and other sections of the Plan. More response resources will be activated to provide further support on a case-by-case basis. It is not possible to describe how all oil spills will be cleaned up on the river shoreline due to the unique nature of every spill. Oil type, size, spill source (instantaneous, continuous), river conditions, location, weather, and other factors will determine the scope of response operations. However, all activities associated with shoreline cleanup work will be consistent with the objectives and operational plans developed by the UC. Additional useful information about shoreline cleanup techniques and other operational considerations can be found in the Shoreline Countermeasures Assessment Manual (Ch. 9420) of the NWACP.

Since a spill in the river can affect both Oregon and Washington shorelines, shoreline cleanup operations will be supported on both sides of the Columbia River as well as the Willamette River, if necessary, through PRC resources and those from its subcontractor and the Ocean Zone OSRO (as necessary), and other support contractors as described in the Appendices. These activities will be closely coordinated through the UC and other appropriate organizations.

3.14. DISPERSANTS

In the event UC chooses to use dispersants during a response, the IC may access dispersants as part of the available Ocean Zone Resources through the Covered Vessel's QI. The QI will coordinate with the SMT to activate and authorize direction of these resources as described earlier in this chapter. NWACP guidelines on dispersant use will be followed during a response.

3.15. IN SITU BURNING

In the event UC chooses to use in situ burning during a response, the IC may access in situ burning as part of the available Ocean Zone Resources through the Covered Vessel's QI. The QI will coordinate with the SMT to activate and authorize direction of these resources as described earlier in this chapter. NWACP guidelines on in situ burning will be followed during a response.

4. RESPONSE ACTION CHECKLIST

This Response Action Checklist is not intended to limit the decisions and actions of the IC or the CRC Response Manager in any way. It is provided as a guide, as to the generally accepted response practices, and as a reminder during the early phases of a spill response.

Upon Notification of a spill or the substantial threat of a spill, and MFSA's Implementation of the Plan, the IC should ensure the following actions are undertaken and important actions are documented on an ICS 201 Form:

4.1. NOTIFICATIONS

NOTE: The Merchants Exchange Communications Center is tasked with taking incident Notifications and recording initial incident information on the Emergency Call Sheet the form of which is located in Appendix (P), Figure P.1 of the Plan. They are also tasked with completing the Response Activation Call List in Appendix (P), Figure P.2 of the Plan.

- ❒ Obtain initial incident information as recorded in the Emergency Call Sheet from the Communications Center Specialist.
- ❒ Remind Communications Center Specialist to continue with notifications as per the Response Activation Call List.
- ❒ If additional notifications are required beyond what is listed in the Response Activation Call List, specify which notifications you would like made. Examples include emergency services (fire department, emergency medical services, etc.), MFSA's contracted SMT (Witt | O'Brien's), Information Officer/public affairs assistance (Hill & Knowlton), or wildlife response specialists IBR.
- ❒ Ask Communications Center Specialist to scan and email Emergency Call Sheet and Response Activation Call List to the IC onsite (or to another SMT representative). Advise Communications Center Specialist to confirm sending of Emergency Call Sheet and verbally relay incident reporting numbers.
- ❒ Contact on-duty CRC Response Manager, establish individual as OSC. Based on initial information, confirm assessment resources for deployment as necessary.
- ❒ Contact the Covered Vessel's QI to keep Owner/Operator apprised of current response and to ensure a smooth Transition of Authority. Also, coordinate with QI in call-out of Ocean Zone Resources as necessary.

4.2. STEPS TO CONTROL DISCHARGE

NOTE: The IC should contact the vessel to verify the proper use of the MFSA Field Guide and discuss shipboard safety procedures.

Vessel emergency scenarios and their associated recommended response actions are typically vessel specific and the vessel crew will follow their on-

board response guides. Typical response steps to common vessel emergencies can be found in Appendix R.

DO NOT use dispersants on the oil spill.
To do so without governmental approval will result in fines and/or imprisonment.

4.3. INITIAL ASSESSMENT

- ❒ Contact on-duty CRC Response Manager.
  - ❒ Discuss initial incident information, location, access, etc.
  - ❒ Discuss status of shipboard mitigation procedures from section 3.2. of this checklist.
  - ❒ Determine initial assessment resources and possible response tactics.

4.4. SAFETY OF RESPONSE PERSONNEL

- ❒ Initiate site safety procedures (tailgate or toolbox safety meetings are appropriate).
- ❒ Determine the extent of the Safety Zone.
- ❒ Refer to MSDS for hazard information.
- ❒ Don PPE as required.
- ❒ Secure Safety Zone to all unauthorized personnel.
- ❒ Enforce site safety procedures inside the zone as necessary.

4.5. INITIAL RESPONSE, CONTAINMENT AND RECOVERY

- ❒ Assess: spill volume, spill movement, weather, and current conditions.
- ❒ Initiate action to contain or divert as necessary on dock, land, or water with boom and sorbent.
- ❒ DO NOT CONTAIN products lighter than #2 Diesel.
  - ❒ Divert as needed (refer to NWACP policy).
- ❒ Consider marking leading edge of spill with tracking device.
- ❒ Initiate action to recover product to prevent shoreline impacts.
- ❒ Identify local environmentally sensitive areas and initiate protective measures (refer to NWACP GRPs).

4.6. ADDITIONAL NOTIFICATIONS

- ❒ Mobilize SMT
  - ❒ MFSA response personnel and internal SMT.
  - ❒ Contracted SMT, Witt | O'Brien's.
  - ❒ Information Officer, Hill & Knowlton (for Public Affairs).
- ❒ Call out additional personnel as necessary.
  - ❒ Additional response contractors, agencies, etc.

4.7. CONTINUE ASSESSMENT, CONTAINMENT AND RECOVERY

- ❒ Continue containment and recovery actions.
- ❒ Continue deployment of equipment based on GRP strategies.
- ❒ Schedule recon over flight ASAP.
- ❒ Assign a surface vessel to monitor movement of oil.

4.8. ESTABLISH INCIDENT COMMAND SYSTEM STRUCTURE

- ❒ Establish command post.
  - ❒ Command post type and location should be considered based on the size of the spill. Options include tailgate command post, Command & Communications Trailer or other command post's as identified in Chapter (9) of the Plan.
- ❒ Establish ICS organization.
  - ❒ Conduct briefing with responders and establish positions and task assignments. Spills range in size and complexity; you may typically establish UC members (in person or over the phone), the OSC, a Division/Group Supervisor, a Task Force, the Planning Section Chief and a Safety Officer, and others as necessary.
- ❒ Develop an ICS Form 201.
  - ❒ Develop Incident Action Plan if multiple operational periods require.
- ❒ Post and maintain charts and status boards/displays.
- ❒ Monitor current and future manpower requirements.
- ❒ Place reserve personnel on standby as appropriate.
- ❒ Anticipate logistics requirements (subsistence catering, re-supply, water, toilet facilities, first aid, administrative staff, etc….).
- ❒ Documentation
  - ❒ Establish master file of all field activity logs.
  - ❒ Establish master file of all personnel and equipment records (daily cost sheet) of PRC.
  - ❒ Establish master file of all personnel and equipment records (daily cost sheet of subcontractors.
  - ❒ Establish and update incident objectives.
  - ❒ Establish and maintain site safety plan, medical plan, communications plan, decon plan, Natural Resources Damage Assessment ("NRDA") plan, and disposal plan as necessary.
- ❒ Finance/Administration
  - ❒ Establish billing procedures for all contractors and subcontractors for the response. (Who bills who and when).
  - ❒ Sign any individual work order agreements for contractors and subcontractors.

4.9. DETERMINE RECOVERY EQUIPMENT REQUIREMENTS

- ❒ Monitor current and future equipment requirements.
- ❒ Place reserve equipment on standby as appropriate.
- ❒ Identify the need to call-out Ocean Zone Resources from the Covered Vessels Ocean Zone OSRO via the Responsible Party's QI.

4.10. SET UP COMMUNICATIONS NETWORK

- ❒ Determine communications requirements.
- ❒ Assign radio frequencies and call signs as necessary.
- ❒ Establish Communications Plan and process for implementing. See Appendix (E).

4.11. RECOVERY OPERATIONS

- ❒ Maximize skimmer utilization.
- ❒ Call in vacuum truck service as necessary.
- ❒ Apply sorbent as appropriate.
- ❒ Set up oil and contaminated material recovery and storage sites.
- ❒ Establish downstream recovery sites.

4.12. COORDINATE INTERIM AND PERMANENT DISPOSAL

- ❒ Identify liquid wastes requiring disposal.
- ❒ Identify solid wastes requiring disposal.
- ❒ Determine appropriate disposal sites. See Appendix (H).
- ❒ Coordinate Disposal Plan approval with UC.

4.13. DECONTAMINATION

- ❒ Establish decontamination facilities for personnel at each clean-up site.
- ❒ Establish decontamination facilities for equipment at each clean-up site.

4.14. DEBRIEF

Conduct a debrief with key response personnel onsite. Include response processes that went well and areas for improvement. List these findings here:

Positive Response Processes

\+ _____

_____

\+ _____

_____

\+ _____

_____

Areas for Improvements

Δ _____

_____

Δ _____

_____

Δ _____

_____

*Attach an additional sheet if necessary.

4.15. TRANSITION OF AUTHORITY

At the conclusion of a response or when a continuing response requires a Transition of Authority, the MFSA ISRC should utilize the Transition of Authority documents in Appendix (B).

❒ **No further Plan Implementation required**. The IC and vessel representative certify that the incident response is complete and no further Plan Implementation or response actions are required. Complete the Acknowledgement of Transfer or Relief (Appendix (B), Figure B.1) and demobilize response resources.

OR

❒ **Continued MFSA Plan implementation is required.** The IC and UC representatives will work with the RP's QI in the Transition of Authority for continued Implementation of the Plan. Complete the Transition Plan (Appendix (B), Figure B.2) in addition to the Acknowledge of Transfer or Relief. The Transition Plan identifies the necessary response actions or processes that must be carried through the Transition of Authority.

5. LIST OF VESSEL INFORMATION AND EMERGENCY CONTACTS

5.1. BASIC VESSEL INFORMATION

Voyage information for Covered Vessels is kept in an electronic database maintained by the Merchants Exchange of Portland. This basic vessel information includes the identification of the Owner/Operator, vessel name, flag, Agent information, QI, Ocean Zone OSRO, etc. Information regarding vessels currently enrolled in the Plan can be obtained 24 hours per day through the MFSA operations center at the number below.

24-HOUR TELEPHONE: 503-220-2055
FAX: 503-295-3660

5.2. DETAILED VESSEL INFORMATION

Detailed ship specific information is obtained by contacting MFSA's 24-hour number and requesting the 24-hour number of the vessel's Agent. The Agent will in turn call the vessel Owner/Operator 24-hour contact number and make the request for detailed vessel information.

Detailed information that should be available on a 24-hour basis through each vessel's Agent should include: general arrangement plan, midship section plan, lines of plan or table of offsets, tank tables, load line assignment, light ship characteristics, and procedure for obtaining damage stability and residual strength calculations. These are also typical documents kept in each ship's office.

5.3. LOCAL AGENT

MFSA maintains a list of all Agents of Covered Vessels. All Agents can be contacted through MFSA's 24-hour contact number.

5.4. SPILL MANAGEMENT TEAM

The IC will activate the internal and/or contracted SMT if deemed necessary for a response. MFSA maintains a 24-hour on-call duty schedule of all qualified ICs who can be assigned as IC upon Notification of a spill or substantial threat of a spill from a Covered Vessel. ICs can be contacted during the course of a response for which the Plan has been Implemented on a 24-hour per day basis through the MFSA operations center at the number noted above. All other MFSA communications should take place with the on-call MFSA Representative. A full list of available personnel to fill internal and/or contracted SMT duties is included in the personnel lists of Appendix (D) and an abbreviated list of command and general staff posting is included in Figure 3.b

5.4.1. CONTRACTED SPILL MANAGEMENT TEAM

Witt | O'Brien's LLC is the contracted SMT that will provide Command and General Staff as needed to augment the SMT of MFSA. A list of their personnel available and dedicated to spill response is included in Appendix (D). The agreement with Witt | O'Brien's is available for review upon request at the MFSA office.

Witt | O'Brien's LLC
2929 E. Imperial Highway, Suite 290
Brea, CA 92821
985-781-0804 (24-Hour)

5.4.2. PUBLIC AFFAIRS

Nexus Northwest is the contracted Public Affairs organization that will provide an Information Officer or Joint Information Center staff as needed to augment the SMT of MFSA. This is provided as part of the SMT contracted resources detailed in 5.4.1.

Nexus Northwest
6932 37th Ave. SW
Seattle, WA 98126

Susan Lagoni, Partner
Phone: (206) 790-9784
Email: suzanne@nexusnorthwest.com

Joan McCoy, Partner
Phone: (206) 473-2663
Email: joan@nexusnorthwest.com

5.4.3. PRIMARY RESPONSE CONTRACTOR

The PRC for this Plan is Clean Rivers Cooperative (CRC), in Portland, Oregon. A list of their personnel and equipment is included in Appendix (D). CRC relies on several affiliated response contractors to meet all the planning standards required under federal and state law. Currently NRCES, with offices located in Portland and Astoria, Oregon; and Seattle/Tacoma, Pasco, Spokane, and Longview, Washington; is a sub-contractor to the PRC. A list of their personnel is also included in Appendix (D). The agreements with CRC and NRCES are available for review upon request at the offices of the Merchants Exchange.

PRC
Clean Rivers Cooperative
200 SW Market Street, Suite 190
Portland, OR 97201
503-220-2040 (24-Hour)

Sub-Contractor
NRC Environmental Services
6211 N. Ensign Street
Portland, OR 97217
503-283-1150 (24-Hour)

5.5. SALVAGE, FIRE FIGHTING, LIGHTERING RESOURCES

5.5.1. FIRE FIGHTING AND EXPLOSION

Marine fire fighting on the Columbia River is provided by the Fire Protection Agencies Advisory Council ("F-PAAC") mutual aid members. F-PAAC is an organization that was formed to set forth a comprehensive system to ensure effective response to vessel fire incidents in the lower Columbia River Region. The F-PAAC is currently comprised of twelve fire agencies located throughout the Columbia and Willamette Rivers. These agencies voluntarily contribute both staff time and equipment costs for participation in meetings, drills and other training exercises. In addition they have mutual aid agreements with each other for marine fire responses.

MFSA keeps a comprehensive list of these agencies with their respective 24-hour contact numbers at its operations center. MFSA's initial contact upon receiving notice of a marine fire will be to the agency with primary jurisdiction over the location of the fire incident. Agencies can be reached 24-hours per day through MFSA. This is the same number as in Chapter 2.2.

5.5.2. COMMERCIAL SALVAGE, FIRE FIGHTING AND LIGHTERING RESOURCES

A vessel's contracted salvage and marine fire fighting resources are listed in their Federal Vessel Response Plan.
Local resources for diving, salvage and lightering are listed below.

Local Diving & Salvage Resources

Advanced American Construction, Inc.
8444 NW St. Helens Road
Portland, OR 97231
503-445-9000 (24-Hour)

Ballard Diving & Salvage dba NW Underwater Construction
727 S. 27th Street
Washougal, WA 98671
866-270-1114 (24-Hour)

Fred Devine Diving & Salvage
6211 N Ensign Street
Portland, OR 97217
503-283-5285 (24-Hour)

Global Diving & Salvage
3840 W Marginal Way SW
Seattle, WA 98106
800-441-3483 (24-Hour)

Local Lightering Resources

Olympic Tug & Barge
7900 NW St. Helens Road
Portland, OR 97210
503-737-0124

Sause Bros.
3710 NW Front Avenue
Portland, OR 97210
503-222-1811

Tidewater Barge Lines
6305 NW Lower River Road
Vancouver, WA 98660
503-281-0081

5.6. OTHER EMERGENCY CONTACTS

5.6.1. SEARCH AND RESCUE

Should a response involve missing persons, either as a result of a fire, explosion or as a result of the response, the IC will immediately call 911. The IC will initiate search and rescue activities within the capabilities and training of contractor personnel on scene. Depending on the circumstances of the emergency either the Coast Guard, local Sheriff's Office or local fire department will initiate a response and management of the search and rescue event.

5.6.2. SITE ACCESS CONTROL AND SECURITY

Shoreside site access will typically be controlled by a combination of contracted security guards and local law enforcement authorities. Waterside security is typically controlled by the USCG and local sheriff's departments. These agencies can be contacted by dialing 911.

5.6.3. WILDLIFE RESPONSE

International Bird Rescue ("IBR") is the contracted wildlife response organization that will provide professional wildlife rehabilitation services that includes search and rescue, veterinarians, specialists, and the manning of our 100 bird capable mobile wildlife rehabilitation trailer and equipment.

International Bird Rescue
444 W. Ocean Boulevard, Suite 777
Long Beach, California 90802
888-447-1743 (24-Hour)

Additional agency contact information for wildlife response activities is as follows:

US Fish and Wildlife Service
24-Hour Response Coordinator: 360-971-6000

NOAA National Marine Fisheries Service
NW Regional Stranding Coordinator: 206-526-6150

Oregon Emergency Response System
24-Hour: 800-452-0311

Washington Emergency Management
Oiled Wildlife Reporting Number: 800-258-5990

Washington Dept. of Fish & Wildlife
24-Hour Oil Spill Response Team: 360-534-8233
Lacey, WA Spill Specific Wildlife Activity: 360-754-9440

6. PLANNING STANDARDS

Equipment and personnel standards have been developed by MFSA and CRC in accordance with OARS 340-141 and WAC 173-182. These planning standards are designed to maximize the effectiveness and ensure the readiness of equipment and personnel for spill response activities. A complete list of this equipment is maintained on the Western Response Resource List ("WRRL") website and can be found at: http://www.wrrl.us. In addition, an equipment list is provided in Appendix (C).

6.1. WORST CASE DISCHARGE, AND TYPES AND AMOUNTS OF OIL

In order to establish the criteria for developing the worst case discharge ("WCD") size, to meet Oregon Department of Environmental Quality ("DEQ") and Washington Department of Ecology ("ECY") requirements, MFSA looked at the historical data reported on the MFSA Arrival Notices for vessels transiting the Lower Columbia and Willamette Rivers and found that the maximum amount of product to be carried was approximately 280,000 bbls of a 400,000 bbl tanker. The amount of product carried on the river is limited due to channel depth. Therefore, the worst case scenario for a tank vessel or tank barge traveling to the Vancouver/Portland area would be approximately 300,000 bbls (12,600,000 gallons) including fuels and lubes carried for vessel operation. For bunkering operations, the approximate worst case discharge is 28,000 bbls (1,176,000 gallons). Bunkering operations could potentially take place at various anchoring points on the river.

The average most probable discharge is established by OAR 340-141-0005(1) as 50 bbls. MFSA planning standards are calculated for a WCD of 300,000 bbls. In order to accommodate a WCD of greater than 300,000 bbls, the planning standards would need to be re-evaluated and additional equipment addressed. Vessels transiting the Columbia River with WCD greater than 300,000 bbls cannot be enrolled under the Plan.

The types of oil products handled by vessels covered under this Plan include crude oils, bunker fuels (Bunker C and IFO derivatives), diesel oil, gasoline, and lube oils. MSDSs for these products are carried on the vessels. Properties of these products are presented on their respective MSDSs. A set of generic MSDSs, from the USCG Chemical Data Guide for Bulk Shipment by Water, for typical products transported within the area of MFSA coverage can be found in the office of the PRC.

It is assumed that the entire cargo of a vessel could contain one of these products or a combination of them.

Figure 6.a

PRODUCTS HANDLED

Product Name	Density (kg/m3)	Specific Gravity	API	Group #	Sulfur
Gasoline	700 - 800	0.7 – 0.8	70.6 – 45.4	I	Not avail.
(synonyms: RUL, subgrade, unlead)					
Jet Fuel	800	0.8	45.4	I	Not avail.
(synonyms: JetA1, avgas)					
Diesel	810	0.8	45.4	I	< 15 ppm
(synonyms: HSFO, LSDF, ULSD)					
Lubes	846	0.85	35	I	Not avail.
Crude Oil	700 – 950	0.7 – 0.95	70.6 – 17.5	I/II	0 – 0.1%
(synonyms: Bakken, Black Wax Crude)					
Bunkers	880 – 1010	0.88 – 1.01	29.3 – 8.6	IV/V	0 – 4.5%
(synonyms: IFO380, hsvgo, hsfo, cbfs, hco)					

NOTE: Information provided on products handled obtained from a study of vessel traffic over the past two years, based on the information provided by the vessel's agent during enrollment and MSDS that are publicly available. The information is not intended to be specific to any particular product or shipment.

6.2. PLANNING STANDARDS BASED ON WCD

The tables on the next page represent the required planning standards based on the worst case discharge of 300,000 bbls. Spreadsheets confirming MFSA's ability to meet these planning standards can be found in Appendix (N) of the Plan.

Figure 6.b

OREGON PLANNING STANDARDS

Hours	**Vessel Columbia River** Includes following sub zones: **Astoria:** river mile (rm) 0-40 **Rainer:** rm 40-85 **Portland:** rm 85 to Bonneville Dam & Willamette River to Willamette Falls	**Vessel Coastal Bay Zone**	**Vessel Open Ocean Zone** * Provided through QI
1	X	X	X
2	• **Booming initiated** If appropriate @1000' on-site, 4x vessel length available. • **Start Initial Assessment**	• **Booming initiated** If appropriate @1000' on-site, 4x vessel length available. • **Start Initial Assessment**	• **Over-flight assessment** • **Booming initiated** If appropriate @ 4x vessel length available. • **Start Initial Assessment**
6	• **Boom** 10,000 feet available • **Recovery** 2% WCD 6,000 barrels	• **Boom** 6,500 feet available • **Recovery** 2% WCD 6,000 barrels	• **Boom** 10,000 feet available • **Recovery** 2% WCD 6,000 barrels
12	• **Boom** 40,000 feet available • **Recovery** 5% WCD 15,000 barrels within 24 hours. • **Assess** Wildlife and shoreline impacts. • **Storage****	• **Boom** 9,500 feet available* • **Recovery** 5% WCD 15,000 barrels within 24 hours* • **Assess** wildlife and shoreline impacts • **Storage****	• **Boom** 40,000 feet available • **Recovery** 5% WCD 15,000 barrels within 24 hours. • **Assess** Wildlife and shoreline impacts. • **Storage****
24	• **Boom** Additional amount & type as dictated by response to protect sensitive areas. • **Recovery** 12% WCD 36,000 within 24 hours. • **Storage****	• **Boom** 14,000' available* • **Recovery** 12% WCD 36,000 within 24 hours. • **Storage****	• **Boom** Additional amount & type as dictated by response to protect sensitive areas. • **Recovery** 12% WCD 36,000 barrels within 24 hours. • **Storage****
48	• **Boom** Additional amount & type as dictated by response to protect sensitive areas. • **Recovery** 17% WCD 51,000 barrels within 24 hours. • **Storage****	• **Boom** Additional amount & type as dictated by response to protect sensitive areas. • **Recovery** 17% WCD 51,000 barrels within 24 hours. • **Storage****	• **Boom** Additional amount & type as dictated by response to protect sensitive areas. • **Recovery** 17% WCD 51,000 barrels within 24 hours. • **Storage****

*Equipment may be from adjacent zone
** Sufficient to support oil removal operations

Figure 6.c

WASHINGTON PLANNING STANDARDS

Tesoro/NuStar Vancouver - (Transfer Sites)			
Hours	**Boom**	**Minimum Recovery Rate**	**Storage**
6	10,000’	12,500 bbls	25,000 bbls (32,500 on land)* (8,750 on water)
12	30,000’	36,000 bbls	72,000 bbls (93,600 on land)* (25,200 on water)
24	50,000’	48,000 bbls	144,000 bbls (187,200 on land)* (50,400 on water)
48	As Necessary	60,000 bbls	As Necessary
Cathlamet Staging Area			
2	1,000’		
3	3,000’		
6	10,000’ (4200’ calm water)	9,000 bbls (at least 900 bbls in shallow water < 10’)	9000 bbls (11,700 on land)* (3,150 on water)
12	30,000’ (5,000’ calm water)	30,000 bbls (7,500 bbls in shallow water < 10’) (7,500 bbls in open water)	45,000 bbls (58,500 on land)* (15,750 on water)
24	50,000’ (10,000 calm water)	42,000 bbls (10,500 bbls in open water)	84,000 bbls (109,200 on land)* (29,400 on water)
48	As Necessary	60,000 bbls	As Necessary
Vancouver			
2	1,000’		
3	3,000’		
6	9,000’ (3000’ calm water)	9,000 bbls (at least 900 bbls in shallow water < 10’)	9000 bbls (11,700 on land)* (3,150 on water)
12	29,000’ (5,000’ calm water)	30,000 bbls (7,500 bbls in shallow water < 10’)	45,000bbls (58,500 on land)* (15,750 on water)
24	49,000 (10,000 calm water)	42,000 bbls	84,000 bbls (109,200 on land)* (29,400 on water)
48	As necessary	60,000 bbls	As Necessary
* Non-dedicated land side storage required to be doubled to meet requirements.			

6.3. PLANNING STANDARDS FOR RESPONSE IN THE OCEAN ZONE

In order to meet the regulatory spill response equipment requirements for the Ocean Zone as defined in Chapter (1) of the Plan, the Covered Vessel must rely on the Ocean Zone OSRO as also defined in Chapter (1) of the Plan. The Covered Vessel's agreement(s) with an Ocean Zone OSRO gives the Covered Vessel access to Ocean Zone Resources that meet the open ocean capable recovery, storage, in situ burn and dispersant resources that meet the planning standard requirements of Oregon and Washington (OAR 30-141-0150(3)(f) – Covered Vessels Operating in the Open Ocean Zone, WAC 173-182-415 – Cathlamet Staging Area, WAC 173-182-450 – Planning Standards for the Washington Coast, WAC 173-182-325 – Planning Standards for Dispersants, and WAC 173-182-330 – Planning Standards for In Situ Burning). The Ocean Zone Resources are accessed through the Covered Vessel's QI as discussed in Chapter (1) and Chapter (3).

6.4. BOOM

Oil spill response containment boom is located in a variety of locations in the Area of Coverage and includes several strategic locations as listed in the WRRL for MFSA's PRC, CRC. The entire inventory of boom amounts to over 62,000 feet and initial deployment can occur anywhere in the Area of Coverage within two hours. For spills requiring additional boom, there are many sources throughout the region and then throughout the United States and can be brought into the area by a variety of transportation means. MFSA also has, by contract, access to all of NRCES's equipment and boom as listed in the WRRL.

6.5. MINIMUM RECOVERY RATE

The minimum daily recovery rate of all equipment was established by using the criteria laid out in WAC 173-182-348 and in Title 33, Part 155, Appendix B, Section 6 of the Code of Federal Regulations. The current recovery rates for CRC and NRCES are found in the WRRL.

6.6. STORAGE

Storage is based on WAC 173-182-335. Sixty-five percent of the WCD is provided by shore side storage facilities. These facilities are listed with all other response equipment and storage on the WRRL website. An additional thirty-five percent of the WCD is provided by on-water storage equipment and includes both CRC owned barges and equipment, and contracted or listed barges. Details of this equipment can be found in Appendix (J) of the Plan.

6.7. TRANSPORTATION

All transportation standards for boom, storage and recovery capability are based on 35 miles per hour on-land and 5 knots per hour on-water for most equipment. However, CRC has been granted faster water travel times for specific equipment by the ECY. CRC and MFSA have an agreement with Tidewater Barge Lines for dedicated on-water storage barges. These barges have also been granted faster travel times by ECY. These alternate travel speed approvals are kept on file at CRC.

6.8. NON-DEDICATED WORKBOATS

Non-dedicated workboats are provided through a letter of intent with several qualified providers as listed in Appendix (J).

6.9. AERIAL SURVEILLANCE

The planning standard for aerial surveillance in WAC 173-282-321 is met through MFSA's PRC, CRC. Pre-identified resources, including specific details on assets, is available in CRC PRC Application.

In addition to CRC's staff that are trained aerial observers, MFSA ICs have received training that meets 33 CFR 155.1050 (I)(2)(iii).

6.10. EQUIPMENT MAINTENANCE

Contingency plans and PRCs are required to maintain response equipment in a state of constant readiness, and in accordance with manufacturer specifications. Contingency plans and PRCs that own equipment shall develop schedules, methods, and procedures for equipment maintenance. Maintenance records shall be kept for at least five years and made available if requested by ECY. All equipment is maintained in accordance with the CRC maintenance program as described in the CRC PRC Approval. All maintenance records are kept on file at the CRC Maintenance Facility located at 5882 NW St. Helens Road, Portland, Oregon 97231.

6.11. GROUP 5 OILS

The planning standard for Group 5 Oils in WAC 173-282-324 is met through MFSA's PRC, CRC. Details are available in CRC PRC Application.

6.12. SHORELINE CLEANUP

The planning standard for Shoreline Cleanup in WAC 173-282-522 is met through MFSA's PRC, CRC. Details are available in CRC PRC Application.

7. PERSONNEL TRAINING, HEALTH AND SAFETY

The safety and efficiency of all responses depends on a robust training program. MFSA relies on its own internal training program for its staff, but relies on the PRC, subcontractors and federal and state agencies to provide training and qualification standards for individuals sent on a response while under their respective organization's supervision.

7.1. TRAINING REQUIREMENTS

7.1.1. GENERAL TRAINING REQUIREMENTS

All personnel responding to a spill under this Plan must meet the training requirements in (Figure 7.a) before performing such duties. Most employees receive this training in their first few weeks of hire. Exceptions may be given for those individuals working in remote office support locations and/or individuals in other support roles who will not come into contact with the spill site (e.g., galley support, message couriers not at the spill site, etc.).

Figure 7.a

Position	HAZWOPER	ICS	Plans	Other
Incident Commander	• 24-Hour HAZWOPER • 8-Hour Annual Refreshers	100-400	• GRPs • NWACP • MFSA Plan	• Equipment and River Familiarization • Oil Spill Response Basics • Others as required
Command Staff (IO, LO, SO)	• 24-Hour HAZWOPER • 8-Hour Annual Refreshers (if applicable)	100-300	• GRPs • NWACP • MFSA Plan	• Equipment and River Familiarization • Oil Spill Response Basics • Media Training (if applicable) • Others as required
General Staff (OSC, PSC, LSC, FSC)	• 24-Hour HAZWOPER • 8-Hour Annual Refreshers (if applicable)	100-300	• GRPs • NWACP • MFSA Plan	• Equipment and River Familiarization • Oil Spill Response Basics • Others as required
Group Supervisors	• 24-Hour HAZWOPER • 8-Hour Annual Refreshers (if applicable)	100-300	• GRPs • NWACP	• Equipment and River Familiarization • Oil Spill Response Basics • Others as required
Task Forces, Strike Teams, Others	• 24-Hour HAZWOPER • 8-Hour Annual Refreshers (if applicable)	100-200	• GRPs	• Equipment and River Familiarization • Oil Spill Response Basics • Others as required

7.1.2. CLEAN RIVERS COOPERATIVE SPECIFIC TRAINING

CRC maintains a robust training program for its personnel and its subcontracted personnel. The initial training program focuses on CRC equipment operations, equipment locations and MFSA Plan Implementation. It also covers familiarization with the NWACP, its associated GRPs, and their implementation. This initial training is followed up with an annual eight hour equipment refresher. If new equipment is placed into service by CRC, then all CRC and subcontracted personnel will receive specific training on that piece of equipment.

CRC completes regularly scheduled monthly training with subcontracted personnel for an eight hour day. This monthly training is held at various locations in the Area of Coverage. The training includes, but is not limited to, boom and skimmer deployment in accordance with specific GRPs, and radar and GPS navigation training. CRC also completes joint field training with the USCG, MSRC, and state agencies.

7.2. TRAINING RECORDS

MFSA and CRC maintain a list of training levels attained by their personnel. This list is regularly updated as personnel receive additional training. All CRC affiliated contractors maintain their own training programs and are required to provide MFSA with their personnel training records. If any significant changes occur with the personnel and training levels of the affiliated contractors that would affect their ability to meet the planning standards under this Plan, they are required to report this to MFSA and CRC immediately upon discovery.

7.3. HEALTH AND SAFETY

During any response, a SO will be assigned by the IC and will be responsible for conducting site safety evaluations and for writing a site safety plan appropriate to the incident. In addition, the SO may direct special instructions for various Groups, Strike Team and Task Force elements responding to an incident.

CRC maintains four gas monitors on each of its moored response vessels to verify and monitor levels of airborne contamination as at the spill scene and during response activities. The model used by CRC is an Industrial Scientific ATX 612 Multi Gas Meter. The meters are equipped with a continuous air pump which simultaneously monitors O_2, LEL, CO and H_2S.

7.4. VOLUNTEERS

As per the NWACP Volunteer Policy, volunteers will normally be used in low

risk activities and only after receiving safety training appropriate for their designated activities.

It is MFSA's policy, during the first 24 hours of a response, for the IC to determine and monitor the need for volunteers. Volunteer requests, if any, will be tracked and this information turned over to the QI who will establish next steps during the Transition of Authority.

7.5. PERSONNEL TRAINING AND QUALIFICATION LIST

Appendix (D) contains a list of MFSA, CRC, NRCES and ORM's personnel and their individual training levels.

8. EXERCISES

8.1. AGENCY REQUIRED EXERCISES

MFSA and its PRC will participate in exercises and drills to ensure the readiness of all Plan elements. Exercises will be conducted in accordance with OARS 340-141, WAC 173-182 and National Preparedness for Response Exercise Program ("NPREP") Guidelines. MFSA will make updates and/or changes as necessary following testing of the Plan during drills and exercises. To ensure that all partner agencies are given full opportunity to design and evaluate these drills and exercises, they will be scheduled on the RRT/NW Area Committee exercise calendar at: https://fortress.wa.gov/ecy/naces/.

Figure 8.a depicts the Schedule of Exercises. Credit for exercise requirements may be gained through actual spill responses. These responses must afford DEQ and ECY the opportunity to participate and evaluate the performance of MFSA and its PRC. Request for credit must be made no later than 60 days after the response. After action and lesson learned reports must be submitted within 90 days of the response.

Figure 8.a

SCHEDULE OF EXERCISES

Type of Exercise	Frequency	Prior Notice to Agency	Scope & Objectives	Records & Reports
Internal Call Out	Every 90 days	N/A	Test communications, call up procedures, personnel availability, and the ability to mobilize & assess.	No reqs for notice. Retain records/reports 3 years for all exercises
Table Top	1/year	60 days	Ensure Command & General Staff can use ICS. One per 3/yrs must be Worst-Case Discharge & req's 90 day notice	Submit report 60 days after exercise to State Agencies
Equipment Deployment	2/year	30 days	Test deployment of each type of equip in inventory, combination of owned & contractor equip; ensure personnel can operate equip & use of GRPs	same
Unannounced	As necessary by agency	N/A	To ensure adequacy of Plan.	same

8.2. ADDITIONAL MFSA, CRC EXERCISES

CRC conducts monthly no-notice call out drills for its contractor. The contractor must arrive at a designated site in the area of interest within two hours with a CRC response vessel manned by the contractor's crew which includes an operator and a deckhand. A contractor Response Manager must also arrive by vehicle within two hours.

CRC staff and its contractor attend several CRC member company drills in the area of interest and throughout the northwest each year.

9. LOGISTICS

Logistic support is a critical element of an effective cleanup. The Logistics Section is encouraged to think creatively in identifying and accessing resources, including identifying resources through phone book and Internet searching. The information listed below is not considered an exhaustive list, nor could it be.

9.1. EMERGENCY SERVICES

Emergency services for police, fire and ambulance for the entire Area of Coverage for this Plan can be reached by dialing 911. 911 requests dialed on cell phones will be transferred to the nearest 911 dispatch center.

9.2. COMMUNICATIONS

An initial communications plan, in the form of an ICS 205-OS, has been developed and is included as Appendix (E). It includes equipment, radio frequencies and channels established for use by MFSA and the USCG. It also includes organizational telephone numbers for the primary response agencies. As individual responders report to the incident, their cellular and landline telephone numbers will be added to the ISC 205-OS.

9.3. COMMAND POST LOCATIONS AND ACCOMMODATIONS

Command posts and accommodations will be located as close to the spill site as practically possible while affording the safety and infrastructure needed to manage the response. The incident command structure will be as large as necessary to manage the spill. It could be comprised of anything from a command trailer up to a convention center depending on the size and complexity of the spill. In Figure 9.a below is a list of possible command posts, but should not be considered exhaustive.

Figure 9.a

COMMAND POST LOCATIONS

Astoria	Longview	Portland/Vancouver
MERTS Center 6540 Liberty Lane Astoria, OR 97103 503-325-7962	Cowlitz Co. Expo Center 1900 7th Avenue Longview, WA 98632 360-577-3121	Double Tree – Lloyd Center 1000 NE Multnomah Street Portland, OR 97232 503-281-6111
Tongue Point 37573 Old US Hwy 30 Astoria, OR 97103 503-325-2131 (operations support only)	Monticello Hotel 1405 17th Avenue Longview, WA 98632 360-425-9900	Marine Safety Unit Portland 6767 North Basin Avenue Portland, OR 97217 503-240-9311
Camp Rilea 91204 Oregon Road Warrenton, OR 97416 503-861-4000	Red Lion Inn 510 Kelso Drive Kelso, WA 98626 360-636-4400	Navy Reserve Portland 6735 N Basin Avenue Portland, OR 97217 503-285-4566
Sector Columbia River 2185 SE 12th Place Warrenton, OR 97416 503-861-6211	Longview Public Schools 2715 Lilac Longview, WA 98632 360-575-7000	NW Regional Training Ctr. 11606 NE 66th St, Suite 103 Vancouver, WA 98662 360-397-2100
CCC Main Campus 1651 Lexington Ave. Astoria, OR 97103 503-338-2411		

9.4. SECURITY

Protecting the public from dangerous environments and keeping the command post and associated support areas is an essential part of an effective response. The IC or the UC, if formed, will determine the need for and the scope of water and land side security measures.

The Coast Guard and Coast Guard Auxiliary, and local County Sheriff's Department are sources for waterside security. In Figure 9.b below, there are numerous private landside security firms are in the coverage area of this plan that can be contracted to provide security services.

Figure 9.b

AREA SECURITY FIRMS

Security Inc. 1417 NE 76th Street, Suite G7 Vancouver, WA 98665 360-693-9283	Securitas Security Services USA 129 SW 4th Avenue Portland, OR 97204 877-773-7389 503-226-1233
Metro Watch 4501 NE Minnehaha Street Vancouver, WA 98661 800-559-2824 360-883-3333	Knighthawk Protection 11779 SE HWY 212, Suite 206 Clackamas, OR 97015 877-487-4238 503-723-5180
Reliant Security Services 9221 SW Barbor Blvd Portland, OR 97219 503-452-1050	

9.5. RIVER ACCESS POINTS

There are numerous access points to the Columbia and Willamette Rivers. A few of these sites include:

Aldrich Point
Bayport Marina
Brownsmeade (Private)
Cathlamet Marina
Chinook
County Marina Science Center (Private)
Clifton (Private)
Donaldson Marine
East End Mooring Basin, Astoria
Fort Canby
Fred's Marina
Goble
Hammond
Hayden Island
Ilwaco Basin
James Gleason Ramp
John Day
Kalama
Larson's Landing
Longview
Rainer
Ryan Point
Skamokawa
St. Helens
Tide Point
Tongue Point (3 Ramps)
Warrenton
Westport
Young's Bay Fish Pens (Private)

This list should not be considered as complete. Other sources for this information are contained in the Evergreen Pacific River Cruising Atlas for the Columbia, Snake and Willamette Rivers, various yacht cruising guides and the Geographic Response Plans of the NWACP. The following websites are probably the best sources for this information:

Columbia River Trail website at: http://www.columbiawatertrail.org/watertrail.

Oregon State Marine Board at: www.oregon.gov/osmb

Washington State Recreation and Conservation Office:
Boating Facilities Maps Intro Page at http://www.rco.wa.gov/maps/boat.htm.

9.6. CATERING

It is important that crews be fed during the response to a spill incident. The American Red Cross is an excellent source for this service. The yellow pages and the internet are also excellent sources for commercial caterers. Past experience indicates that the businesses listed in Figure 9.c below are reliable caterers.

Figure 9.c

AREA CATERING SERVICES

Astoria	Longview	Portland
Stephanie's Cabin 12 W Marine Drive Astoria, OR 97103 503-325-7181	Stuffy's II 804 Ocean Beach Hwy Longview, WA 98632 360-423-6356	Tubby's Deli 3330 NW Yeon Ave, Suite 110 Portland, OR 97210 503-225-1300
Silver Salmon Grill 1105 Commercial Street Astoria, OR 97103 503-338-6640	Subway 1328 Washington Way Longview, WA 98632 360-425-1147	Rivers Edge Café 200 SW Market Street Suite 102 Portland, OR 97201 (503) 222-0232
Rollin' Thunder BBQ 77 11th Street, Suite C Astoria, OR 97103 503-325-5936	Lynn's Catering 1133 14th Avenue, Suite C Longview, WA 98632 360-577-5656	C & L Catering 2854 NE 65th Avenue Suite D Vancouver, WA 98661 360-694-3608
Subway 11 W Marine Drive Astoria, OR 97103 503-325-3322	Wild Currant 201 S 1st Street St. Helens, OR 97051 503-366-9099	Tommy O's 801 Washington Vancouver, WA 98660 360-694-5107

9.7. EQUIPMENT RENTAL

The best largest source for information on equipment rental is the yellow pages and the internet. However, the following sources in Figure 9.d below are included for ready reference:

Figure 9.d

AREA EQUIPMENT RENTAL SERVICES

United Rentals 2525 Highway 101 N. Seaside, OR 97138 (503) 738-7368	United Rentals 1002 Tennant Way Longview, WA 98632 (360) 425-2350
JL Storedahl & Sons Inc. 2233 Talley Way Kelso, WA 98626 (360) 636-2420	United Rentals 5111 NE 82nd Ave. Portland, OR 97220 (503) 224-2000 1-800-334-1235
Precision Hydraulics 2715 NW Saint Helens Rd. Portland, OR 97210 (503) 228-7133	CCS – A Division of PNE Corp. 55 International Way Longview, WA 98632 (360) 423-6316
Watkins Tractor & Supply Co. 501 S. Pacific Ave. Kelso, WA 98626 (360) 423-7220	Don's Rentals 2274 Columbia Blvd. St Helens, OR 97051 (503) 397-0585
S & I Equipment Rental 6710 NE 219th St. Battle Ground, WA 98604 (360) 574-1034	Ostrander Rock & Construction Co. 6150 Ocean Beach Hwy. Longview, WA 98632 (360) 636-4430
Hertz Rental 330 S.W. Pine Street Portland, OR 97204 (503) 249-5727	Tidewater Barge Lines 6305 NW Old Lower River Rd. Vancouver, WA 98660 (360) 693-1491

9.8. MEDICAL FACILITIES

The best largest source for information on potential medical services is the yellow pages and the internet. However, the following sources in Figure 9.e below are included for ready reference:

Figure 9.e

AREA MEDICAL SERVICES

Astoria	Longview
Columbia Memorial Hospital 2111 Exchange Street Astoria, OR 97103 503-325-4321	St. John Medical Center 1615 Delaware Street Longview, WA 98632 360-414-2000
Urgent Care NW 2120 Exchange Street, Suite # 111 Astoria, OR 97103 503-325-0333	Legacy Urgent Care 500 North Columbia River Highway St. Helens, OR 97051 503-397-7119
CMH Urgent Care 2265 Exchange Street Astoria, OR 97103 503-338-4050	
Ocean Beach Hospital 174 First Avenue N Ilwaco, WA 98624 360-642-3181	
Vancouver	**Portland**
Legacy Salmon Creek Hospital 2211 NE 139th Street Vancouver, WA 98686 360-487-1000	Oregon Health and Science University 3181 Southwest Sam Jackson Park Road Portland, OR 97239 503-494-8311
Southwest Washington Medical Center 400 NE Mother Joseph Place Vancouver, WA 98664 360-256-2000	Legacy Emanuel Medical Center 2801 North Gantebein Avenue Portland, OR 97227 503-413-2200
Family Care & Urgent Medicine 406 SE Mill Plain Blvd, A101 Vancouver, WA 98685 360-253-2822	Urgent Care Express 4160 NE Sandy Blvd Portland, OR 97212 503-249-9000

*Emergency medical attention may be obtained by dialing 911.

10. ADMINISTRATION

This Plan shall be maintained and updated in accordance with OARs 340-141-0130, 0210 and 0220, and WAC 173-182-140, 145 and 150.

10.1. IMPLEMENTATION STRATEGY

All spills and exercises will be conducted in accordance with this Plan. To maximize use of this Plan, all Covered Vessels will be provided with the Field Guide which contains the "Oil Spill Response -- Emergency Procedures" and "Initial Oil Spill Report" prior to entry into the Area of Coverage. During the enrollment process, Covered Vessels are instructed about their obligation to have the Field Guide on board. This information is detailed in the Enrollment Agreements and on the MFSA Arrival Notice.

The following persons/entities are provided with a complete copy of this Plan and any revisions thereto:

- ISRCs;
- Spill Response Managers;
- Primary Response Contractors;
- Spill Management Team; and
- Owners of Covered Vessels that directly enroll in the Plan.

A Plan summary document, focusing on initial response roles and responsibilities will be provided to the following persons/entities, explaining how to access the Plan:

- QIs;
- Agents of Covered Vessels;
- P & I Club representatives;
- MFSA staff and Spill Management Team participants; and
- All contractors named in this Plan (as listed in Chapter (5)).

Additionally, all QIs are given a copy of the "Response Action Checklist" found in Chapter (4) of the Plan.

All of the above-named recipients of this Plan are required to acknowledge receipt of the Plan and agreement for acting in accordance with Plan procedures. Acknowledgements will be made available for review by regulators upon request at the offices of MFSA. The Plan summary document and a description of the process for official acknowledgement are included in Appendix (O).

The Plan is located in full on the MFSA website for access by any interested party. MFSA uses annual meetings, committee meetings, periodic newsletters, memos, the website and correspondence with interested parties as well as the enrollment process as a means of instruction about a Covered Vessel's obligations under the Plan.

10.2. SPILL AND EXERCISE DOCUMENTATION AND REVIEW

The major events of each major exercise and spill in which a UC is established will be captured by the Documentation Unit. Using this documentation, and the experiences of those individuals who participated, a review of this Plan will be conducted. This review process will take place in an open forum with debriefs provided by all participating agencies and organizations. Any inaccuracies, omissions, deficiencies or other opportunities for improvement will be identified and made during this review process. These items may also be used to update or improve the Plan.

10.3. UPDATES AND AMENDMENTS

A record of all amendments and updates will be maintained in the front of this Plan. DEQ and ECY will be notified in writing within 24 hours of amendments or updates that could significantly affect the ability to respond in accordance with this Plan (e.g., changes in equipment or personnel). Written changes to the Plan will be distributed to DEQ and ECY within 30 days.

10.4. PERIODIC REVIEWS

Administrative reviews of this Plan for general content and accuracy will be conducted annually. If any changes are required, DEQ and ECY will be notified within 24 hours of the changes and be given copies of the changes within 30 days. In addition, if no changes are required a letter to that fact will be sent to DEQ and ECY.

Every five years the Plan will be resubmitted to DEQ and ECY for approval. If there are no significant changes MFSA will request that they review the existing Plan on file.

Figure A.1 FIELD GUIDE

COLUMBIA AND WILLAMETTE RIVERS, STATES OF OREGON AND WASHINGTON

Keep this checklist where it can always be located by vessel personnel!

ATTENTION: This "Field Guide" - Emergency Procedures Checklist must be on board the vessel prior to entering the States of Oregon and Washington, which begins 3 nautical miles out from the mouth of the Columbia River, and posted at all times. This document replaces all prior "on-board" field guide documents. The vessel Owner or operator, as the Responsible Party ("RP"), must follow this Field Guide in the event of a spill or substantial threat of a spill. For clarification on what constitutes a substantial threat of a spill refer to Figure A.5.

The notifications required in this Field Guide should be made by an "Authorized Representative" which is the individual authorized by the Owner to act on the Owner's behalf with respect to the Plan, including the Master, the Agent, the QI and the P&I Club representative or another person specifically authorized by the Owner.

OIL SPILL RESPONSE – EMERGENCY PROCEDURES
EVERY SPILL OR SUBSTANTIAL THREAT OF A SPILL MUST BE REPORTED
Fines and/or imprisonment for failure to report oil spills are possible.

1. RP ACTIONS:

Stop Flow of Product: Quickly close valves and secure.
Notifications: Designate Authorized Representative to make RP REQUIRED NOTIFICATIONS (see Section 2 below) and immediately continue with RP ACTIONS, or designate vessel personnel to continue RP ACTIONS and immediately make RP REQUIRED NOTIFICATIONS.
Shut Off Ignition Sources: Kill motors, electrical circuits, open flames, etc.
Warn Personnel: Enforce safety and security.
Initiate Containment: Deploy on the deck and/or in the water – oil boom or sorbents.

DO NOT use dispersants on the oil spill. To do so without governmental approval will result in fines and/or imprisonment.

2. RP REQUIRED NOTIFICATIONS - An Authorized Representative must make the following calls:

MFSA: Dial MFSA's 24-Hour Emergency Line, 503-220-2055 or hail MFSA on radio channels VHF 16 (156.8) or VHF 18A (156.9) using call sign "WHW 656". MFSA will ask a series of questions regarding incident information.
US Coast Guard National Response Center: 800-424-8802 or 202-267-2675. Use Figure A.2 to provide incident information.
Oregon Emergency Response System ("OERS"): 800-452-0311 or 503-378-6377. Use Figure A.2 to provide incident information.
Washington Emergency Management Division ("WEMD"): 800-258-5990 or 253-912-4904. Use Figure A.2 to provide incident information.

3. MFSA REQUIRED NOTIFICATIONS - MFSA will make the following calls:

Incident Commander: Responsible for leading all aspects of the response. (MFSA designated IC will serve until relieved by the RP Authorized Representative, up to first 24 hours).
Primary Response Contractor: Provides immediate response under direction of IC with pre-staged equipment, vessels, and personnel for containment, recovery, cleanup and disposal.
Agent: Reminder of vessel liability & responsibility to have RP Authorized Representative assume IC role within 24 hours.
QI: To keep RP apprised of current response, ensure a smooth transition, and coordinate call out of OSRO resources named in Federal VRP as necessary

Figure A.2 INITIAL OIL SPILL REPORT (NOTIFICATION)

per 33 CFR 155.1040(b) [OPA-90 / VRP], and 33 CFR 151.26(b)(3) [SOPEP] – IMO Telex Form Accepted

INITIAL OIL SPILL REPORT (NOTIFICATION)

NOTE: It is not necessary to wait for all information before making initial notifications.

Reported by (name, title, telephone number, or monitored radio frequency):

Vessel name, size, type, country of registry, official number, and call sign (if applicable):

Towing vessel (if applicable):

Date / time of incident: Date / time reported: Date / time of next report:

Location of incident:

Course, speed, and intended track of vessel:

Type and quantity of oil onboard:

Estimate of oil discharged~~,~~ or threat of discharge; details of pollution or potential:

Nature of incident (e.g. grounding, collision, etc.), and extent of defects / damage:

Weather and sea conditions on scene:

Actions taken or planned by persons on scene:

Current condition of the vessel:

Injuries or fatalities:

ASSISTANCE REQUIRED:

Other pertinent information (continue on reverse side / extra page, if necessary):

NOTIFICATIONS COMPLETED

Date / Time	To: (name and report/incident #):	
	❶ MFSA / Incident Commander	
	❷ USCG NRC 1-202-267-2675 or 1-800-424-8802	
	❸ OERS / ODEQ 1-503-378-6377 or 1-800-452-0311	
	❹ WEMD / WDOE 1-360-407-6300 or 1-800-258-5990	
	❺ QI	
	❻ OTHERS (list, use separate sheets)	

BY (Name/Title):

Figure A.3 ESTIMATING THE SIZE OF THE SPILL

SPILL QUANTITY ESTIMATION	
SLICK APPEARANCE	QUANTITY OF OIL SPILLED
Barely visible	25 gallons/mi^2
Silvery sheen	50 gallons/mi^2
Faint colors	100 gallons/mi^2
Bright color bands	200 gallons/mi^2
Dull brown	600 gallons/mi^2
Dark brown	1,300 gallons/mi^2
ALTERNATE QUANITY ESTIMATIONS (for low light situations)	
Gauge tanks after spill and subtract from pre spill volume	
Volume Loss = (Pump rate)(elapsed time) + Static line and hose contents	

Figure A.4 OIL CLASSIFICATION

Oil Type	Designation	Representative Oils	Diagnostic Properties	Physical/Chemical Properties
A	Light volatile oils	Distillate fuel and most light crude oils	Highly fluid, usually transparent but can be opaque; strong odor, rapid spreading; can be dissipated by agitation	May be flammable; high rate of evaporative loss of volatile components; assumed highly toxic to marine and aquatic biota when fresh; form unstable emulsions; may penetrate substrate
B	Non-sticky oils	Medium to heavy paraffin-base refined and crude oils	Moderate to high viscosity; waxy or oily feel; can be rinsed from surfaces by low-pressure water	Generally removable from surfaces; penetration of substrates variable; includes water in oil emulsions
C	Heavy sticky oils	Residual fuel oils; medium to heavy asphaltic and mixed base crudes	Typically opaque brown or black, sticky or tarry & viscous; cannot be dissipated by agitation	Highly viscous; hard to remove from surfaces; tends to form stable emulsions; high specific gravity and potential for sinking after weathering; low substrate penetration; low toxicity (biological effects due primarily to smothering)
D	Non-fluid oils (at ambient temperatures)	Residual and heavy crude oils (all types)	Tarry or waxy (solid) lumps	Non-spreading; cannot be pumped without pre-heating or slurrying; initially relatively non-toxic.

Opaque: Cannot see through coating of oil.
Waxy: Feels sticky but is not sticky; can be easily wiped off fingers with a cloth; can be viscous.
Solid Lumps: Doesn't flow; can have solid consistency or be soft like putty.
Sticky or Viscous: Oil is very sticky, has a thick consistency; not easily removed without using detergents.

Figure A.5 SUBSTANTIAL THREAT OF SPILL DETERMINATION

Substantial Threat of Spill: Or a "vessel emergency" as described by Washington State, a substantial threat of pollution originating from a vessel, including loss or serious degradation of propulsion, steering, means of navigation, primary electrical generating capability, and seakeeping capability.

The following are examples of events that could result in a substantial threat of spill:

- Tank vessel grounding.
- Non-tank vessel grounding outside the channel on the LCR.
- LOP (main) or LOS (primary) while underway on the LCR, for prolonged time.
- A marine casualty that results in unintended anchoring or safe harbor/berth of convenience (exclude crew issues that are unrelated to seaworthiness of vessel).

It is the responsibility of the enrolled vessel to determine if a vessel emergency constitutes a substantial threat of spill. If further clarification is necessary on the definition of substantial threat of spill, please contact the MFSA at 503-220-2055.

Figure A.6 FOLLOW-UP REPORT

When significant changes to the initial information occur and a follow-up report is required per WAC 173-182-250(4), the IC is to complete this Follow-Up Report and provide the updated information to the following agencies:
USCG National Response Center – (800) 424-8802 / (202) 267-2675
Oregon Emergency Response System – (800) 452-0311 / (503) 378-6377
Washington Emergency Management Division – (800) 258-5990 / (253) 912-4904
Vessel Owner/Agent/QI – See Arrival Notice

Vessel Name:		
Date of Incident:		
Location of Incident:		
USCG Incident Report Number:		
State(s) Incident Number: (if applicable)	**OERS:**	**WEMD:**

1.	**Provide additional details on the type of oil on board:**
2.	**Provide any additional details on the condition of the vessel and the ability to transfer ballast and fuel:**
3.	**Provide additional details on the quantity, extent, and movement of the pollution and whether the discharge is continuing:**
4.	**Report any changes in the on-scene weather or sea conditions:**
5.	**Provide details of any actions being taken with regard to the discharge and the movement of the ship:**

The following pages of Appendix B contain the Transition of Authority documents used during the transfer of command as described in Chapter (3) or at the conclusion of a response; (1) Figure B.1, the Acknowledgement of Transfer or Relief, and (2) Figure B.2, the Transition Plan.

The remainder of this page intentionally blank.

Figure B.1 ACKNOWLEDGEMENT OF TRANSFER OR RELIEF

This Acknowledgement of Transfer or Relief relieves the Maritime Fire & Safety Association ("MFSA") of its authority as the Incident Commander ("IC") for an oil spill or substantial threat of spill incident. (This form may be used either at the conclusion of a response or the Transition of Authority from MFSA to the Responsible Party ("RP")). Capitalized terms not defined herein are defined in the MFSA Vessel Response Plan (the "Plan").

Covered Vessel: _____

Owner/Operator: _____

Qualified Individual ("QI"): _____

On or about _____ hours, on the _____ day of _____, 20_____,

at _____, an incident occurred requiring Notification of MFSA under the Plan. MFSA received Notification from an Authorized Representative of the Covered Vessel and implemented the Plan. (Select one option below.)

❒ **No further Plan Implementation required**. The Incident Commander ("IC"), QI, and any Unified Command ("UC") representatives certify that the incident response is complete and no further Plan Implementation or response actions are required. The RP should demobilize response resources.

MARITIME FIRE & SAFETY ASSOCIATION

_____
Signature

_____
Printed Name

_____
Title

QUALIFIED INDIVIDUAL

_____
Signature

_____
Printed Name

_____
Title

-OR-

❒ **Continued MFSA Plan Implementation is required.** The IC and UC representatives will work with the QI in the Transition of Authority for continued Implementation of the MFSA Plan. *The Transition Plan of Figure B.2 identifies the necessary response actions or processes that must be carried through the Transition of Authority*. Begin the Transition of Authority process and attach the completed Transition Plan prior to full execution of this document. Execution of this document certifies that the Transition Plan has been reviewed and approved by UC and all Command and General Staff if applicable. Any necessary Transition of Authority has occurred and the RP is solely responsible for continued Plan Implementation.

Dated this _____ day of _____, 20_____, at _____ hours, MFSA is hereby relieved of its responsibilities for Implementing the Plan and any necessary Transition of Authority has occurred.

MARITIME FIRE & SAFETY ASSOCIATION

_____
Signature

_____
Printed Name/Title

UNIFIED COMMAND

_____ _____
By Title

_____ _____
By Title

RESPONSIBLE PARTY

_____
Signature

_____
Printed Name/Title

_____ _____
By Title

_____ _____
By Title

Figure B.2 TRANSITION PLAN

This Transition Plan serves to support the Transition of Authority from MFSA to the incoming RP. It is designed to be flexible and thorough in addressing the needs of the ongoing response in ensuring a smooth and effective transition. The Transition Plan should be completed in conjunction with the Acknowledgement of Transfer or Relief by MFSA's IC and the RP's QI when it is determined that continued Plan Implementation is required and a transition should occur.

Incident Information

Scenario Details: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Review ICS 201 Form or Incident Action Plan ("IAP")

1. **Incident Briefing with current UC and QI**
   During the transfer of command process, an Incident Command System ("ICS") 201-formatted briefing provides the incoming IC/UC with basic information regarding the incident situation and the resources allotted to the incident. Most importantly it functions as the IAP for the initial response and remains in force and continues to be updated until the response ends or the Planning Section generates the incident's first IAP. It is also suitable for briefing individuals newly assigned to the Command and General Staff, incoming tactical resources, as well as needed assessment briefings for the staff.

   ### Incident Briefing Agenda:
   i. Current situation (note territory, exposures, safety concerns, etc.; use map/charts)
   ii. Initial objectives and priorities
   iii. Current and planned actions
   iv. Current on-scene organization
   v. Resource assignments
   vi. Resources en-route and/or ordered
   vii. Facilities established
   viii. Incident potential

Transition of Authority Initial Discussion

i. Open Actions
ii. Transition Plan Overview
iii. Set time for full transition to occur

2. Command and General Staff Meeting

At the Command and General Staff Meeting, IC/UC will present their decisions and Transition Plan to the Command and General Staff Members. Discussion should also include topics like roles and responsibilities, section management, and process, flow and communication. Officers and Section Chiefs should then individually discuss these items with their respective successors.

Transition Checklist

❒ Ensure Sufficient Staff
❒ Update ICS Form 203/207
❒ Ensure Adequate Command Post Location. Relocate if necessary
*If necessary, new location information:

_____ _____
Location Phone

❒ Review and Approve Current Site Safety Plan
❒ Review and Approve Salvage Plan
❒ Review and Approve Finance/Administration Procedures
❒ P & I Club/Insurer Representative Established
Representative contact information:

_____ _____
Name and Company Phone

❒ Review Response Contracts:

All response related billing and invoicing from Plan implementation up until the Transition of Authority will be billed as follows:

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All response related billing and invoicing from the Transition of Authority up until the completion of all response activities (or until changed by UC/Finance & Administration) will be billed as follows:

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❒ Review Claims, Provide QI with Claims Information.
❒ Review Media Releases, Press Briefing transcripts and Joint Information Center procedures.

Transition of Authority Meeting

❒ Review Situation Status
❒ Review Tactical Response Operations in progress
❒ Identify Process Changes for Command Post/ICS Operations
❒ Identify Open Items, clarify if necessary
❒ Review Transition Plan

Additional Transition Information:

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Transition of Authority

- ❒ Formal announcement to Command Post of Transition of Authority
- ❒ Role Change
- ❒ Provide a copy of the Transition Plan and Acknowledgement of Transfer or Relief to Documentation and the original to MFSA. Additional copies are provided to the Covered Vessel and UC representatives.

The Transition Plan has been reviewed and approved by UC, and all Command and General Staff if applicable. The Transition of Authority is certified by execution of the Acknowledgement of Transfer or Relief.

_____ _____

IC Signature Date

A complete list of equipment under the direct control of CRC and immediately available for spill response, is maintained on the WRRL. This list can be found on the WRRL website at: http://www.wrrl.us. An current matrix can be found in the following pages of Figure C.1. In addition, MFSA and its contractor can request additional equipment from private, non-profit or government organizations. See Appendix (J) for a complete list of service agreements, contracts, letters of intent and mutual aid agreements. Much of the equipment available under these agreements can also be viewed at http://www.wrrl.us.

Figure C.1 Equipment List

wrrlID	Resource	KindType	Indentification	Specificatons	EDRC	Liquid Storage	Boom	Staging
29133	Boom	B3	12" Boom	American Marine	0	0	3000	Owens Corning(on barge) at Dock
29134	Boom	B3	12" Boom	American Marine	0	0	2000	Spill Response Trailer (316-40)
29136	Boom	B3	12" Boom	American Marine (includes WRRL ID 29060)	0	0	2000	SWB 109-29 (PFR Fire Station 6)
29146	Boom	B3	12" Boom	American Marine (includes WRRL ID 29050)	0	0	400	SWRB 105-29 (Tesoro Facility)
29147	Boom	B3	12" Boom	American Marine (includes WRRL ID 29057)	0	0	400	SWRB 106-29 (Weyerhaeuser)
29148	Boom	B3	12" Boom	American Marine (includes WRRL ID 29053)	0	0	400	SWRB 102-29 (Weyerhaeuser)
29149	Boom	B3	12" Boom	American Marine (includes WRRL ID 29052)	0	0	400	SWRB 103-29 (Weyerhaeuser)
29150	Boom	B3	12" Boom	American Marine (includes WRRL ID 29054)	0	0	400	SWRB 101-29 (Tongue Point)
29151	Boom	B3	12" Boom	American Marine (includes WRRL ID 29055)	0	0	400	Columbia Pacific Bio-Refinery (SWRB 100-29)
29154	Boom	B3	12" Boom	American Marine (include WRRL ID 29029)	0	0	2000	FRV Columbia Responder (Dillards, St.Helens Marina)
29171	Boom	B3	12" Boom	American Marine (includes WRRL ID 29176)	0	0	1000	Skamokawa, WA (Trailer 306-35)
29132	Boom	B3	14" Boom	American Marine (includes WRRL ID 29030)	0	0	1500	FRV Independence (Jack Fowler's Marina)
29152	Boom	B3	14" Boom	American Marine (includes WRRL ID 29176)	0	0	500	Skamokawa, WA (Boom Trailer 306-35)
29126	Boom	B2	20" Boom	American Marine	0	0	3900	Trailer (303-35) Tongue Point
29127	Boom	B2	20" Boom	American Marine	0	0	5000	Trailer (304-35) Port of Vancouver
29129	Boom	B2	20" Boom	American Marine	0	0	4200	Trailer (309-35) Weyerhaeuser
29130	Boom	B2	20" Boom	American Marine	0	0	5000	Trailer (313-35) Georgie Pacific Facility
29131	Boom	B2	20" Boom	American Marine	0	0	5000	Trailer (307-35) Weyerhaeuser
29135	Boom	B2	20" Boom	American Marine	0	0	5000	53' Trailer (312-35)
29137	Boom	B2	20" Boom	American Marine	0	0	400	Scappoose Fire Bureau
29138	Boom	B2	20" Boom	American Marine (includes WRRL ID 29176)	0	0	2500	28' Trailer (306-35), Vista Park
29139	Boom	B2	20" Boom	American Marine (includes WRRL ID 29180)	0	0	5000	Boise Cascade (Boom Trailer 310-35)
29140	Boom	B2	20" Boom	American Marine (includes WRRL ID 29185)	0	0	5000	Boom Trailer (308-35), PGE Beaver
29141	Boom	B2	20" Boom	American Marine (includes WRRL ID 29031)	0	0	1000	FRV Protector (Dillards Marina)
29142	Boom	B2	20" Boom	American Marine (includes WRRL ID 29033)	0	0	1100	OSRV Mark O. Hatfield (Freds Marina)
29143	Boom	B2	20" Boom	American Marine (includes WRRL ID 29032)	0	0	1000	OSRV HW Zarling (Sause Bros)
29144	Boom	B2	20" Boom	American Marine (includes WRRL ID 29035)	0	0	1000	OSRV Clean Rivers 1 (Foss Dock)
29145	Boom	B2	20" Boom	American Marine (includes WRRL ID 29034)	0	0	1000	MFSA 1 (Elochoman Marina)
29181	Boom	B2	20" Boom	American Marine	0	0	4000	Trailer (338-35) Portland Base

wrrlID	Resource	KindType	Indentification	Specificatons	EDRC	Liquid Storage	Boom	Staging
30051	Boom	B2	20" Boom	American Marine	0	0	2000	20' Connex box on chassis, Tidewater Facility in Boardman, Oregon.
29125	Boom	B2	20" Boom	American Marine	0	0	5000	Trailer (302-35), Tongue Point
29153	Boom	B2	28" Fast Water Boom	American Marine (includes WRRL ID 29169)	0	0	700	Boom Trailer 303-35 (Tongue Point)
29169	Boom	B2	30" Boom	American Marine (includes WRRL ID ?)	0	0	400	Trailer 303-35 (Tongue Point)
29047	Equipment	VH0	1 Ton Service Truck	2008 GMC	0	0	0	Portland Base
29159	Equipment	VH0	4x4 Pick-up	2003 Ford F-350	0	0	0	Portland Base
29160	Equipment	VH0	4x4 SUV	2007 Toyota 4-Runner	0	0	0	Portland Base
29082	Equipment	VH0	Boat Trailer	Trailer (16' Skiff 013-58)	0	0	0	Portland base (WB 013-58)
29083	Equipment	VH0	Boat Trailer	Trailer (16' Skiff 014-58)	0	0	0	Portland Base (WB 014-58)
29086	Equipment	VH0	Boat Trailer	Trailer (Liz Furse 005-26)	0	0	0	Portland Base (WB 005-26)
29048	Equipment	VH0	Boom Trailer	53' Trailer (includes boom from WRRL ID 29169, 29153 and 29126)	0	0	0	Tongue Point
29049	Equipment	VH0	Boom Trailer	45' Trailer (includes boom from WRRL ID 29127)	0	0	0	Port of Vancouver
29161	Equipment	VH0	Boom Trailer	53' Trailer	0	0	0	Portland Base
29174	Equipment	VH0	Boom Trailer	48' Trailer	0	0	0	Tongue Point
29176	Equipment	VH0	Boom Trailer	28' Trailer (miscellaneous boom)	0	0	0	Vista Park
29177	Equipment	VH0	Boom Trailer	48' Trailer	0	0	0	Weyerhaeuser
29178	Equipment	VH0	Boom Trailer	42' Trailer	0	0	0	Georgia Pacific
29179	Equipment	VH0	Boom Trailer	48' Trailer	0	0	0	Weyerhaeuser
29180	Equipment	VH0	Boom Trailer	48' Trailer	0	0	0	Boise Cascade
29184	Equipment	VH0	Boom Trailer	53' Trailer	0	0	0	Tongue Point
29185	Equipment	VH0	Boom Trailer	48' Trailer	0	0	0	PGE (Beaver Facility)
29192	Equipment	VH0	Boom Trailer	53' Trailer	0	0	0	
29172	Equipment	COM	Command & Communication Trailer	53' Specialty Trailer - Command & Communications	0	0	0	Portland Base
30052	Equipment	VH0	Connex Box	20' container on chassis	0	0	0	Tidewater Facility in Boardman, Oregon
29193	Equipment	SR0	CounterVac 3315	21' pull on 3" hose	0	0	0	Portland Base
29194	Equipment	SR0	CounterVac 3315	21' pull on 3" hose	0	12	0	Tidewater Barge # 4
29195	Equipment	SR0	CounterVac 3315	21' pull on 3" hose	0	12	0	Tidewater Barge # 2
29199	Equipment	SR0	Desmi DOP 160	Hydraulic Power Unit (160)	0	0	0	Portland Base
29200	Equipment	SR0	Desmi DOP 160	Hydraulic Power Unit (160)	0	0	0	Portland Base
29187	Equipment	VH0	Equipment Trailer	30' Trailer (contains misc. spill response equipment)	0	0	0	Columbia Pacific Bio-Refinery

wrrlID	Resource	KindType	Indentification	Specificatons	EDRC	Liquid Storage	Boom	Staging
29071	Equipment	VH0	Equipment Trailer	48' Trailer w/ lift gate	0	0	0	Weyerhaeuser
29165	Equipment	VH0	Flatbed Crane Truck	1980 GMC	0	0	0	Portland Base
29164	Equipment	VH0	Flatbed Trailer	48' Flatbed Trailer	0	0	0	Portland Base
29196	Equipment	PTP	Float-O-Pump	100 gpm	0	0	0	Portland Base (Trailer 346-40)
29197	Equipment	PTP	Float-O-Pump	100 gpm	0	0	0	Portland Base (Trailer 346-40)
29198	Equipment	PTP	Float-O-Pump	100 gpm	0	0	0	Portland Base (Trailer 346-40)
29189	Equipment	SR0	Generator Trailer	25kw Generator	0	0	0	Portland Base
29190	Equipment	SR0	Generator Trailer	35kw Generator	0	0	0	Portland Base
29188	Equipment	VH0	Spill Response Trailer	34' Trailer	0	0	0	Portland Base
30948	Equipment	VH0	Tractor	2007 Freightliner	0	0	0	Portland
29167	Equipment	VH0	Tractor	2001 Freightliner	0	0	0	Portland Base
29168	Equipment	VH0	Tractor	1993 International	0	0	0	Tongue Point
30950	Equipment	Truck/Suv	Work Truck/Pickup	1 Ton Ford 350 Super Duty 2008	0	0	0	Portland Base
29035	OSRV	OSRV3	OSRV Clean Rivers 1	34' Kvichak (includes boom from WRRL ID 29144)	3720	24	0	Foss Dock
29032	OSRV	OSRV3	OSRV HW Zarling	34' Kvichak (includes boom from WRRL ID 29143)	3720	24	0	Sause Bros.
29033	OSRV	OSRV3	OSRV Mark O. Hatfield	34' Kvichak (includes boom from WRRL ID 29142)	3720	24	0	Fred's Marina
29034	OSRV	OSRV3	OSRV MFSA 1	34' Kvichak (includes boom from WRRL ID 29145)	3720	24	0	Elochoman Marina
29050	OSRV	OSRV3	Shallow Water Recovery Barge	30' Kvichak w/ Lori Skimmer (includes boom from WRRL ID 29146)	2473	100	0	Tesoro Facility
29052	OSRV	OSRV3	Shallow Water Recovery Barge	30' Kvichak w/ Lori Skimmer ((includes boom from WRRL ID 29149)	2473	100	400	Tongue Point
29053	OSRV	OSRV3	Shallow Water Recovery Barge	30' Kvichak w/ Lori Skimmer (includes boom from WRRL ID 29148)	2473	100	400	Weyerhaeuser
29054	OSRV	OSRV3	Shallow Water Recovery Barge	30' Kvichak w/ Lori Skimmer (includes boom from WRRL ID 29150)	2473	100	400	Portland Base
29055	OSRV	OSRV3	Shallow Water Recovery Barge	30' American Eagle w/ Lori Skimmer (includes boom from WRRL ID 29151)	2473	100	400	Columbia Pacific Bio-Refinery
29057	OSRV	OSRV3	Shallow Water Recovery Barge	30' American Eagle w/ Lori Skimmer (includes boom from WRRL ID 29147)	2473	100	400	Weyerhaeuser
29182	Shoreline	TR0	Shoreline Clean-up Trailer	(includes WRRL ID 29042)	0	0	0	Portland Base
29042	Skiff	WB5	14' Skiff	14' Skiff w/15 hp	0	0	0	Trailer 316-40
29043	Skiff	WB5	14' Skiff	14' Skiff w/15 hp	0	0	0	Trailer 346-67
29191	Skiff	WB5	14' Skiff	14' Skiff with 5 hp Outboard	0	0	0	Portland Base (Trailer 316-40)

wrrlID	Resource	KindType	Indentification	Specificatons	EDRC	Liquid Storage	Boom	Staging
29041	Skiff	WB5	14' Skiff	14' Skiff w/15 hp	0	0	0	Portland Base (Trailer 315-40)
29044	Skiff	WB5	16' Skiff	16' Skiff w/25 hp	0	0	0	Portland Base Trailer (333-40)
29045	Skiff	WB5	16' Skiff	16' Skiff w/ 25hp	0	0	0	Columbia PacificBio-Refinery: Trailer (332-40)
29155	Skimmer Portable	SK3	12" Drum Skimmer (Flotation Unit ID 548-56)	Yanmar Diesel Hydraulic Power Unit (804-58) and 3" Hydraulic Diaphragm Transfer Pump (ID 640-57)	891	0	0	Portland Base
29156	Skimmer Portable	SK3	12" Drum Skimmer (Flotation Unit ID 549-56)	Yanmar Diesel Hydraulic Power Unit (ID 805-58) and 3" Hydraulic Diaphragm Transfer Pump (ID 641-57)	891	0	0	Portland Base
29121	Skimmer Portable	SK3	36" Coated Drum Skimmer (Unit ID 544-56)	Yanmar Diesel Hydraulic Power Unit (ID 800-58) and 3" Hydraulic Diaphragm Transfer Pump (636-57)	891	0	0	Portland Base
29122	Skimmer Portable	SK3	36" Coated Drum Skimmer (Unit ID 545-56)	Yanmar Diesel Hydraulic Power Unit (ID 801-58) and 3" Hydraulic Diaphragm Transfer Pump (ID 637-56)	891	0	0	Portland Base
29123	Skimmer Portable	SK3	36" Coated Drum Skimmer (Unit ID 546-56)	Yanmar Diesel Hydraulic Power Unit (ID 802-58) and 3" Hydraulic Diaphragm Transfer Pump (ID 638-57)	891	0	0	Portland Base
29124	Skimmer Portable	SK3	36" Coated Drum Skimmer (Unit ID 547-56)	Yanmar Diesel Hydraulic Power Unit (ID 803-58) and 3" Hydraulic Diaphragm Transfer Pump (ID 639-57)	891	0	0	Trailer (330-40) Weyerhaeuser
29087	Skimmer Portable	SK3	API Drum Skimmer	Hydraulic Power Unit and Drum Attachment	2400	0	0	Trailer (ID 330-40) at Weyerhaeuser in Longview, WA
29088	Skimmer Portable	SK3	API Drum Skimmer	Hydraulic Power Unit (56-454) (in Trailer 29187)	2400	0	0	Columbia Pacific Bio-Refinery
29089	Skimmer Portable	SK2	Desmi Terminator 250	Hydraulic Power Unit (250) (57-251)	3017	0	0	Portland Base
29090	Skimmer Portable	SK2	Desmi Terminator 250	Hydraulic Power unit (250) (57-252)	3017	0	0	Portland Base
29100	Skimmer Portable	SK3	Douglas 18000 Skim-Pak	For use with CounterVac 3315 (502-56)	4457	0	0	Tidewater Barge # 2
29101	Skimmer Portable	SK3	Douglas 18000 Skim-Pak	For use with CounterVac 3315 (502-56)	4457	0	0	Tidewater Barge # 2
29102	Skimmer Portable	SK3	Douglas 18000 Skim-Pak	For use with CounterVac 3315 (503-56)	4457	0	0	Tidewater Barge # 4
29103	Skimmer Portable	SK3	Douglas 18000 Skim-Pak	For use with CounterVac 3315 (503-56)	4457	0	0	Tidewater Barge # 4
29104	Skimmer Portable	SK3	Douglas 18000 Skim-Pak	For use with CounterVac 3315 (504-56)	4457	0	0	Portland Base
29105	Skimmer Portable	SK3	Douglas 18000 Skim-Pak	For use with CounterVac 3315 (504-56)	4457	0	0	Portland Base

wrrlID	Resource	KindType	Indentification	Specificatons	EDRC	Liquid Storage	Boom	Staging
29107	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 507-56)	3" Yanmar Diesel (Unit ID 608-57) 300 GPM	2057	0	0	Tongue Point
29106	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 508-56)	3" Yanmar Diesel (Unit ID 607-57) 300 GPM	2057	0	0	Tongue Point
29097	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 509-56)	3" Yanmar Diesel (Unit ID 609-57) 300 GPM	2057	0	0	Tongue Point
29095	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 510-56)	3" Yanmar Diesel (Unit ID 606-57) 300 GPM	2057	0	0	Tongue Point
29094	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 513-56)	3" Yanmar Diesel (Unit ID 615-57) 300 GPM	2057	0	0	Weyerhaeuser
29096	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 514-56)	3" Yanmar Diesel (Unit ID 616-57) 300 GPM	2057	0	0	Weyerhaeuser
29098	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 515-56)	3" Yanmar Diesel (Unit ID 617-57) 300 GPM	2057	0	0	Weyerhaeuser
29108	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 517-56)	3" Yanmar Diesel (Unit ID 610-57) 300 GPM	2057	0	0	Portland Base
29092	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 518-56)	3" Yanmar Diesel (Unit ID 611-57) 300 GPM	2057	0	0	Portland Base
29093	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 519-56)	3" Yanmar Diesel (Unit ID 612-57) 300 GPM	2057	0	0	Portland Base
29091	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 520-56)	3" Yanmar Diesel (Unit ID 613-57) 300 GPM	2057	0	0	Portland Base
29099	Skimmer Portable	SK3	Douglas 18000 Skim-Pak (Unit ID 521-56)	3" Yanmar Diesel (Unit ID 614-57) 300 GPM	2057	0	0	Portland Base
29109	Skimmer Portable	SK3	Douglas 4200 Skim-Pak	2" Yanmar Diesel (601-57) Diaphragm	480	0	0	Portland Base
29110	Skimmer Portable	SK3	Douglas 4200 Skim-Pak (524-56)	2" Yanmar Diesel (600-57) Diaphragm	480	0	0	Portland Base
29112	Skimmer Portable	SK3	Douglas 4200 Skim-Pak (526-56)	2" Yanmar Diesel (602-57) Diaphragm	480	0	0	Portland Base
29111	Skimmer Portable	SK3	Douglas 4200 Skim-Pak (527-56)	2" Yanmar Diesel (603-57) Diaphragm	480	0	0	Columbia Pacific Bio-Refinery
29113	Skimmer Portable	SK3	Douglas 4200 Skim-Pak (528-56)	2" Yanmar Diesel (604-57) Peristaltic	480	0	0	Portland Base
29114	Skimmer Portable	SK4	Ro-Clean Rope Mop Skimmer	Hatz Diesel	30	0	0	Portland Base
29115	Skimmer Portable	SK2	Slickbar "High Capacity Oil Skimmer"	For use with CounterVac (503-56) (WRRL ID 29194)	4457	0	0	Tidewater Barge # 4
29116	Skimmer Portable	SK3	Slickbar "High Capacity Oil Skimmer"	For use with CounterVac (502-56) (WRRL ID 29195)	1714	0	0	Tidewater Barge # 2
29117	Skimmer Portable	SK2	Slickbar "High Capacity Oil Skimmer"	For use with CounterVac (504-56) (WRRL ID 29193)	4457	0	0	Portland Base

wrrlID	Resource	KindType	Indentification	Specificatons	EDRC	Liquid Storage	Boom	Staging
29118	Skimmer Portable	SK2	Slickbar "High Capacity Oil Skimmer"	For use with CounterVac (504-56) (WRRL ID 29193)	4457	0	0	Portland Base
29119	Skimmer Portable	SK3	Slickbar "High Capacity Oil Skimmer"	For use with CounterVac (504-56) (WRRL ID 29193)	1714	0	0	Portland Base
29120	Skimmer Portable	SK3	Slickbar "Manta Ray"	For use with CounterVac (504-56) (WRRL ID 29193)	1028	0	0	Portland Base
29068	Storage	PS4	1000 gal. Bladder	American Marine	0	23	0	Tongue Point
29072	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Portland Base
29073	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Portland Base
29074	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Portland Base
29075	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Portland Base
29076	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Portland Base
29077	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Portland Base
29078	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Portland Base
29079	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Shoreline Clean-up Trailer (346-40)
29080	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Wildlife Transport Trailer(350-66)
29081	Storage	PS4	1000 gal. Portable Storage Tank	FastTanks Storage Tank	0	24	0	Wildlife Transport Trailer (350-66)
29063	Storage	PS4	2500 gal. Towable Bladder	American Marine	0	60	0	Portland Base
29064	Storage	PS4	2500 gal. Towable Bladder	American Marine	0	60	0	Portland Base
29065	Storage	PS4	2500 gal. Towable Bladder	American Marine	0	60	0	Portland Base
29066	Storage	PS4	2500 gal. Towable Bladder	American Marine	0	60	0	Portland Base
29067	Storage	PS4	2500 gal. Towable Bladder	American Marine	0	60	0	Portland Base
29069	Storage	PS4	500 gal. Bladder	American Marine	0	11	0	Tongue Point
29051	Storage	TB4	Shallow Water Barge	30' American Eagle	0	100	0	Portland Base Trailer#321-40
29058	Storage	TB4	Shallow Water Barge	30' American Eagle	0	100	0	Portland Base Trailer# 320-40
29059	Storage	TB4	Shallow Water Barge	30' American Eagle	0	100	0	Portland Base
29060	Storage	TB4	Shallow Water Barge	30' Kvichak (includes boom from WRRL ID 29136)	0	110	0	Portland Fire & Rescue Station #6 Moorage
29056	Storage	TB4	Shallow Water Barge	30' American Eagle	0	100	0	Weyerhaeuser
30499	Vessel	WB4	18' Skiff	18' Skiff w/ 25hp	0	0	0	Portland Base (Trailer 348-40)
30500	Vessel	WB4	18' Skiff	18' Skiff w/ 25hp	0	0	0	Portland Base (Trailer 349-40)
31080	Vessel	WB4	20' Workboat	20' Alumaweld III w/90hp	0	0	0	Portland Base Trailer# 352-40
29039	Vessel	WB4	20' Workboat	20' Alumaweld I w/115 hp	0	0	0	Portland Base Trailer (331-40)
29157	Vessel	WB4	20' Workboat	20' Alumaweld II w/90 hp	0	0	0	Porland Base Trailer (342-40)

wrrlID	Resource	KindType	Indentification	Specificatons	EDRC	Liquid Storage	Boom	Staging
29038	Vessel	WB4	21' Workboat	21' Boston Whaler w/150 hp	0	0	0	Portland Base Traliler (341-40)
29040	Vessel	WB4	Elizabeth Furse	27' Allday	0	0	0	Portland Base Trailer (329-40)
29029	Vessel	WB3	FRV Columbia Responder	32' Kvichak (includes boom from WRRL ID 29154)	0	0	0	West Mooring Basin, Port of Astoria
29030	Vessel	WB3	FRV Independence	32' Browns (includes boom from WRRL ID 29132)	0	0	0	Jack Fowler's Marina
29031	Vessel	WB3	FRV Protector	34' Munson (includes boom from WRRL ID 29141)	0	0	0	Dillards, St. Helens Marina
29046	Wildlife	WR0	Widlife Rehabilitation Shelter	19' x 35' Western Shelters Gatekeeper 1935	0	0	0	Portland Base (Wildlife Rehabilitation Trailer 300-38)
29170	Wildlife	WR0	Wildlife Rehabilitation Trailer	48' Specialty Trailer - Wildlife Rehabilitation (includes WRRL ID ?)	0	0	0	Portland Base
29163	Wildlife	WR0	Wildlife Transport Trailer	32' Climate Control Cargo Trailer	0	0	0	Portland Base

Excel spreadsheets and matrices of personnel training and qualifications for MFSA, CRC, NRCES, and Witt | O'Brien's follow this page.

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Figure D.1 SPILL MANAGEMENT TEAM "PRIMARY & ALTERNATE" ROSTER

The following table displays primary and alternate personnel to serve in MFSA's SMT. Details of training and experience can be found on additional Excel spreadsheets for MFSA, CRC, NRCES, and ORM personnel in this Appendix.

Incident Commander	
Training Required: 24-Hour HAZWOPER, ICS-400, NWACP, MFSA Plan, GRPs, Oil Spill Response Basics, River and Equipment Familiarization	
Jerry Holmes, MFSA	Jack Kyle, MFSA
George Birch, MFSA	Bob Hyke, MFSA
Richard Arrasmith, MFSA	*Fred Myer, MFSA*
Fred Harding, MFSA	*Alternate – Witt O'Brien's*
Information Officer ("IO")	
Training Required: ICS-300, NWACP, MFSA Plan, GRPs, Oil Spill Response Basics, Media Training	
Note: This position, as per the NWACP, is to be filled by a State or Federal representative; however, MFSA maintains individuals to participate in the Joint Information Center and in the IO role if an agency representative is not available, qualified or willing.	
Primary	*Alternate*
Joan McCoy, O'Brien's	Suzanne Lagoni, O'Brien's
Safety Officer	
Training Required: ICS-300, NWACP, MFSA Plan, GRP's, Oil Spill Response Basics, Health & Safety Training	
Primary	*Alternate*
Ken Koppler, NRCES	Jerry Popovice, O'Brien's
Liaison Officer ("LO")	
Training Required: ICS-300, NWACP, MFSA Plan, GRP's, Oil Spill Response Basics	
Note: This position, as per the NWACP, is to be filled by a State or Federal agency representative: however, MFSA maintains individuals to participate in the LO role if an agency representative is not available, qualified or willing.	
Primary	*Alternate*
Suzanne Lagoni, O'Brien's	Joan McCoy, O'Brien's

Operations Section Chief	
Training Required: 24-Hour HAZWOPER, ICS-300, NWACP, MFSA Plan, GRP's, Oil Spill Response Basics, River and Equipment Familiarization	
Primary	*Alternate*
Ernie Quesada, CRC	Mac McCarthy, O'Brien's
Planning Section Chief	
Training Required: ICS-300, NWACP, MFSA Plan, GRP's, Oil Spill Response Basics	
Primary	*Alternate*
Cheryl Surface, O'Brien's	Jim Morris, O'Brien's
Logistics Section Chief	
Training Required: ICS-300, NWACP, MFSA Plan, GRP's, Oil Spill Response Basics	
Primary	*Alternate*
Dan Sobieski, O'Brien's	Cheryl Surface, O'Brien's
Finance Section Chief	
Training Required: ICS-300, NWACP, MFSA Plan, GRP's, Oil Spill Response Basics	
Primary	*Alternate*
Chann Noun, MFSA	Rory Dabney, O'Brien's

This list is not meant to be exhaustive or limit the use of other available qualified response personnel identified in this Appendix. The SMT is activated as the incident requires, through the IC.

MFSA Spill Management Team

7/14/2014

Name	Position/Discipline	Role(s)					Health & Safety Training			Office Location	Yrs. Exp.	ICS Level	ICS Role
		Response Manager	Safety Officer	Waste Specialist	Boaters	CDL Driver	OSHA 24 hr (min.)	8 Hr. Supervisor	Current 8 Hr. Refresher				
Holly Robinson	Program Manager								**3/6/2014**	Portland	17	300	RES, LOGS, DOC, SIT
Robin Wright	Admin, Communications									Portland	8	200	RES, LOGS, DOC, SIT
Alyson Evans	Administration						**x**		**3/6/2014**	Portland	1	200	RES, LOGS, DOC, SIT
Chann Noun	Accounting									Portland	7	200	FINANCE
Michael Moreno	Accounting									Portland	3	200	FINANCE
John Cordasco	Communications									Portland	26	200	LOGS, SIT, DOC
Jim Harrison	Communications									Portland	4	200	LOGS, DOC
Rindy Primeau	Communications									Portland	5	200	DOC
Esmerelda Rupp-Spangle	Communications									Portland	5	200	DOC
Samantha Steerman	Communications									Portland	1	200	DOC
Becky Hassler	Communications									Portland	15	200	DOC
Bekah Canfield	Administration						**x**		**6/23/2014**	Portland	0.5	200	RES, DOCS, SIT
Richard Arrasmith	Incident Commander								**10/31/2013**	Portland	42	400	IC, ALL
Jack Kyle	Incident Commander		**x**	**x**			**x**	**x**	**2/13/2014**	Salem	33	400	IC, ALL
George Birch	Incident Commander				**x**		**x**	**x**	**8/15/2013**	Vancouver	15	400	IC, ALL
Jerry Holmes	Incident Commander						**x**	**x**	**6/20/2014**	Portland	38	400	IC, ALL
Fred Myer	Incident Commander						**x**		**2/13/2014**	Portland	30	400	IC, ALL
Ernie Quesada	Response Manager	**x**			**x**	**x**	**x**	**x**	**3/6/2014**	Portland	23	400	OPS
Carl Boelter	Response Manager	**x**	**x**		**x**	**x**	**x**	**x**	**3/6/2014**	Portland	15	400	OPS, SO
Jim Layton	Response, Operations				**x**	**x**	**x**		**3/6/2014**	Portland	28	200	OPS, LOG

Training records for personnel are available for review at the offices of MFSA.
200 SW Market Street, Suite 190, Portland, Oregon 97201

"This information constitutes a trade secret under ORS 192.501(2) or confidential proprietary information, and is not to be disclosed except in accordance with the Oregon Public Records Law, ORS Chapter 192."

Last Name	First Name	Position	Driver License Type	Hours of Hazwoper Training Achieved	Hazwoper Supervisor Training Completed	ICS Level
PORTLAND						
Almanza	**Jorge**	Driver	A	40		
Amen	**Mike**	Health & Safety Dir	C	80		300
Claeys	**Chris**	Driver	A			
Dawson	**Dale**	Technician I	A	24		
Gilbertsen	**Rex**	Mechanic	A	40		
Gilfillan	**Aaron**	Project Supervisor I	A	80	Yes	
Groesback	**Dean**	Transportation Supv.	A	40	Yes	300
Hyke	**Robert**	Marine Project Supv.	C	40	Yes	400
Jackman	**Mark**	Marine Technician	B	40		
Janak	**Bob**	Bus. Dev. Manager	C	40	Yes	400
Jensen	**Ray**	Marine Operator	A	24		
Kiggins	**John**	Technician		80		
Miltenberger	**Jason**	Project Supervisor	A	80	Yes	
Miltenberger	**Jeff**	Operations Manager	A-X	80	Yes	200
Quaife	**Harvey**	Technician II	C	40		
Ransdell	**Robert**	Project Supervisor II	B	40	Yes	300
Robinson	**Helen**	Tech II		80		100
PORTLAND - STANDBY						
Bany	**Troy**	Marine Operator				
Bishop	**Ryan**	Technician I		40		
Bock	**Gene**	Captain - Responder	A	40		
Bridges	**Eva**	Deckhand	C	40		
Britt	**Ronald**	Marine Operator	A	24		
Bruner	**Bryan**	Driver	A	40		
Buckendahl	**Tim**	Deckhand	A	40		
Budnick	**Martin**	Marine Operator				
Clark	**Todd**	Marine Operator				
Clingman	**Daniel**	Marine Operator		24		
Cox	**Ron**	Deckhand	C	24		
Cox	**Lisa**	Deckhand		24		
Crookshanks	**Darren**	Deckhand	C	24		
Cunningham	**Mike**	Technician III				
Dyer	**Donell**	Marine Operator-Lic				
Fleming Jr.	**Doug**	Deckhand		24		
Ford	**Jeremiah**	Deckhand		40		
Forsberg	**Vern**	Marine Operator	C	40		200
Galloway	**Tom**	Deckhand	C	24		
Gaunt	**Scott**	Deckhand	C	40		300
Glad	**David**	Marine Operator-Lic				
Grocott	**John**	Marine Operator-Lic		24		
Groesbeck	**Ryan**	Marine Operator		40		

Last Name	First Name	Position	Driver License Type	Hours of Hazwoper Training Achieved	Hazwoper Supervisor Training Completed	ICS Level
Harding	**Griffin**	Marine Operator-Lic	C	40		
Harding	**Tyler**	Marine Operator		24		
Harmston	**Brian**	Deckhand				
Hartley	**Mike**	Marine Operator	A	24		
Hartley	**Tom**	Marine Operator		40		
Holmes	**Derek**	Deckhand				
Holzgraf	**Jamie**	Marine Operator-Lic		24		
Jacko	**Mark**	Driver	A			
Johnson	**Greg**	Deckhand	C	24		
Jolma	**Bruce**	Deckhand	A	40		400
Jolma	**Roger**	Deckhand	C	40		
Kallunki	**John**	Deckhand	C	40		
King	**Tim**	Vessel Operator		24		
Lindblom	**Kelly**	Deckhand		40		
Little	**Zachary**	Marine Operator		40		
Long	**Stephen**	Marine Operator-Lic				
Marsch	**Tad**	Marine Operator-Lic				
Miltenberger	**Zachary**	Deckhand		80		
Mustola	**Greg**	Deckhand	C	24		
Mustola	**Ryan**	Deckhand		40		
Nielson	**James**	Deckhand	C	40		
Pierson	**Steve**	Marine Operator		24		
Olson	**Gary**	Deckhand		24		
Potts	**Collin**	Deckhand	B	80		
Radonski	**Dan**	Deckhand	C	24		
Simonis	**Paul**	Marine Operator-Lic		40		
Stayton	**Perry**	Equipment Operator	B	90		
Stone	**Jeff**	Deckhand		40		
Tarabochia	**John**	Deckhand	C	24		
Wall	**Randy**	Deckhand	C	24		
Wall	**Brenda**	Deckhand	C	24		

Last Name	First Name	Position	Driver License Type	Hours of Hazwoper Training Achieved	Hazwoper Supervisor Training Completed	ICS Level
SEATTLE - FULL TIME LAND						
Alexander	**Brian**	Project Manager	B-N	80	Yes	300
Allen	**Eric**	Technician I		40		
Artley	**James**	Driver/Tech II	A-TX	80		200
Baza	**Lance**	Project Suervisor	B	80	Yes	
Blair	**Jason**	ER Manager	C	80	Yes	800
Broadway	**Ron**	ER Supervisor	A-3X	80	Yes	300
Briere	**Jacob**	Equipment Operator	A-N	40		200
Decker	**Jim**	Project Supervisor	A	48	Yes	200
Dickerson	**Eric**	Tech I		40		
Doherty	**Neil**	Project Manager		40		
Elgin	**Dan**	Driver	A	24		
Firestone	**Brent**	Project Supervisor		80		
Forney	**Justin**	Technician III	B-N	80		200
Forslund	**Travis**	Project Supervisor		40		
Fryberg	**Jason**	Driver I	B-X	80		
Goller	**Bret**	Field Chemist		40		300
Guerrero	**Richard**	Tech II		80		200
Heatherly	**Jake**	Dispatcher		80		200
Holmes	**Greg**	Project Supervisor		48	Yes	
Hunt	**Travis**	Technician I		40		
Kelly	**Sean**	Tech I		40		
Koppler	**Ken**	Health & Safety Mgr.	C	80	Yes	300
Leiataua	**Al**	Driver	A	40		
Martens	**Mark**	Hazmat Driver II	A-3P1TN	40		
Muck	**Dale**	Driver	A-X	40		
Myers	**Rick**	Driver	A	40		200
Palermo	**Frank**	Tech III	A-HN	80		300
Patte	**Shellea**	Technician I		40		
Potts	**Autumn**	Technician I		80		
Potts	**Jason**	ER Services Manager		80	Yes	800
Ranahan	**Mark**	Driver	A-TN	40		200
Shcherbina	**Aleksey**	Warehouse Technician	A-P1TX	40		200
St. John	**Scott**	Operations Manager		40	Yes	200
Vasquez	**Jesus**	Technician II		80		200
Wilkinson	**Adam**	ER Supervisor		80	Yes	200
Ziller	**Bill**	Driver	A-N	40		200
Zuluaga	**James**	Technician II		40		
SEATTLE - FULL TIME MARINE						
Baldwin	**Nathan**	Deckhand		40		200
Bass	**Steve**	Marine Operator	B-N	24		300
Blattner	**George**	Deckhand		24		
Campbell	**Leslie**	Resource & Logistics Supv		40	Yes	300

Last Name	First Name	Position	Driver License Type	Hours of Hazwoper Training Achieved	Hazwoper Supervisor Training Completed	ICS Level
Clendenen	**Paul**	Licensed Marine Operator		40		200
Crosby	**Becky**	Project Supervisor II		80	Yes	300
Davis	**Thom**	Sr. Project Manager		40		400
DePoe	**Ronald**	Vessel Engineer	B M/C3	40		200
Dimock	**Sean**	Deckhand		24		
Dodson	**Bart**	Project Manager	M/C3	80	Yes	300
Ferrario	**Jay**	Marine Operator		24		200
Foss	**C.**	Marine Operator		24		
Gallo	**Tiffany**	Project Manager		40	Yes	300
Gatchet	**Jonas**	Deckhand		24		200
Gibson	**Mark**	Tech III	C	80		
Goode	**Nathan**	Deckhand		24		
Grandt	**Torey**	Project Supervisor		40	Yes	300
Hadley	**Terry**	Asst. Vessel Manager		24		200
Hallgren	**Tom**	Project Supervisor II	B	80	Yes	300
Haws	**Paul**	Licensed Marine Operator		24		
Hemstad	**Christopher**	Asst. Vessel Manager		24		
Klaja	**Zachary**	Deckhand	B-M/C3 P1	40		200
Knutson	**Doug**	Vessel Manager		24		
Konrad	**Matthew**	Deckhand		40		
Lynch	**Bryan**	Deckhand		40		200
Macham	**Allen**	Deckhand		40		
Manly	**Dan**	Mechanic		40		300
Manly	**David**	Fleet Maint. Supervisor	B M/C7 N	40	Yes	200
Mardesich	**Matthew**	Marine Operator		24		200
Martin	**Sky**	Deckhand		40		300
McKellar	**Jamison**	Marine Operator		24		200
Morgan	**Russell**	Project Manager		40		
Munson	**Gregory**	Marine Operator		24		
Norman	**Janell**	Marine Project Supv		40	Yes	300
Owen	**John**	Vessel Manager-Quest		24		
Peth	**Jay**	Marine Operator		24		200
Petrich	**Jonathan**	Supv/Marine Operator		40		200
Pollock	**Charles**	Dispatcher		40		100
Ramsdell	**Larry**	Marine Operator		24		
Raymond	**Dale**	Vessel Manager	C	40		
Rose	**Doug**	Deckhand		24		
Sanford	**David**	Marine Ops Manager		24		
Scouller	**John**	Marine Operator-Licensed		24		
Smith	**Richard**	Deckhand		24		
Sollid	**Bjorn**	Marine Operator		40		
Sparrow	**Jacob**	Marine Operator		40	Yes	200
Sparrow	**Kyle**	Marine Ops Supv I		80	Yes	300
Stovall	**Gabriel**	Deckhand		24		

Last Name	First Name	Position	Driver License Type	Hours of Hazwoper Training Achieved	Hazwoper Supervisor Training Completed	ICS Level
Straws	**Thomas**	Resources Supervisor		40		300
Swain	**John**	Technician III	C	80		200
Townsdin	**John**	Deckhand		40		
Walker	**William**	Safety Engineer		40	Yes	
Weed	**Kathy**	Regulatory Affairs Supv		40		300

SEATTLE - STANDBY

Atchley	**Justin**	OPL - Deckhand		24		
Beck	**Keith**	Licensed Marine Operator				
Bilof	**Randy**	Licensed Marine Operator		24		
Boyd	**Angela**	OPL - Deckhand				
Boyd	**Season**	OPL - Deckhand				
Breckenridge	**Austin**	Deckhand		24		
Breckenridge	**Heidi**	Deckhand		24		
Breckenridge	**Tony**	Marine Operator				
Bukovnik	**Bryan**	Marine Operator		24		
Bukovnik	**Shaun**	Deckhand		40		
Burrows	**Al**	Deckhand		24		
Coulter	**Steven**	Licensed Marine Operator		24		
Davis	**Deborah**	Field Runner		24		
Deane	**Richard**	Marine Operator		24		
Dennis	**Eric**	Licensed Marine Operator	B X	40		
DePoe	**Patrick**	Licensed Marine Operator		40		
DeVault	**Gregory**	Licensed Marine Operator		24		
Dodson	**Allison**	OPL - Deckhand		24		
Edgbert	**Jay**	OPL - Deckhand		24		
Elwell	**Doug**	Licensed Marine Operator		40		
Espinoza	**Zacarias**	Deckhand		24		
Esposito	**Jason**	Deckhand		24		
Franey	**Zachary**	Deckhand				
Fyler	**David**	Deckhand		24		
Gunn	**Helen**	Deckhand		24		
Haines	**Joseph**	Licensed Marine Operator		24		
Hardy	**Mike**	Marine Operator		24		
Hardy	**Richard**	Licensed Marine Operator	A	40		
Harmeling	**Robert**	Licensed Marine Operator		24		
Harrison	**Chester**	Marine Operator		24		
Harsila	**David**	Marine Operator		24		
Hart	**Brian**	Marine Operator	A-T	40		
Hartford	**Erin**	Marine Operator				
Hatton	**Kevin**	Marine Operator		40		
Hayes	**Joe**	Licensed Marine Operator		24		
Heckathorn	**Jim**	Licensed Marine Operator		24		
Hill	**Christopher**	Deckhand		24		
Holmes	**Timothy**	Licensed Marine Operator		40		

Last Name	First Name	Position	Driver License Type	Hours of Hazwoper Training Achieved	Hazwoper Supervisor Training Completed	ICS Level
Horchover	**Bob**	Licensed Marine Operator		24		
Howe	**James**	Marine Operator		24		
Karlsen	**Jostein**	Licensed Marine Operator		24		
Kelley	**John**	Licensed Marine Operator				
Knutson	**Jerad**	Deckhand				
Knutson	**Nathan**	Deckhand		24		
Konrad	**Adam**	Deckhand		24		
Lablond	**Luke**	Deckhand		24		
LaChapelle	**Michael**	Licensed Marine Operator		40		
Leavitt	**Heather**	Field Clerk		40		
Lenssen	**Jerry**	OPL - Deckhand		24		
Lewis	**Jim**	Vessel Mechanic				
Lewis	**John**	Marine Operator		80		
Liberio	**Dominick**	Deckhand		24		
Linder	**David**	Marine Operator		24		
Lindsay	**Dennis**	Marine Operator		40		
Lockhart	**Chuck**	Deckhand		24		
Loria	**James**	Licensed Marine Operator				
Lowry	**Dale**	Deckhand				
Macham	**Mike**	Marine Operator		24		
Macham	**Sander**	Marine Operator		80		
Martin	**Tynan**	Deckhand		40		
McGrath	**Travis**	Licensed Marine Operator				
McKeller	**Kent**	Licensed Marine Operator		24		
Medenwald	**Richard**	Licensed Marine Operator		24		
Monaghan	**George**	Marine Operator		24		
Mullan	**Kris**	Marine Operator		24		
Mullan	**Scott**	Licensed Marine Operator		24		
Nelson	**Robert**	Marine Operator		24		
O'Connor	**Michael**	Deckhand		24		
Ogden	**Fred**	Marine Operator		24		
Ortiz	**Dioscoro**	Marine Operator		24		
Overa	**Ken**	Licensed Marine Operator		24		
Parker	**Rick**	Licensed Marine Operator		24		
Petrich	**Alia**	OPL		24		
Polizzi	**Frank**	Marine Operator		24		
Prater	**Dan**	Deckhand		40		
Ramsdell	**Ross**	Deckhand		24		
Reed	**Tim**	Deckhand		24		
Reeves	**Dan**	Licensed Marine Operator		40		
Remington	**Gene**	Marine Operator		24		
Sanford	**Dustin**	Deckhand		24		
Saul	**Bryan**	Licensed Marine Operator		24		
Scouller	**Amber**	Licensed Marine Operator				

Last Name	First Name	Position	Driver License Type	Hours of Hazwoper Training Achieved	Hazwoper Supervisor Training Completed	ICS Level
Shapansky	**Joe**	Deckhand		24		
Simmons	**Donald**	Marine Operator		40		
Skeffington	**Paul**	Licensed Marine Operator		24		
Smith	**Colin**	Deckhand				
Solberg	**Reidar**	Marine Operator		24		
Street	**David**	Marine Operator		24		
Strom	**Luke**	Marine Operator		24		
Tackett	**Lon**	Marine Operator		40		
Taylor	**Wayne**			40		
Thomson	**Mike**	Licensed Marine Operator				
Tovrea	**Phil**	Marine Operator		24		
Valdez	**Art**	Marine Operator		40		
Waldrup	**Duane**	Marine Diesel Mechanic		40		
Waters	**Douglas**			24		
Weinberg	**Stanley**	Licensed Marine Operator		24		
Wells	**Charlene**	OPL		24		
Wilcoxen	**Darren**	Vessel Manager	A	24		200

Witt | O'Brien's
Staffing for MFSA Contingency Plan

All are contactable 24/7 via the
O'Brien's Command Center at (985) 781-0804

Name	Position
Jim Morris	Incident Commander, Planning Section Chief, Environmental Unit, Liaison, Logistics
Brendan Geraghty	Incident Commander, Planning Section Chief, Operations, Logistics
Cheryl Surface	Incident Commander, Planning Section Chief, Environmental Unit, Liaison, Logistics, Operations
Dan Sobieski	Incident Commander, Planning Section Chief, Environmental Unit, Liaison, Logistics
Ed Stanton	Incident Commander, Operations, Planning
Jack Kyle	Incident Commander, Operations, Planning, Safety
Ray Perry	Incident Commander, Operations, Planning, Safety
Jerry Popovice	Incident Commander, Operations, Planning, Safety
Pam Chelgren-Koterba	Incident Commander, Planning, Logistics, Resource Unit, Environmental Unit, Situation Unit
Bill Hutmacher	Incident Commander, Operations, Planning
Preston Sleeger	Incident Commander, Planning, Environmental Unit
Bill Weber	Operations, Planning, Situation Unit
Lou Herrick	Incident Commander, Planning, Logistics, Resource Unit, Environmental Unit, Situation Unit
Rory Dabney	Documentation, Finance, Logistics
Barry Troutman	Planning, Environmental Unit
Susan Forsythe	Planning, Situation Unit, Logistics, Finance
Mark McEntire	Staging Area Manager, Logistics, Finance
Suzanne Lagoni	Public Information Officer, Liaison Officer
Joan McCoy	Public Information Officer, Liaison Officer
Jan Fisher	Public Information Officer, Liaison Officer

WITT | O'BRIEN'S

Communications plans will be developed using ICS 205-OS. The following ICS 205-OS contain both radio and telephone contacts. Additional contact information will be added as individuals report to the command post during an incident.

Figure E.1 COMMUNICATIONS PLAN (ICS 205-OS FORM)

1. Incident Name	2. Operational Period (Date / Time) From: To:	INCIDENT RADIO COMMUNICATIONS PLAN ICS 205-OS

3. BASIC RADIO CHANNEL USE

SYSTEM / CACHE	CHANNEL	FUNCTION	FREQUENCY	ASSIGNMENT	REMAKRS
CRC/MFSA	Spill Command	Command Use	RX 150.98000 TX158.445000 Tone TX 100.0	For use by Command and General Staff & CRC/MFSA management.	Functional from Portland to Astoria. A portable repeater is assigned to this channel.
CRC/MFSA	Spill Tact 1	Tactical	RX159.48000 TX154.85000 Tone RX 100.0	Supervisors and field personnel.	Functional in the area of the Portland/Vancouver harbor. A portable repeater is assigned to this channel.
CRC/MFSA	Spill Tact 2	Tactical	RX159.48000 TX154.85000 Tone RX 100.0 TX 127.3	Supervisors and field personnel.	Functional through Columbia River Miles 70-120. A portable repeater is assigned to this channel.
CRC/MFSA	Spill Tact 3	Tactical	RX159.48000 TX154.85000 Tone RX 100.0 TX141.3	Supervisors and field personnel.	Functional through Columbia River Miles 30-70.
CRC/MFSA	Spill Tact 4	Tactical	RX159.48000 TX154.85000 Tone RX 100.0 TX151.4	Supervisors and field personnel.	Functional through Columbia River Miles 0-30.
CRC/MFSA	Clean Rivers	Working Channel, Private	158.4450	CRC management and field use.	Line of sight use.
USCG	VHF 80	Working Channel, Public	157.0250	As needed.	Line of sight use.
USCG	VHF 81A	Working Channel, Public	RX 161.675000 TX157.075000	As needed.	Fixed repeater is assigned to this channel for public use.
USCG	VHF 16	Hailing & Emergency Channel, Public	156.8000	For hailing and emergency use only.	

4. Prepared by: (Communications Unit)

MFSA/CRC **Date / Time:** 6/17/2011

1. Incident Name	2. Operational Period (Date / Time) From: To:	INCIDENT PHONE COMMUNICATIONS PLAN ICS 205-OS

3. TELEPHONE NUMBERS OF RESPONSE ORGANIZATION

SYSTEM / CACHE	CHANNEL	FUNCTION	FREQUENCY	ASSIGNMENT	REMAKRS
MFSA		Command	503-220-2055	Command Staff	Initial Contact Number
USCG – Sector Columbia River		Command	503 861-6211	Command Staff	Initial Contact Number can also be used for emergency events within the response.
USCG - NRC		Notification	202-267-2675 800-424-8802	Command Staff	Initial Contact Number
OR DEQ/OERS		Command	503-378-6377 800-452-0311	Command Staff	Initial Contact Number
WA ECY/WEMD		Command	253-912-4904 800-258-5990	Command Staff	Initial Contact Number

4. Prepared by: (Communications Unit)

MFSA/CRC **Date / Time:** 6/17/2011

As noted in Chapter 3, Section 3.10, all responses to oiled wildlife shall be in accordance with the NWACP and Chapter 9310 of the NWACP Northwest Wildlife Response Plan is included here in full.

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Section 9310

Northwest Wildlife Response Plan

Table of Contents

Section **Page**

9310 Northwest Wildlife Response Plan 9310-1

9310 Acronyms and Abbreviations 9310-1
9311 Introduction and Background 9310-2
9312 Federal and State Law Mandates 9310-3
9312.1 Migratory Bird Treaty Act 9310-4
9312.2 Endangered Species Act 9310-4
9312.3 Marine Mammal Protection Act 9310-5
9313 Natural Resource Trustees for Wildlife 9310-6
9314 Agreements Regarding Wildlife Response Activities 9310-8
9315 Response Planning 9310-8
9316 Response Personnel 9310-9
9317 Activation of the Wildlife Branch 9310-9
9318 Designation of Wildlife Branch Director and Deputy 9310-10
9319 Wildlife Branch Organizational Structure 9310-10
9320 Wildlife Branch Operations 9310-11
9320.1 Duties and Responsibilities 9310-11
9320.2 Response Actions 9310-12
9320.2.1 Oiled Bird Response 9310-14
9320.2.2 Oiled Sea Otter Response 9310-17
9320.2.3 Oiled Pinniped Response 9310-22
9320.2.4 Killer Whale Response 9310-23
9321 Wildlife Branch Positions and Responsibilities 9310-24
9321.1 Wildlife Branch Director 9310-25
9321.2 Deputy Wildlife Branch Director 9310-26
9321.3 Wildlife Liaison 9310-27
9321.4 Wildlife Branch Planning Support Staff 9310-27
9321.4.1 Oiled Wildlife Reporting Coordinator 9310-27
9321.4.2 Spill Management Software Specialist 9310-28
9321.4.3 Documentation Specialist 9310-28
9321.5 Wildlife Veterinarians 9310-28
9321.6 Wildlife Reconnaissance Group 9310-28
9321.6.1 Aerial Survey Unit 9310-29
9321.6.2 Boat Survey Unit 9310-29
9321.6.3 Shoreline Survey Unit 9310-29
9321.7 Bird Recovery and Rehabilitation Group 9310-30
9321.7.1 Bird Recovery, Field Stabilization, and Transport Unit 9310-30
9321.7.2 Bird Rehabilitation Unit 9310-31
9321.7.3 Bird Deterrence Unit 9310-32

Table of Contents (cont.)

Section **Page**

9321.8 Mammal Recovery and Rehabilitation Group 9310-33
9321.8.1 Mammal Recovery, Field Stabilization, and Transport Unit 9310-34
9321.8.2 Mammal Rehabilitation Unit 9310-34
9321.8.3 Mammal Deterrence Unit 9310-35
9321.9 Volunteers 9310-35
9322 Demobilization of Wildlife Operations 9310-36

9310

Northwest Wildlife Response Plan

9310 Acronyms and Abbreviations

ACP	Area Contingency Plan
ART	Applied Response Technology
ATV	All Terrain Vehicle
DEQ	Oregon Department of Environmental Quality
DPR	Department of Parks and Recreation
DOE	Washington Department of Ecology
DOI	U.S. Department of the Interior
EPA	U. S. Environmental Protection Agency
ESI	Environmental Sensitivity Index
EU	Environmental Unit
FOSC	Federal On-Scene Coordinator
GIS	Geographic Information System
GPS	Global Positioning System
IAP	Incident Action Plan
ICS	Incident Command System
IDFG	Idaho Department of Fish and Game
MMSN	Marine Mammal Stranding Network
NCP	National Contingency Plan
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA HMRD	NOAA National Ocean Service Hazardous Materials Response and Assessment Division
NPS	National Park Service
NRDA	Natural Resource Damage Assessment
ODFW	Oregon Department of Fish and Wildlife
OPA 90	Oil Pollution Act of 1990
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
PRP	Potential Responsible Party
RP	Responsible Party
SCAT	Shoreline Cleanup Assessment Team
SLC	State Lands Commission
SOSC	State On-Scene Coordinator
UC	Unified Command
USCG	U. S. Coast Guard
USFWS	U. S. Fish and Wildlife Service
WBD	Wildlife Branch Director
WDFW	Washington Department of Fish and Wildlife

9311 Introduction and Background

The purpose of this Wildlife Response Plan is to outline the responsibilities of the Wildlife Branch within a Unified Command structure during an oil spill, describe the procedures to be used, and identify the personnel and equipment necessary to meet wildlife protection responsibilities of the responsible party and the Federal and State governments during a spill. The mission of the Wildlife Branch is to minimize the adverse impacts of oil spills and oil spill response on wildlife.

The Northwest Area Wildlife Response Plan (Plan) contains:

- statutory, policy, and procedural bases for Wildlife Branch operations;
- activation criteria and factors to consider when developing response actions; and
- organizational infrastructure for wildlife response operations.

When oil spills occur, the Incident Command System (ICS) is used as the organizational structure to coordinate the response actions. The ICS organizational structure typically includes the Unified Command and the Operations, Planning, Logistics, and Finance Sections. The actual response organization will grow to fit the level of response necessary for a specific incident. Response actions concerning the protection, identification, rescue, processing, and rehabilitation of oiled or threatened wildlife are performed by the Wildlife Branch within the Operations Section.

It is the policy of the Northwest Area Committee (NWAC) that representatives of the U.S. Fish and Wildlife Service (USFWS) will assume the positions of Director and Deputy Director of the Wildlife Branch. State Fish and Wildlife representatives will assume these positions if a USFWS representative is not available, or if designated by a USFWS representative. Appointment of other parties, including Responsible Parties representatives, to one or both of these positions may be made by a USFWS representative or their designee at any time during an incident, and for such periods of time as may be deemed appropriate. Unless otherwise indicated by USFWS, the Wildlife Branch Director position will be delegated to the Washington Department of Fish and Wildlife for spills that occur within the legal boundaries of Washington State. The remaining staff within the Wildlife Branch is made up of state and federal agencies, Tribal representatives, employees from the responsible party, professional wildlife response organizations, aquaria, community groups, specialized wildlife interest groups, contractors, and the public.

Within the Wildlife Branch there are three Groups who report to the Wildlife Branch Director: the Wildlife Reconnaissance Group, the Bird Recovery & Rehabilitation Group, and the Mammal Recovery & Rehabilitation Group. The roles, responsibilities, and duties of these Groups and individuals within these Groups are described in detail in the Wildlife Branch Positions and Responsibilities section of this document.

Communication between the Wildlife Branch, the Environmental Unit, the Situation Unit, and the Joint Information Center is critical. Wildlife Branch field staff perform reconnaissance by land, boat, and air. Environmental Unit staff gathers information regarding wildlife impacts through aerial over-flights, field observers, and through on-the-ground Shoreline Cleanup Assessment Teams. The Wildlife Branch and the Environmental Unit share this information so that it can be used by the Planning and Operations Sections to aid in strategic assessment and planning of response strategies. The Wildlife Branch Director is responsible for keeping the Unified Command informed, through the Operations Section Chief and the Situation and Environmental Units in the Planning Section, regarding the status of affected wildlife during the response. The Wildlife Branch maintains a Wildlife Liaison position to ensure effective communication and coordination amongst these different groups.

While the organizational structure, roles, and responsibilities remain the same regardless of the location and type of material spilled (i.e., oil or hazardous material, marine or inland environments), some functions may be altered as appropriate. The Plan applies to the entire Northwest Area covering Washington, Oregon, and Idaho and was developed jointly by a working group of government agencies and interested parties. The Wildlife Workgroup/Task Force included members from: Washington Department of Ecology, Washington Department of Fish & Wildlife, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Oiled Wildlife Care Network – UC Davis, U.S. Coast Guard, BP, Tesoro, Islands' Oil Spill Association, National Response Corporation Environmental Services, Focus Wildlife, International Bird Rescue, the Progressive Animal Welfare Society Wildlife Center (PAWS), Salish Sea Hydrophone, Marine Mammal Stranding Network, United States Department of Agriculture Wildlife Services, and private practice veterinarians. The Plan has been developed to meet portions of the Northwest Area Contingency Plan's (NWACP) Fish and Wildlife and Sensitive Environments Plan requirements set forth in the National Contingency Plan (NCP), 40 CFR 300.210(c)(4).

9312 Federal and State Law Mandates

The Federal Oil Pollution Act of 1990 (OPA 90), incorporated into the NCP, requires that a Fish and Wildlife and Sensitive Environment Plan be developed in consultation with the USFWS, the National Oceanic and Atmospheric Administration (NOAA), and other interested parties, including state fish and wildlife agencies (33 U.S.C. § 1321(d)(2)(M)). The plan must include "immediate and effective protection, rescue, rehabilitation of, and the minimization of risk of damage to fish and wildlife resources and habitat that are harmed or that may be jeopardized by a discharge." Additionally, 40 CFR 300, Section 300.210(c)(4) sets forth the requirements for this plan as an annex to Area Contingency Plans. This Wildlife Response Plan has been written in conjunction with other sections of the NWACP to address the federal requirements. Certain other federal and state

laws also apply to oil spill response. Of particular concern is compliance with the Migratory Bird Treaty Act, the Marine Mammal Protection Act, the Endangered Species Act, and state wildlife rehabilitation rules.

9312.1 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703-711) protects most bird species in the United States and requires specific authorization (or exemptions) to conduct activities that may result in a "take" of migratory birds. "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Most response actions that would result in a take are permitted by issuance of a Migratory Bird Rehabilitation Permit (50 CFR 21.31). A rehabilitation permit authorizes recovery, temporary possession, transport, and rehabilitation of oiled migratory birds. The permit provisions also allow authorized individuals to euthanize migratory birds that are medically determined to have poor prospects of survival.

The Migratory Bird Rehabilitation Permit has two stipulations that are specific to oil spill response. The permit regulations specify that wildlife rehabilitators must be authorized to work on a specific oil spill incident by USFWS and the Federal On-scene Coordinator (FOSC). The purpose of the stipulation is to assure that wildlife rehabilitators utilized during an oil spill incident are qualified and experienced in caring for *oiled* wildlife.

The Migratory Bird Rehabilitation Permit (50 CFR 21.31) also stipulates that specific authorization to remove dead oiled birds must be obtained from the USFWS Division of Law Enforcement for each spill incident. The Wildlife Branch, in consultation with the trustee agencies, will develop protocols and authorizations for removing dead oiled birds for each incident.

The Wildlife Branch Director will obtain the necessary authorizations from USFWS and will consult with trustee agencies on Wildlife Branch activities. Coordination with trustee agencies and Tribes is essential to conducting successful wildlife response operations.

USFWS policy requires spill responders to comply with the care standards outlined in *Best Practices for Migratory Bird Care During Oil Spill Response*, which is incorporated as a requirement of the NWACP. This Wildlife Response Plan adopts the operational guidelines as well as the standard of care requirements of the *Best Practices for Migratory Bird Care During Oil Spill Response* (http://www.fws.gov/contaminants/OtherDocuments/best_practices.pdf).

9312.2 Endangered Species Act

The Endangered Species Act of 1973 (ESA) (16 USC 1531-1543) has strict permit requirements for the handling of threatened and endangered species (listed species). Permitting requirements apply (with a few exceptions) for any species listed as threatened or endangered. A Migratory Bird Rehabilitation Permit (see above) authorizes the recovery, temporary possession, transport, and

rehabilitation of oiled threatened and endangered species of migratory birds with no additional ESA permits required.

In the event of an oil spill or hazardous substance release, the ESA must be considered in the development of Federal response activities and actions during an oil spill response (Section 4314 of Northwest Area Contingency Plan). As the spill response occurs, the FOSC must consult with the natural resource trustees as laid out in Section V.B of the *Inter-agency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act (ESA MOA)*. The Environmental Unit as outlined in the ESA MOA will address ESA Section 7 Consultation requirements. However, the Wildlife Branch will be instrumental in documenting the affects of response actions on listed species. Coordination between the Wildlife Branch and the Environmental Unit is critical to accomplishing this task.

Deterrence actions may be utilized by the Wildlife Branch to keep unoiled wildlife away from oil. No Federal permits are required for non-lethal deterrence of migratory birds (50 CFR 21.41) However, this exemption does not apply to eagles and endangered species. The ESA does not specifically authorize deterrence and preemptive capture of endangered species. The Wildlife Branch, in consultation with the appropriate trustee agencies, may develop response strategies for deterrence and preemptive capture of endangered species for a specific spill incident. "Take" of endangered species resulting from approved response actions will be deemed incidental to the primary action of the spill response and will be covered by the ESA Section 7 Emergency Consultation process, unless otherwise authorized by a permit.

Oil spill-related deterrence actions which involve the southern resident killer whales are subject to the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). There is a contingency under the Marine Mammal Protection Act that gives a waiver for the "take" of marine mammals by Federal or State employees for the health and safety of the animals or for human safety. There is no such exemption under the Endangered Species Act but, a scientific research and enhancement permit (No. 932-1489) held by NOAA's Marine Mammal Health and Stranding Response Program covers oil spill-related actions under the MMPA and ESA in Puget Sound.

9312.3 Marine Mammal Protection Act

Under the Marine Mammal Protection Act (MMPA) (16 USC 1361-1407), federal, state and local government officials, or designees of the relevant Secretaries of the Departments of the Interior and Commerce, may take marine mammals during the course of official response duties if such taking is for the protection or welfare of the mammal, the protection of public health and welfare, or the non-lethal removal of nuisance animals (16 USC 1379 Section 109(h)(1)). Government contractors conducting officially authorized oiled wildlife spill

response related activities and acting under the direct supervision of the Wildlife Branch Director are regarded as spill response employees and may take marine mammals *if* the Wildlife Branch *is activated* and the Wildlife Branch Director is authorized pursuant to Section 109(h) of the Marine Mammal Protection Act and implementing regulations (USFWS, National Marine Fisheries Service, state wildlife agency, or is designated by the National Oceanic and Atmospheric Administration Regional Administrator under 16 USC 1382 Section 112(c)). "Take" is considered appropriate for the purposes of recovery and transport of marine mammals (live or dead) to a designated location, rehabilitation by an authorized facility, return to the wild, or for the collection of evidence. If oiled wildlife spill response field personnel are contract employees of a non-government agency and not otherwise authorized pursuant to Section 109(h) or 112(c) of the Marine Mammal Protection Act, authorization to take oiled marine mammals during spill response activities must be obtained directly from the appropriate Federal trustee (USFWS or NOAA National Marine Fisheries Service). Likewise, if the Wildlife Branch is not activated, authorization to take oiled marine mammals must be obtained directly from the appropriate federal trustee (USFWS or NOAA National Marine Fisheries Service) pursuant to 16 USC 1382 Section 112(c). There are a number of research organizations in the Northwest that are permitted to work with marine mammals. These groups and their resources will be coordinated by the Wildlife Branch where appropriate.

Sea otters in Washington State are not currently protected under the ESA. Sea otters are protected by the Marine Mammal Protection Act. The USFWS is the lead federal trustee agency with responsibility for protection and management of sea otters. USFWS and Washington Department of Fish and Wildlife will work with the Wildlife Branch to develop appropriate response actions for sea otters within the legal framework of the Marine Mammal Protection Act and to authorize individuals to collect, transport and rehabilitate oiled sea otters (16 USC 1379(h) and 1382(c)). Spill responders will comply with the *Washington Sea Otter Response Handbook*, which is incorporated as a requirement of the NWACP. This Wildlife Response Plan adopts the operational guidelines as well as the standard of care requirements of the *Washington Sea Otter Response Handbook* (http://wdfw.wa.gov/publications/pub.php?id=00302).

9313 Natural Resource Trustees for Wildlife

Trustee agencies provide input into the selection of response methods used so that wildlife operations comply with each trustee's governing laws and their obligations to preserve and protect wildlife and habitat. During a spill response, the wildlife trustee agencies will advise the Wildlife Branch Director about local wildlife resources, sensitive species or habitats, logistical considerations, and other issues that arise.

Federal trustee agencies that are most likely to participate in Wildlife Branch decisions and response activities are as follows:

- Department of the Interior

  - Bureau of Indian Affairs
  - Bureau of Land Management
  - National Park Service
  - U.S. Fish and Wildlife Service
- Department of Commerce
  - NOAA, Office of Response and Restoration
  - NOAA, National Marine Fisheries Service
  - NOAA National Marine Sanctuaries
- Department of Agriculture
  - U.S. Forest Service
- Department of Defense (military lands)

The U.S. Coast Guard and the U.S. Environmental Protection Agency are not trustee agencies for natural resources, but are the primary lead federal agencies during a spill response and also participate in Wildlife Branch decisions. In any spill, the potential responsible party or discharger is responsible to federal and state resource trustees, to federally recognized Indian Tribes, and to foreign trustees, all of whom are empowered to assess impacts and seek compensation for injuries to natural resources which have been caused by a discharge of oil. State trustee agencies that are most likely to participate in Wildlife Branch decisions and response activities will vary by state and may include:

Washington

- Washington State Fish and Wildlife
- Washington State Department of Natural Resources (Tidelands)
- Washington State Parks & Recreation

Oregon

- Oregon Department of Environmental Quality
- Oregon Department of Fish and Wildlife

Idaho

- Idaho Department of Fish and Game

Indian Tribes

Indian Tribes retain sovereign authority to manage wildlife resource issues within reservation boundaries. Consultation and coordination is necessary with Tribal governments whose lands may be impacted by an oil spill. Regardless of whether an oil spill occurs directly on Tribal lands or moves onto or through Tribal lands, Tribes have an important role in developing wildlife response actions affecting Tribal resources. Tribes may have additional natural resource interests related to retained rights outside of reservation lands. In such circumstances, the Wildlife Branch will work in coordination with affected Tribes to develop appropriate wildlife response strategies to address wildlife and Tribal concerns, in compliance with Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), DOI Secretarial Order 3206, USFWS Native American Policy, as well as compliance with Section 3420.3 of the Northwest Area Contingency Plan.

9314 Agreements Regarding Wildlife Response Activities

In order to provide an efficient and coordinated response, principal federal and state fish and wildlife trustees may enter into cooperative agreements regarding a variety of issues that arise during spills of oil and toxic substances. These issues include agency response roles, reconnaissance, capture, treatment, rehabilitation, and release of injured wildlife.

Because oil spills can occur across state and national borders, agreements have been established with all western states and British Columbia. The states of Alaska, California, Hawaii, Oregon, Washington and the province of British Columbia entered into a Memorandum of Cooperation in June 2001. This Memorandum was developed by the Pacific States–British Columbia Oil Spill Task Force to ensure effective coordination between the states and British Columbia in the event of a spill. The Pacific States/British Columbia Oil Spill Task Force Mutual Aid Plan (Revised 2009 version) can be implemented to support wildlife operations by requesting equipment and personnel from adjoining states. The Wildlife Branch Director will make recommendations to the Unified Command when additional assistance (mutual aid) is needed.

The Canada-United States Joint Marine Pollution Contingency Plan (CANUSPAC) enables international cooperation during a marine spill response. This agreement includes information needed for spill responders and their equipment to cross the international border. The Canada-United States Joint Inland Pollution Contingency Plan (CANUSWEST) provides for similar coordination in the inland areas (http://www.canuswest.com/files/canuswest.pdf).

9315 Response Planning

The primary purpose of the Wildlife Branch is to provide the best achievable care for impacted wildlife and to minimize wildlife losses, which includes preventing injury to wildlife or habitats from both the oil and from the implementation of response countermeasures. However, undertaking an effective response requires planning and preparation before the need to respond to an actual incident.

State and Federal Trustees are encouraged to work with the oil industry and Northwest Area wildlife rescue and rehabilitation organizations to prepare an adequate response capability for Wildlife Branch operations. Preparation involves assessing potential impacts to wildlife; ensuring adequate equipment, personnel, and wildlife response protocols are available; and practicing the planned response through oil spill exercises. In particular, oiled wildlife rehabilitation requires large amounts of space, water, and personnel, and these resources are not readily available without prior planning. The Wildlife Task Force of the Regional Response Team/Northwest Area Committee will continue to work with State and Federal Trustees to develop a list of trained personnel and existing and needed equipment.

This Plan provides specific response guidance relative to birds, sea otters, and killer whales. Response strategies are currently being drafted to address harbor seal adults and pups. Sea lions, terrestrial mammals, and reptiles may also be affected by oil spills and plans for these animals will be developed after the harbor seal plan has been completed.

9316 Response Personnel

Worker safety must be considered before any wildlife response effort is conducted. Therefore, all Wildlife Branch activities must conform to the Site Safety Plan for the response. All workers must be current in Occupational Safety and Health Administration (OSHA) information and training that relates to safety of working in an environment with uncontrolled oil products. Additional safety requirements may be included in an incident specific Wildlife Branch Safety Plan. All personnel involved in Wildlife Branch operations must have appropriate job-specific safety training for the tasks to be performed as well as utilize appropriate personal protection equipment. Those people involved with animal handling should be trained in techniques that ensure worker safety and present the least amount of stress to wildlife. Appropriate biosecurity measures will be utilized to reduce the risk of transmission of infectious diseases between wildlife and personnel during an oiled wildlife response.

An oiled wildlife response requires personnel with specialized training and experience to effectively capture and rehabilitate animals. The number of people required is largely determined by the number of animals impacted, the location of the spill, and the duration of the spill. Personnel are needed for reconnaissance, capture, field stabilization, transport, and rehabilitation as well as to manage and support the response. Management and support positions are generally located at the Command Post and are responsible for supporting the various wildlife response activities that occur in the field or at the rehabilitation center(s).

Wildlife response personnel can come from various state and federal agencies, the responsible party, professional wildlife response organizations, aquaria, community groups, specialized wildlife interest groups, and the public. Consistent with ICS principles, positions should be assigned to individuals and/or organizations based on their experience and skills. Wildlife Branch staff can be supplied by Government agencies, professional wildlife response organizations, the responsible party, and contractors, and the public. The only positions within the Wildlife Branch that are pre-determined are those of the Branch Director and Deputy (see Section VIII). Specific position descriptions and duties can be found later in this document.

9317 Activation of the Wildlife Branch

Every spill will be assessed for potential impacts to wildlife. The Wildlife Branch will be activated when either a Federal or State trustee agency, responsible party or the Unified Command determines that an oil spill is in the vicinity of wildlife resources (mammals or birds), or has a trajectory that puts wildlife resources at

risk. Once this determination has been made, the Operations Section Chief and the Unified Command will be notified when the Wildlife Branch is operational. As described in the **Response Actions** section below, the Wildlife Branch will be developed to appropriately respond to the anticipated magnitude of wildlife impacts.

9318 Designation of Wildlife Branch Director and Deputy

Representatives of the USFWS will assume the positions of Director and Deputy Director of the Wildlife Branch. State Fish and Wildlife representatives will assume these positions if a USFWS representative is not available, or if designated by a USFWS representative. This designation may be made on a case-by-case basis or through a pre-existing agreement. Appointment of other parties, including Tribal representatives, Responsible Parties representatives, or others to one or both of these positions may be made by a USFWS representative or their designee at any time during an incident, and for such periods of time as may be deemed appropriate. Unless otherwise indicated by USFWS, the Wildlife Branch Director position will be delegated to the Washington Department of Fish and Wildlife for spills that occur within the legal boundaries of Washington State. Delegation of the position may change during a spill of extended duration.

9319 Wildlife Branch Organizational Structure

The Wildlife Branch directs the operations of the wildlife response with the Operations Section. Within the Wildlife Branch, three Groups report to the Wildlife Branch Director (See Figure 1):

- Wildlife Reconnaissance - aerial, ground, and on-water reconnaissance of wildlife in the spill area.
- Bird Recovery & Rehabilitation - search, recovery, transport, field stabilization, rehabilitation, documentation and deterrence of birds.
- Mammal Recovery & Rehabilitation - search, recovery, transport, field stabilization, rehabilitation, documentation and deterrence of mammals.

To ensure Wildlife Branch objectives are achieved with maximum efficiency, the Wildlife Branch coordinates and manages the activities of all personnel in the Wildlife Branch who fall under the authority of the Unified Command during a spill response. These include federal, state, and local agencies along with commercial and non-profit organizations responsible for wildlife. The Wildlife Branch Director will manage all personnel and equipment supplied by the Potentially Responsible Party to the Wildlife Branch. The Wildlife Branch Director is responsible for appointing the Deputy Wildlife Branch Director and all

Group Supervisors. Group Supervisors are responsible for appointing the various staff positions within their Group.

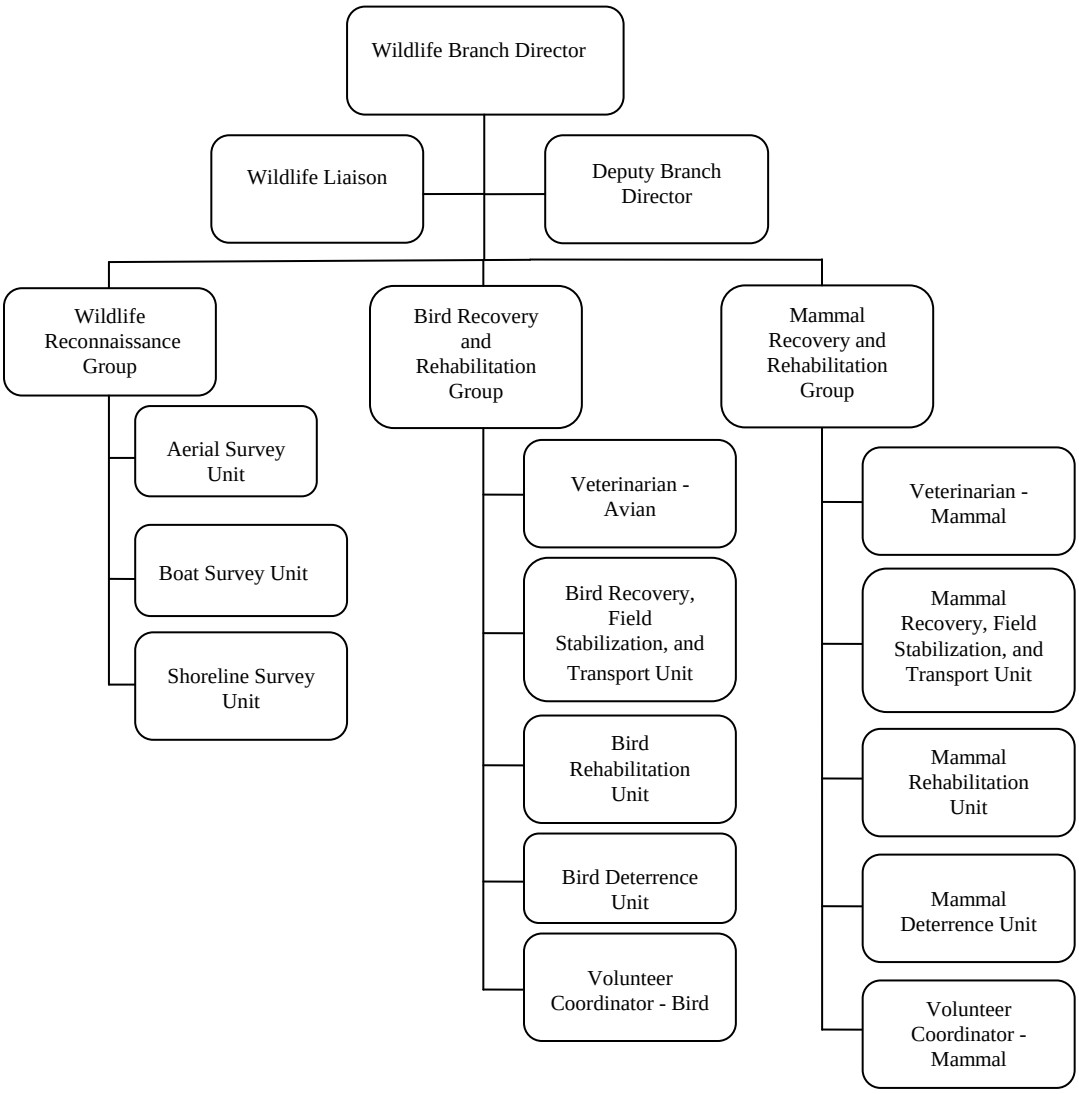


Figure 1 Wildlife Branch Organizational Structure

9320 Wildlife Branch Operations

9320.1 Duties and Responsibilities

Once activated, the Wildlife Branch Director is responsible for ensuring that the appropriate protocol and process is followed during the search, recovery, and rehabilitation of impacted wildlife. The Wildlife Branch Director will make recommendations to the Unified Command through the Operations Section Chief regarding the need for additional Wildlife Branch resources based on anticipated wildlife impacts and associated field operations.

The Wildlife Branch includes the following Groups, which operate under direction of the Wildlife Branch Director: Wildlife Reconnaissance, Bird Recovery and Rehabilitation, and Mammal Recovery and Rehabilitation. This

organizational structure is expanded beyond the structure described in the *2006 Incident Management Handbook* (USCG COMDTPUB P3120.17A), which includes only the Wildlife Recovery Group and the Wildlife Rehabilitation Center.

The Wildlife Branch, working for the Operations Section Chief, will develop operational strategies, tactics and resource needs for operations activities for the Branch in the Incident Action Plan. The Branch Director or one of the Branch staff will work closely with the Safety Officer or one of the Safety Assistants to develop a section of the Site Safety Plan specific to wildlife response activities. Operations activities can include wildlife deterrence, conducting oiled wildlife search and recovery, field stabilization, transportation of oil-impacted wildlife, rehabilitation of oiled wildlife, and release of rehabilitated wildlife. The Wildlife Branch Director will implement the operational guidelines as well as the standard of care requirements of the USFWS *Best Practices for Migratory Bird Care During Oil Spill Response*, *Washington Sea Otter Response Handbook*, *and the Killer Whale Hazing and Monitoring Plan* in all aspects of Wildlife Branch operations.

Wildlife Branch activities affect and interact with numerous other sections of the Incident Command and it is important that good communications are established and maintained between the Wildlife Branch and other responders. In particular, coordination between the Wildlife Branch and the Environmental Unit, a part of the Planning Section, is essential. The Planning Section may assign a Wildlife Technical Specialist to help with coordination. The Wildlife Branch Director is responsible for keeping the Operations Section Chief and Unified Command informed about the status of branch operations.

The Wildlife Branch is responsible for providing information to the Unified Command, the Planning Section, and the Public Information Officer/Joint Information Center relative to the daily numbers of live and dead animals and their status. During a spill response the Wildlife Branch will develop a Wildlife Branch Plan that will be included in the Incident Action Plan. The Wildlife Branch Plan describes the wildlife response activities that will occur within a designated operational period. The Wildlife Branch Plan is routed through the Planning Section for inclusion in the IAP. At the direction of the Operations Section Chief, the Wildlife Branch Director or a member of the Branch staff will attend tactics meetings, planning meetings, and Unified Command briefings. The Branch will also coordinate with Air Operations regarding wildlife overflights, and coordinate with the Logistics Section in accordance with existing IC/UC policy for any materials needed. The Wildlife Branch is also responsible for working with the Planning Section, Demobilization Unit to develop the Wildlife Branch Demobilization Plan.

9320.2 Response Actions

Activities associated with the activation of the Branch will be appropriate to the size of the spill. Activation of personnel and equipment is based primarily on

anticipated adverse effects on wildlife. Depending on the size of the incident, the Wildlife Branch may range in size from just the Branch Director position to full activation of the organization displayed in Figure 1, including the associated equipment and personnel resources. Development of Wildlife Branch operations is an iterative, dynamic process that calls for good information, knowledge, experience, and judgment. It is important to understand that "activation" of the Branch does not mean that a full-scale wildlife response will be mounted. The level of response is completely dependent on the number of animals that may potentially be impacted.

On every spill response, the first action of the Wildlife Branch must be to deploy trained observers to the spill site to determine the extent of the initial and anticipated wildlife impacts in a timely manner. The ability to effectively determine the size and scale of the wildlife response is highly dependent on getting trained observers on-scene quickly. The initial observers must be able to identify oiled wildlife behaviors because the impact oil and other hazardous materials has on wildlife is not always obvious to the average responder. Oiling from light petroleum products, unlike heavy petroleum products, can be especially difficult to determine without the use of a trained observer. Unless heavily oiled, impacted wildlife may be mobile and may not remain at the site of the initial oiling.

Results of the initial reconnaissance will determine the initial size and complexity of the Wildlife Branch and the subsequent deployment of personnel and equipment. This involves establishing the Wildlife Branch organizational structure (Figure 1), contacting wildlife recovery and rehabilitation organizations, notifying the appropriate federal and state trustees, and determining rehabilitation facility needs. The number of animals affected, or potentially affected, will determine the number and type of personnel and equipment resources that are needed. The Wildlife Branch will work with Logistics to obtain and bring in resources, personnel and equipment. Deterrence, search and recovery, field stabilization, rehabilitation, and release activities will proceed as deemed necessary and appropriate by the Wildlife Branch Director, with approval of the Unified Command.

Wildlife response actions can be summarized as discrete and separate actions, all with the goal of minimizing adverse effects of oil on wildlife and maximizing the release rate and survival of rehabilitated animals. The distinct components of wildlife response actions include:

1) Wildlife Reconnaissance (as described above) to locate oiled wildlife and help determine the scope and magnitude (size) of wildlife response.
2) Oiled Wildlife Recovery (search and capture) to capture and transport oiled wildlife to the response rehabilitation facility. Capture teams may work by boat, ATV, vehicle or on foot depending on location the spill. Oiled wildlife capture is often a very labor intensive effort.
3) Field Stabilization is initial care provided to animals after their capture and prior to rehabilitation. Field stabilization generally occurs close to the

point of capture and is intended to increase the animal's chances of a successful rehabilitation. Field stabilization may consist of providing fluid therapy and warming or cooling of the animal depending on the circumstances. Field stabilization may not be utilized in all spills, depending on the location and circumstances of the incident.

4) Rehabilitation includes several steps in an often lengthy process of providing specialized medical and husbandry care to oiled animals with the goal of successfully returning them to the wild. Primary care is provided to oiled animals after they have received an intake examination and throughout the rehabilitation process. Primary care occurs at the rehabilitation facility and includes stabilization, wash/rinse, and conditioning.
5) Release into the wild after rehabilitation. All previously oiled animals must be completely cleaned of contaminants, fully waterproof, and must pass a standardized species-specific set of base-line medical and health criteria prior to being deemed ready for release. Release activities must be coordinated with USFWS and appropriate state trustees and media agencies. Wildlife will be released into approved sites and release is to be considered only after the threat of re-oiling has been eliminated or minimized.

Although numerous agencies, organizations, and volunteers are involved in wildlife response operations the majority of the work is accomplished utilizing Oiled Wildlife Response Organizations – professional organizations that may or may not be "for profit" that provide specialized services relative to the capture and care of oiled wildlife. The following sections describe the response structure, personnel, and equipment needed to conduct an oiled bird response, an oiled sea otter response, and killer whale deterrence and monitoring.

9320.2.1 Oiled Bird Response

Birds are usually the most common wildlife affected by oil spills, especially marine birds, waterfowl, shorebirds, gulls, and predatory birds. These birds spend the majority of their time on or near the water's surface, which puts them in direct contact with oil. When the feathers of a bird become oiled the feathers lose their capacity to insulate the bird's skin from the water. Once the cold water is allowed to come in contact with the bird's skin the bird becomes hypothermic, lethargic, and unable to feed and preen. Eventually the birds attempt to escape the cold water by beaching themselves. Oiled birds are prime targets for predatory and scavenging animals. This scavenging then leads to secondary oiling and further spread of the oil. Thus it is important to retrieve live and dead birds. The survival rate of rehabilitated birds depends greatly on conducting a quick response and using appropriate personnel and facilities.

Table 1 provides response actions needed when planning for oiled wildlife rescue and rehabilitation operations. The response resources for each specific spill should be developed on a case-by-case basis and the size of the Wildlife Branch will adjust as more accurate information about the spill incident and wildlife

impacts becomes available. Most spill incidents in the Northwest Area would utilize a Level IV wildlife response (Table 1). Some extraordinary circumstances would require mobilization at Levels III or II from the outset. The Wildlife Branch will notify the Operations Section Chief promptly of needed changes in the deployment of personnel and equipment.

Table 1: Response Levels for Wildlife Branch Operations for Oiled Birds[1]

	Level IV	Level III*	Level II*	Level I*
Projected Number of Oiled Birds	**1-15**	**16-100**	**101-500**	**500+**
Personnel				
Wildlife Branch Director	1	1	1	1
Wildlife Veterinarian (avian)	1	1	1-2	1-2
Deputy Wildlife Branch Director	0	0-1	1	1-2
Wildlife Liaison	0	1	1	1+
Bird Recovery & Rehabilitation Group Supervisor	0-1	1	1-2	2
Deputy Bird Recovery and Rehabilitation Group Supervisor	0	0	0	1
Bird Recovery and Rehabilitation Group Administration Staff	0-4	1-4	5+	5+
Bird Recovery & Transportation Unit Leader	0-1	1	1-2	2
Bird Recovery & Transportation Unit Staff	1+	2	6+	12+
Oiled Wildlife Reporting Coordinator	0	1	1-2	2+
Bird Rehabilitation Unit Leader	0-1	1	1-2	1-2
Bird Rehabilitation Unit Staff	4+	8+	25+	50+
Volunteer Coordinator	0-1	1	1-2	2-3
Bird Deterrence Unit Leader	0-1	0-1	1-2	1-2
Bird Deterrence Unit Staff	0-3	0-3	5+	5+
Wildlife Reconnaissance Group Supervisor	0-1	1	1-2	2
Wildlife Reconnaissance Administration Staff	0	0	1+	2+
Aerial Survey Unit Leader	0-1	0-1	1	1
Aerial Survey Unit Staff	1	1-2	2-4	5+
Boat Survey Unit Leader	0-1	0-1	1	1
Boat Survey Unit Staff	0-2+	2+	5+	10+
Shoreline Survey Unit Leader	0-1	0-1	1	1
Shoreline Survey Unit Staff	0-2+	2+	20+	40+
Documentation Specialist	0	1	1-2	2+
Spill Management Software Specialist	0	1	2	2+
Equipment				
Facility - Permanent or temporary	1	1+	2+	4+
Stabilization Facility	0	0	2+	4+
Vehicle – Recovery	0-4	0-4	6+	12+
Vehicle – Transport	1	1+	4+	8+
Boat – Capture	0-2	0-2	4+	8+
ATVs	0-2	0-2	4+	8+
Air (helicopter)/land/water reconnaissance	0-1	0-1	1-2	1-2

1 - The number of staff and equipment are based on a spill involving average sized birds (i.e., common murres), with moderate oiling, that are easily accessible. Size of birds and degree of oiling may require substantially different personnel and equipment resources. When mammals are affected, personnel and equipment requirements may double in number to account for separate response efforts. Note: Response levels are numbered consistent with National Incident Management Systems (NIMS compliant).

* The logistical needs of the Wildlife Branch are substantially different at the lower and upper ends of the range of projected oiled birds for each level.

9320.2.2 Oiled Sea Otter Response

Sea otters can be found scattered along the outer coast of Washington and into the Strait of Juan de Fuca. Any oil spill that reaches the nearshore environment may impact sea otters. Early reconnaissance of potentially impacted sea otters should be completed as soon as possible. Unlike most marine mammals that possess a thick layer of insulating blubber, sea otters are highly vulnerable to oil because they depend on their fur for insulation. When sea otter fur becomes oiled there is an immediate loss of thermal protection. Success of sea otter response will depend largely on the ability to quickly implement response actions outlined in this plan.

Sea otters fall under the jurisdiction of the United States Fish and Wildlife Service, are listed as Endangered on Washington's Species of Concern (SOC) List, and are protected by the Marine Mammal Protection Act. Wildlife Branch recommendations to implement sea otter response actions will be fully coordinated with the U.S. Fish and Wildlife Service and the Washington Department of Fish and Wildlife.

Oiled sea otter capture and rehabilitation is very difficult and requires specialized staff and equipment. Due to the environments that otters live, safety of the responders is of paramount concern. Only trained and experienced personnel will be utilized in capture of sea otters. An incident specific health and safety plan may be required for capture and transport of sea otters and will be coordinated with the incident Safety Officer and included in the IAP Site Safety Plan.

Pre-emptive capture of sea otters before they become oiled may be an option. However, it is unlikely that it will be utilized as a response option in the Pacific Northwest due to the logistics involved, the dangers to the animals themselves during the capture, and the dangers to personnel involved with capture efforts. The outer coast of Washington is remote, logistically challenging, and not an ideal location to attempt the capture of healthy sea otters.

Oiled sea otters will be located and recovered by reconnaissance and capture teams and transported as quickly as possible, preferably by air, to a primary treatment facility. Once the animals are waterproof and in good condition they will be transferred to a pre-release facility where they will remain until the USFWS determines when and where they can be released. As there is not currently a dedicated primary treatment facility for oiled otters, their rehabilitation is heavily dependent on the assistance of northwest aquaria. Specific protocols that will be followed when dealing with oiled sea otter capture, transport, and husbandry can be found in the *Washington Sea Otter Response Handbook* (http://wdfw.wa.gov/publications/pub.php?id=00302).

9320.2.2.1 Sea Otter Organizational Structure

Oiled sea otter response requires specialized personnel and resources. The following chart provides the organizational structure to be established under the Mammal Recovery and Rehabilitation Group. The number of personnel required

to accomplish the duties of this group will be determined by the size of the incident. Specific responsibilities and duties can be found in the *Washington Sea Otter Response Handbook.*

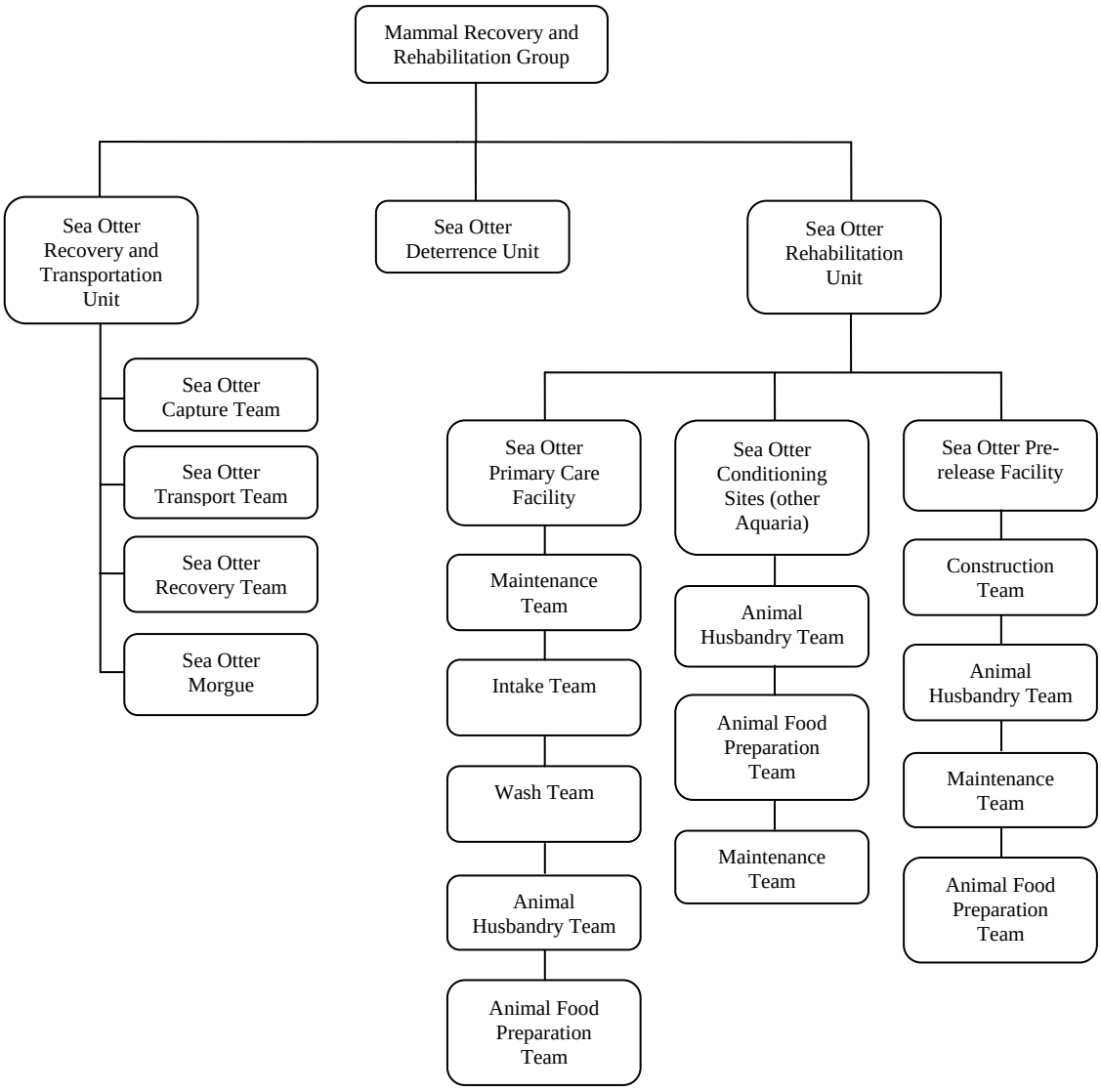


Figure 2 Sea Otter Response Organizational Structure

9320.2.2.2 Sea Otter Response Levels

The size of the spill and more importantly the number of sea otters affected will determine the numbers of staff that are needed to perform the functions identified above. The numbers of personnel needed for various levels of sea otter impacts are listed by function in Table 1. The levels are as follows:

Level I	more than 100 sea otters
Level II	50 to 99 sea otters
Level III	10 to 49 sea otters
Level IV	1 to 9 sea otters

Table 1 and 1a identify the estimated personnel and equipment that would be required to mount a response appropriate to the levels listed above. It is probable that an oil spill on the outer coast would impact both sea otters and marine birds. Consequently some positions may serve dual function for both birds and otters. These positions include the Wildlife Branch Director, and the Wildlife Reconnaissance Group.

Table 1 Personnel Needs for Sea Otter Collection and Rehabilitation by Response Level				
	Level IV	Level III	Level II	Level I
Response Level	1 or 9	10 to 49	50 to 99	>=100
Personnel				
Wildlife Branch Director	1	1	1	1
Deputy Wildlife Branch Director	0	1	1	1 to 2
Wildlife Veterinarian	1	2	3	4
Marine Mammal Recovery & Rehabilitation Group Supervisor	0-1	1	1	1
Deputy Marine Mammal Recovery & Rehabilitation Group Supervisor	0	0	1	1
Marine Mammal Recovery and Transportation Unit Leader	1	1	1	1
Deputy Marine Mammal Recovery and Transportation Unit Leader			1	1
Sea Otter Capture Team Leader	1	2 to 4	4 to 8	10
Sea Otter Capture Team Staff	4	8 to16	16 to 32	40
Sea Otter Transport Team Leader	1	1	2	2
Sea Otter Transport Team Staff	2 to 3	3 to 6	6 to 10	10
Mort Recovery Team Leader		1	1	1
Mort Recovery Team Staff		4	4	4
Morgue Supervisor	1	1	1	2
Marine Mammal Hazing Unit Leader	*	*	*	*
Deputy Marine Mammal Hazing Unit Leader	*	*	*	*
Marine Mammal Hazing Unit Staff	*	*	*	*
Marine Mammal Rehabilitation Unit Leader	0-1	1	1	1
Deputy Marine Mammal Rehabilitation Unit Leader		1	1	2
Sea Otter Primary Care Facility Manager	1	2	2	2
Maintenance Team	2 to 3	4	8	12
Intake Team (DVM + 2 animal handlers + recorder)	4			
Wash Team (Anesthesia + 3 to 5)	4 to 6	8 to 12	12 to 16	16 t0 24
Animal Husbandry Team (DVM + 2handlers + 1 additional for every 6 more otters)	4	4 to 12	12 to 20	20 +
Animal Food Prep Team (15 lb of food per otter per day) L4 15-135 lb, L3 150-735 lb, L2 750-1485 lb, L1 >=1500 l	2 to 4	4 to 6	6 to 8	8 to 10
Sea Otter Conditioning Site Leader	0	1	1 to 2	2 to 3
Animal Husbandry Team	4	4 to 12	12 to 20	20 +
Animal Food Prep Team	2 to 4	4 to 6	6 to 8	8 to 10
Maintenance Team	2 to 3	4	8	12
Sea Otter Pre-release Facility Manager	1	1	1	1
Construction Team	4	8	12	12
Animal Husbandry Team (As needed similar numbers to those assigned to primary treatment facility)	4	4 to 12	12 to 20	20 +
Maintenance Team (Retained from construction team as needed)	4	8	12	12
Animal Food Prep Team	2 to 4	4 to 6	6 to 8	8 to 10
Volunteer Coordinator **	0-1	1	1 to 2	2 to 3
Wildlife Reconnaissance Group Supervisor **	0 -1	1 to 2	2 to 3	2 to 3
Aerial Survey Unit Leader **	0-1	0-1	1	1
Aerial Survey Unit Staff **	1	1 to 2	2 to 4	5+
Boat Survey Unit Leader **	0-1	0-1	1	1
Boat Survey Unit Staff **	0-2	2+	5+	10+
Shoreline Survey Unit Leader **	0-1	0-1	1	1
Shoreline Survey Unit Staff **	3	6	8	15
* Hazing to be considered on a case by case basis for otters (staffing dependent on method selected).				
** May not need to duplicate staff likely in place for bird reconnaissance.				

Table 1a Equipment Needs for Sea Otter Collection and Rehabilitation by Response Level				
	Level IV	Level III	Level II	Level I
Response Level	1 or 9	10 to 49	50 to 99	>=100
EQUIPMENT				
Capture and Transport Equipment				
Dip Net	1	2 to 4	4 to 8	10+
Bite pillow	2	4 to 8	8 to 16	20+
Herding boards	3	6 to 12	6 to 9	10+
restraint box	1	2 to 4	4 to 8	10+
Vehicle - Recovery (pick-up or cargo van)	2	4 to 8	8 to 16	20+
Vehicle - Transport	2 to 3	2 to 3	2 to 3	3+
Coolers of ice	1	2 to 4	4 to 8	10+
Boat - Capture	1	2 to 4	4 to 8	10+
ATVs (if approved for use)	1	2 to 4	4 to 8	10+
Helicopter on call for land/water recovery	0-1	0-1	1 to2	1 to 2
Fixed wing aircraft on call for otter transport	0-1	0-1	1 to2	1 to 2
Sky kennels for capture and transport	6	12	24	24+
Field Stabilization Facility (optional)	0-1	0-1	1	1
Treatment Equipment				
Holding cages (for drying critical care monitoring) 4 per wash station	4	8 to 16	20 to 32	40+
Temp controlled holding area (approximate)	10x10	10x100	50x100	50x100 +
Wash Rince Dry Station - Permanent or temporary (i.e. 53 foot response trailer)	1	1 to 2	3 to 4	5 to 7
Post Wash Holding (2 otter pens) or suitable segregated available space in non-display tanks	1 to 5	5 to16	17 to 27	27 plus
Freshwater maximum daily consumption (wash and holding in 2-otter cages)	39600	122400	208800	225600
Post waterproofing holding pools (Circular 14 ft diameter 4 foot deep) hold 6 compatible animals	2	9	9 to 15	16+
Saltwater daily maximum consumption (gallons)	441600	1987200	3312000	3753600
Towels for drying otters (per day)	60	120	240	250
Pet Dryers (one per cage)	4	8 to 16	20 to 32	40+
Food preparation capacity per day in pounds	135	150 to 735	750 to1485	1500+
Vehicle to pick up food supplies	1 car	1 pick-up	1 pick-up	1 van
Sea Otter Conditioning sites	1	1 to 2	2 to 4	4
Pre-Release Facility Equipment				
Pre release Pen (10x18 net pen plus floats) 8 otters each with pad for special grouping i.e. mother with pups	1 to 2	6 to 8	12 to 14	14+
Staff Support facility (Building or boat to shelter and support sea otter monitoring and care staff)	1	1	1	1
Food preparation facility (Not needed if food prepared at Primary Care Facility and shipped daily)	1	1	1	1
Boats	1 to 2	1 to 2	1 to 2	1 to 2
Transport Cages (Probably the same ones used for collection)	6	12	24	24+

9320.2.3 Oiled Pinniped Response

Pinnipeds (phocids (seals) and otariids (sea lions, fur seals)) are common in the marine waters of Washington and Oregon and may also be found in the estuaries and lower reaches of many rivers. All pinniped species in Washington and Oregon fall under the jurisdiction of the NOAA National Marine Fisheries Service. Phocids, including harbor seals and elephant seals, rest on shore at "haul-outs" scattered along the coast. Harbor seals are common in the coastal bays, the Strait of Juan de Fuca and throughout the Salish Sea. Elephant seals are much less commons and only haul out in a few locations. Otariids, including California sea lions, Steller sea lions, and northern fur seals may be found in the marine areas of both states. California sea lions migrate into and through the Pacific Northwest from August through May. Steller sea lions are resident in Oregon and Washington with larger aggregations at haul-outs along the outer coast. Northern fur seals off Washington and Oregon are pelagic and rarely come ashore.

Spilled oil in the marine environment or on-shore may impact pinnipeds, but except for northern fur seals the risks are somewhat different than for sea otters. Northern fur seals rely on their fur coats for insulation like sea otters and therefore are similarly vulnerable to oiling. As previously noted fur seals are found farther offshore and are unlikely to be encountered during spills near shore or in the inland marine areas east of the entrance to the Strait of Juan de Fuca.

The remaining pinnipeds, phocid seals and sea lions, rely on a thick blubber layer to maintain body temperature rather than fur and so the risk associated with loss of thermal protection when the pelage becomes oiled is lower. Seals and sea lions do not devote as much effort to preening and maintaining their coat and so are less likely to ingest oil during preening. In addition, seals and sea lions routinely haul-out on shore, offshore rocks, or floating structures thus providing an opportunity for contaminating oil to be sloughed or abraded from the pelage. If oiling is severe and individual pinnipeds become debilitated intervention or capture may be necessary to allow excessive oil to be removed and to treat possible injuries or illness.

Pinniped capture is difficult and requires familiarity with the species, specialized staff and equipment. Safety of the responders is of paramount concern. Because pinnipeds are powerful swimmers and very agile in the water, in-water captures are largely infeasible. Capturing pinnipeds on land will only be authorized using trained and experienced personnel. For sea lions the cages used for transport are large and heavy which may rule out capture attempts in locations with limited shore access. An incident specific health and safety plan may be required for capture and transport of pinnipeds and will be coordinated with the incident Safety Officer and included in the IAP Site Safety Plan.

As information about the extent of the spill, type of material spill, area of coverage, and trajectory, the Wildlife Branch Director should advise the Wildlife Reconnaissance Unit about potential pinniped haulouts that may be impacted.

Haulout maps and descriptions can be found in the *"Atlas of Seal and Sea Lion Haulout Sites in Washington"* (Jeffries et al 2000). Aerial Survey assets may be used to determine the initial impacts of oil at haulout sites. Aerial Survey aircraft should maintain a minimum 1000 altitude in the vicinity of haulout sites and avoid passing directly over aggregations of pinnipeds on land. Shoreline Survey teams may also be dispatched to assess oiling at haulouts if shore access is available. Shoreline Survey conducting haulout assessments should maintain sufficient distance from pinnipeds on land to avoid flushing animals to the water. Survey teams should collect and report information on the pinniped species encountered the number of animals at risk at the haulout location, the estimated number of animals already impacted by oil and the degree of oiling observed on the animals. Pinnipeds that are encountered on shore either dead or in moribund condition should be marked with flagging and their position noted for collection by Wildlife Recovery teams.

9320.2.3.1 Pinniped Strandings and Mortalities

Regional marine mammal stranding networks should be alerted by NOAA Fisheries when a spill occurs that may impact pinnipeds. If a carcass is found and NOAA Fisheries authorizes a necropsy, the necropsy should follow the protocols outlined in NOAA's draft NOAA Marine Mammal Oil Spill Response Guidelines (Johnson and Ziccardi, 2006) and be coordinated with NOAA Fisheries.

9320.2.4 Killer Whale Response

The southern resident killer whale (SRKW) population is listed as endangered under the U.S. Endangered Species Act (ESA) and is also protected under the Marine Mammal Protection Act. Evidence suggests that killer whales are unlikely to detect and avoid spilled oil and exposure can result in population-level impacts (Matkin et al. 2008). Specific deterrence methods (if any) recommended at the time of a spill will be those that have the greatest chance of success depending on current conditions and information. Whether or not killer whales can be deterred from entering an oil spill is directly related to the degree to which the whales are attracted to an area. No one individual deterrence technique will work in all situations. Deterrence and monitoring activities are the only mitigation measures possible during an oil spill as capture and rehabilitation of killer whales is improbable. Killer whale response activities will comply with guidelines in the document "Supporting Information for the Killer Whale section of the Northwest Wildlife Response Plan". Additional information on deterrence techniques and the availability of equipment and trained personnel can be found at NOAA's Office of Response and Restoration webpage.

9320.2.4.1 Killer Whale Deterrence Activities

In situations where immediate action is necessary to prevent killer whales from entering oil, NOAA Fisheries has given the Wildlife Branch pre-approval through the Federal On-Scene Coordinator to implement the following deterrence activities: use of Oikomi pipes, use of seal bombs deployed from vessels, and use of helicopters to attempt to herd/move whales. Every reasonable effort will be made to contact NOAA Fisheries prior to attempting these methods but it is

recognized that this might not always be possible. Use of any deterrence mechanisms other than the three methods listed above will require consultation with NOAA Fisheries prior to implementation. Any deterrence actions taken, as well as the results of those actions, will be reported to NOAA Marine Mammal Health and Stranding Program as soon as possible. If the nature of the threat to killer whales is not imminent, the WBD will consult with the NOAA Marine Mammal Health and Stranding Program prior to taking action.

A deterrence program will be considered any time killer whales are reported in or near an oil spill. The Wildlife Branch Director will determine whether or not to activate the Mammal Deterrence Unit to implement the deterrence program. There is not a "single" deterrence technique that will work in all situations. The Reconnaissance Group is responsible for collecting information on the effectiveness of deterrence activities. Spills of persistent oils or spills that are likely to cover large areas and that occur in the following areas and times will be given high priority for the development of deterrence plans/strategies:

- Haro Strait and Strait of Georgia up to Canadian Border off Point Roberts. Period - May through September
- Admiralty Inlet and central Puget Sound Period - October through January
- Local Alert Areas (Examples include: Hood Canal during extended transient killer whale incursions in 2003 and 2005 or an event like the extended stay of Southern Resident Killer Whales in Dyes Inlet in 1997.)

9320.2.4.2 Killer Whale Monitoring Activities

Killer whale activity will be monitored to determine if whales will be exposed to oil or have been exposed to oil and to evaluate the effectiveness of deterrence activities. Observers, who are coordinated by the Wildlife Branch, should be familiar with the differences between the behavior of the transient and resident whale populations in order to better predict their potential movements. Observers should photo document all whales that are observed. Photos should be taken from the side with a clear view of the dorsal fin and saddle patch to identify the individual animal.

9320.2.4.3 Killer Whale Strandings and Mortalities

Regional marine mammal stranding networks should be alerted by NOAA Fisheries when a spill occurs that may impact killer whales. If a carcass is found and NOAA Fisheries authorizes a necropsy, the necropsy should follow the established killer whale necropsy protocol (Raverty and Gaydos, 2004); NOAA's draft NOAA Marine Mammal Oil Spill Response Guidelines (Johnson and Ziccardi, 2006) and be coordinated with NOAA Fisheries.

9321 Wildlife Branch Positions and Responsibilities

Duties and issues that relate to a specific position are listed under that position in the sections that follow. Not all positions will be staffed at each spill, therefore the duties described below need to be distributed to staff on hand.

Responsibilities that apply to all personnel in the Wildlife Branch include:

- Check in and out of duty each day
- Attend incident and safety briefings
- Obtain/review 201 (Incident Briefing) for current spill response status
- Obtain/review 202 (Incident Objectives)
- Maintain individual log (214a)

9321.1 Wildlife Branch Director

The Wildlife Branch Director is responsible for managing all wildlife rescue and rehabilitation operations and personnel. The Branch Director activates and supervises wildlife operations in accordance with the Incident Action Plan and directs its execution; directs the Branch Operations, requests resources, ensures coordination with other Sections or Units within the Incident Command, and reports to the Operations Section Chief. The magnitude of the event and the potential for wildlife to be impacted will dictate the level of staffing in the Wildlife Branch. Smaller spills will generally have less staff. Under these circumstances the Branch Director may have to take on additional responsibilities beyond those described below. In addition to the general duties described above, the Wildlife Branch Director's duties include but are not limited to:

- Supervises the Wildlife Reconnaissance Group (coordinating aerial, shoreline, and on-water wildlife surveys), the Bird Recovery and Rehabilitation Group, and the Mammal Recovery and Rehabilitation Group.
- Attends tactics meetings, planning meetings, and Unified Command briefings.
- Notifies Trustee agencies and Tribes with interest in oiled wildlife response operations.
- Develops the Wildlife Branch Plan for the Incident Action Plan for the next operational period.
- Determines wildlife rescue and rehabilitation staffing needs (including the need to request volunteers), in accordance with Unified Command procedures and directives.
- Manages and tracks Wildlife Branch personnel using an appropriate tracking system.
- Oversees the preparation of work order forms for Incident Action Plan preparation and logistics tracking.
- Provide updates to the Unified Command, Planning Section and Public Information Officer/Joint Information Center regarding the status of oiled wildlife (live and dead, observed and captured).
- Ensures that wildlife samples are collected in coordination with the Sampling Specialist.
- Identifies methods to minimize collateral damage to wildlife and habitat from recovery, transportation, and reconnaissance operations.
- Ensures that qualified personnel perform wildlife recovery and rehabilitation safely and properly.
- Establishes phone (wildlife hotline), internet, and other reporting mechanisms to enable public reporting of oiled wildlife.

- Ensures appropriate use, maintenance and disposition of ICS Forms (documentation).
- Maintains Unit/Activity Log (ICS 214).
- Updates the media as requested by the Unified Command.
- Identifies resources that can be released and develops and implements Wildlife Branch Demobilization Plan.
- Ensures Wildlife Branch personnel have appropriate/required training and certifications.

9321.2 Deputy Wildlife Branch Director

The Deputy Branch Director reports to the Branch Director and serves as a key member of the Branch Management Team. Duties of the Deputy Branch Director include, but are not limited to the following:

- Attend to Wildlife Branch Director responsibilities when the Director is absent.
- Develop and disseminate Branch organization chart.
- Ensure that Group and Team leaders are provided with appropriate job descriptions and job aids.
- Develops Wildlife Branch Safety Plan in concert with the Safety Officer, ensures that all personnel assigned to the Branch receive a daily pre-operational safety briefing and a post-operational de-briefing, and records a summary each day as part of the Unit Log (ICS 214).
- Coordinate and document personnel and logistical support needs with Group supervisors, prepare logistical requests (and justification, if needed) for review and approval by Wildlife Branch Director and the Operations Section Chief, submit approved requests to the Logistics Section.
- Provide operational updates to the Situation Unit.
- Coordinate the development of standardized evidentiary protocols with US Fish and Wildlife Service law enforcement, National Marine Fisheries Service enforcement and Natural Resource Damage Assessment representatives, ensuring that the needs of each entity are met.

- Coordinate with the Bird and Mammal Recovery and Rehabilitation Group Leaders to determine logistical needs for:
  - Search and recovery
  - Field tagging of dead and live animals
  - Transporting dead and live animals
  - Identification of a central wildlife processing center
  - Treatment and rehabilitation facilities
  - Veterinary services
- Establishing oiled wildlife reporting mechanisms for the public and spill responders. This can include phone lines, email addresses, and social media sites.
- Maintain Individual and Branch Activity Log.

9321.3 Wildlife Liaison

The primary responsibility of the Wildlife Liaison is to ensure that all Branch activities are coordinated with the various other sections within the Incident Command. A number of Wildlife Branch activities overlap the Environmental Unit, the Joint Information Center, the Logistics Section, Natural Resource Damage Assessment activities, and the Safety office. It is important that these groups maintain continuous communication with one another to avoid overlap and confusion. The Wildlife Liaison is also responsible for ensuring that the various state and federal agencies, Tribes, and volunteer organizations coordinate with Branch activities, including Canadian provincial and federal agencies in the case of a transboundary spill.

9321.4 Wildlife Branch Planning Support Staff

The Wildlife Branch planning staff include the Oiled Wildlife Reporting Coordinator, the Spill Management Software Specialist, and the Documentation Specialist. As the number of animals impacted increases so does the need for these supporting positions.

9321.4.1 Oiled Wildlife Reporting Coordinator

The Oiled Wildlife Reporting Coordinator is responsible for accumulating, coordinating, and distributing reports of oiled wildlife that are received from the public and spill responders. The Coordinator ensures that the various groups in the Wildlife Branch receive this information in a timely manner.

Duties of the Oiled Wildlife Reporting Coordinator include:

- Monitoring 1-800 phone lines
- Monitoring email
- Monitoring social media sites
- Forwarding oiled wildlife reports to the Bird and Mammal Recovery and Transportation Unit Leaders.

9321.4.2 Spill Management Software Specialist

Most state and federal agency employees and oiled wildlife response contractors are not proficient with the proprietary software that some of the larger companies use to manage a spill response. When this software is used a spill management software specialist from the responsible party or the software vendor should be embedded within the Wildlife Branch.

Duties of the Spill Management Software Specialist include:

- Enter resource requests, general messages, and other information into the spill management software.
- Monitor the spill management software to ensure that information entered is reflected in the system.

9321.4.3 Documentation Specialist

Accurate and efficient documentation is required during an oil spill. Managing and tracking the high volumes of documents generated by the Wildlife Branch, particularly in a large event is very problematic and requires dedicated staff to be effective.

Duties of the Documentation Specialist include:

- Maintain copies of all documentation produced within the Wildlife Branch.
- Ensure that documents (originals, copies, etc) are distributed appropriately within the Command System.
- Ensure that incoming documents are distributed appropriately within the Branch.

9321.5 Wildlife Veterinarians

The Wildlife Veterinarians report to their respective Recovery and Rehabilitation Group Supervisors (birds and mammals) and are responsible for ensuring that impacted animals receive appropriate medical treatment. It is important to retain the services of a wildlife veterinarian who is experienced with the species that are impacted. During large spills in which high numbers of both birds and mammals are impacted the service of more than one wildlife veterinarian may be warranted. Additionally, oiled wildlife care is a specialized field, thus veterinarians who have experience with oiled wildlife are preferred. The Wildlife Veterinarians work with the Branch Director and Trustee agencies to develop euthanasia protocols appropriate for each spill incident.

9321.6 Wildlife Reconnaissance Group

The Wildlife Reconnaissance Group is responsible for determining the location and movement of animals that may be, or already have been, impacted. Daily and seasonal movements of birds and mammals, necessitate rapid, real-time characterization and reconnaissance of wildlife concentrations. The Wildlife Reconnaissance Group consists of the Aerial, Boat, and Shoreline Survey Units. Each unit may be composed of multiple teams. The Reconnaissance Group is

responsible for coordinating surveys that occur in habitat for threatened or endangered species in the National Marine Sanctuary, Congressionally Designated Wilderness Areas, or State Parks. Depending on the spill size, Wildlife Reconnaissance Group teams may be integrated with Recovery and Transportation Unit teams, although this is usually not desirable because it may over-task the teams. Experienced personnel are essential for effective wildlife reconnaissance and surveillance. Observers should be able to identify wildlife species, behavioral characteristics associated with oil impacts, and be knowledgeable about local ecological factors.

Reconnaissance Group personnel may include professional wildlife biologists, trustee agency representatives, contractors, and other trained people. If specialized surveys for threatened and endangered species are needed, additional wildlife specialists may be called in by the Reconnaissance Group Supervisor or Wildlife Branch Director. These specialists will advise the Branch Director and the Unified Command about threats to listed species, the locations and numbers of oiled animals, and the need for capture, deterrence or other protection strategies. These experts will typically use species-specific observation protocols.

Duties of the Reconnaissance Group Supervisor include:

- Determine the need for reconnaissance activities.
- Develop land, water, and air reconnaissance plans.
- Establish reconnaissance schedules for land, water, and air effort.
- Identify and coordinate staff to participate in reconnaissance activities.
- Ensure that information gathered by the reconnaissance teams are routed to the appropriate Wildlife Branch and Environmental Unit staff.

9321.6.1 Aerial Survey Unit

The Aerial Survey Unit is responsible for conducting oiled wildlife reconnaissance from fixed wing and helicopter aircraft. This survey unit is able to survey large geographical areas quickly. Information gathered from aerial surveys may be used to guide land and water animal recovery efforts.

9321.6.2 Boat Survey Unit

The Boat Survey Unit is responsible for conducting oiled wildlife reconnaissance from boats. The crews used in this reconnaissance effort will survey pre-defined areas and report on animal presence and numbers. These crews will only collect oiled animals if the collection of the animal does not impede the crew's ability to conduct reconnaissance.

9321.6.3 Shoreline Survey Unit

The Shoreline Survey Unit is responsible for conducting oiled wildlife reconnaissance from the land. The crews used in this reconnaissance effort will survey pre-defined areas and report on animal presence and numbers. These crews will only collect oiled animals if the collection of the animal does not impede the crew's ability to conduct reconnaissance.

9321.7 Bird Recovery and Rehabilitation Group

The Bird Recovery and Rehabilitation Group is responsible for wildlife deterrence, recovering dead birds, capturing live birds, transporting them to processing centers, and providing medical care to impacted animals. Wildlife recovery by any agency or organization must be done under the direction of the Wildlife Branch, with approval of the Unified Command. Recovery and rehabilitation activities must comply with agreements and permits from the appropriate management agencies (i.e. State Fish and Wildlife agencies and USFWS). Recovery and Rehabilitation Group personnel are drawn from state and federal trustee agencies and approved contractors. Trained, qualified volunteers can be used as long as they comply with the Northwest Area Volunteer Policy including ensuring appropriate training requirements and Occupational Safety and Health Administration standards are met. The Bird Recovery and Rehabilitation Group is made up of three units: Bird Recovery and Transportation; Bird Rehabilitation; and Bird Deterrence. Depending on the spill size, each of these Units may be staffed by no personnel or dozens of highly-trained individuals.

Duties of the Bird Recovery and Rehabilitation Group Supervisor include:

- Contact/coordinate migratory bird issues with USFWS and the Wildlife Branch Liaison.
- Ensure safety plans are developed and understood by Group personnel.
- Estimate type and number of birds that will be recovered.
- Develop bird reconnaissance (in the absence of a Reconnaissance Group), search and collection, field stabilization (if needed), transport, deterrence, euthanasia, rehabilitation, and release plans.
- Determine where rehabilitation facilities will be located and procure resources.
- Determine waste handling needs (liquid and solids) and incorporate into the Environmental Unit Disposal Plan.

9321.7.1 Bird Recovery, Field Stabilization, and Transport Unit

The Bird Recovery and Transportation Unit is responsible for recovering live and dead oiled birds and transporting them to rehabilitation facilities and/or morgues. Success at recovering impacted birds (especially mobile birds) depends on proper technique and timing. Only trained staff should recover live birds. Once captured, impacted live birds should be transported to the designated field stabilization site or rehabilitation facility as soon as possible. Field Stabilization is initial care provided to animals after their capture and prior to rehabilitation. Field stabilization generally occurs close to the point of capture and is intended to increase the animal's chances of a successful rehabilitation. Field stabilization may consist of providing fluids, food, and warming or cooling of the animal depending on the circumstances. Field stabilization may not be utilized in all spills, depending on the location and circumstances of the incident.

Appropriate measures must be undertaken by the Wildlife Branch to ensure that dead animals are recovered appropriately, identified, documented and held until

the trustees approve disposal, or as directed by appropriate trustee agencies. The prompt removal of disabled and dead oiled animals from the environment can be critical to minimize the effects of secondary oiling such as poisoning of predators and scavengers. The Wildlife Branch, in consultation with the trustee agencies, will develop incident specific protocols and authorizations for removing and handling dead oiled birds for each incident. All oiled animals, both live and dead within the spill area should be recovered and processed for triage, rehabilitation, or storage, as appropriate or as directed by an appropriate trustee agency. Dead animals that present a scavenging or secondary oiling potential shall be collected and documented. Live unoiled animals will only be collected under special circumstances under the guidance of the Wildlife Branch and in coordination with trustee agencies.

9321.7.2 Bird Rehabilitation Unit

The Bird Rehabilitation Unit is responsible for ensuring that all recovered live birds exposed to oil receive the best achievable care and for ensuring that oiled birds are properly documented, sampled, tracked, and released. The Bird Rehabilitation Unit is responsible for the oversight of all oiled bird rehabilitation facilities whether they are permanent or mobile. When rehabilitated animals are ready for release, clean, non-oiled release sites should be chosen in consultation with appropriate trustee agencies.

Oiled bird facilities must comply with Federal and State regulations and must meet minimum recommendations in *Best Practices for Migratory Bird Care During Oil Spill Response*. Washington State has minimum oiled wildlife facility infrastructure requirements (WAC 232-12-275) that must be met in order to serve as an oiled wildlife facility during the course of a response.

Basic oiled bird rehabilitation facilities should include:

- Areas for intake, physical exam, and evidence processing;
- Space for a veterinary hospital with isolation capabilities,
- Indoor bird housing and caging,
- Food storage and preparation facilities,
- Animals washing and rinsing areas,
- Indoor drying pens,
- Outdoor pool and pen areas,
- Pathology facilities,
- An area with restrooms, separate rooms for eating and volunteer training,
- Administrative offices with multiple phone and fax lines and with conference space,
- Storage,
- Access to a large parking area, and
- Adequate ventilation, hot and cold water, and climate control.

9321.7.3 Bird Deterrence Unit

Deterrence is defined as the use of physical, auditory, or visual stimulus that are intended to move or disperse birds or mammals away from an area. This is also commonly referred to as hazing. The objective of using deterrence mechanisms is to minimize the number of animals that may become oiled.

The Bird Deterrence Unit in coordination with the Wildlife Branch Director is responsible for determining when and if bird deterrence operations should take place. The recommendation will be guided by site-specific and species-specific factors present at the time of the oil spill, and availability of proven deterrence techniques. If deterrence is determined to be appropriate, the Unit should develop a site-specific deterrence plan in consultation with all appropriate trustee agencies. Deterrence should always be considered in heavily impacted habitats, particularly when clean (not likely to be oiled) sites are present in the area. Wildlife that has already been oiled should not be dispersed, because this can lead to the introduction of oiled animals into uncontaminated areas and populations. Rather, oiled animals should be captured as soon as practical.

It must be stressed that deterrence activities must take place only under the authority and oversight of trustee agencies, in coordination with the Unified Command. Permits and authorizations for deterrence are discussed above in Federal and State Law Mandate section of this plan. Deterrence recommendations will be guided by site-specific and species-specific factors present at the time of the spill, availability of proven deterrence techniques, and availability of appropriate equipment and experienced deterrence personnel.

Special efforts should be taken to notify appropriate authorities whenever deterrence activities are contemplated near large or small airports. The movement of birds by deterrence operations during an oil spill may create additional problems and conflicts with normal bird control operations at airports. This is especially true in spills near large airports such as in Portland or Seattle. The Port of Portland (Portland Airport) and the Port of Seattle (SEA-TAC Airport) must be included in agency coordination when developing deterrence plans in locations that might affect airport operations. Airport personnel may also be available to assist with planning deterrence operations.

Deterrence devices include both visual and auditory techniques. A variety of deterrence devices are available and can be deployed to meet the situation, including helicopters, fixed-wing aircraft, propane cannons, shell crackers, bird bombs, screamers, launchers, airboats, ATVs, sonic buoys, mylar tape, lasers, flags, distress and alarm calls, and effigies. Experience has shown that effective deterrence will require the use of multiple techniques simultaneously in order to move animals away from established feeding or resting areas.

Pre-emptive capture is another means of keeping wildlife away from oil and cleanup operations. As the term preemptive implies, this response action involves capturing animals before they become oiled. It usually is only applicable to a

small number of animals in a specific location and will usually only happen under limited circumstances. Decisions to utilize preemptive capture will be closely coordinated with appropriate state and federal trustee agencies.

Deterrence equipment, techniques, and considerations are described in detail in the Bird Hazing Manual: Techniques and Strategies for Dispersing Birds from Spill Sites, published by California Office of Spill Preparedness and Response and the University of California, Davis. The Bird Hazing Manual is included as an appendix in Chapter 9971 of the Northwest Area Contingency Plan.

Effective deterrence is dependent on utilizing trained and experienced wildlife response personnel to implement a deterrence program. A list of deterrence resources that are available for use in the Pacific Northwest is included in Chapter 9971 of the Northwest Area Contingency Plan. The resources list includes equipment and experienced personnel from wildlife response organizations that are available to be activated if deterrence is determined to be a viable wildlife response action. Experienced deterrence personnel may also be utilized to assist the Bird Deterrence Unit in developing the site-specific deterrence plan.

9321.8 Mammal Recovery and Rehabilitation Group

The Mammal Recovery and Rehabilitation Group is responsible for the recovery and rehabilitation of impacted mammals. This involves deterrence, recovering dead or capturing live mammals, transporting them to processing centers, and providing medical and husbandry care to impacted animals. These activities are performed in close coordination with the Unified Command along with state and federal trustee agencies. Wildlife recovery by any agency or organization must be conducted under the direction of the Unified Command. Their activities must comply with agreements and permits from the appropriate management agencies (i.e., State Fish and Wildlife agencies, NOAA National Marine Fisheries Service, USFWS). Although marine mammals are generally associated with oil spills, it is also possible to recover terrestrial mammals such as muskrat, raccoon, and river otter. The Mammal Recovery and Rehabilitation Unit is responsible for all mammals.

Recovery and Rehabilitation Group personnel are drawn from state and federal trustee agencies and approved contractors. Unlike other Wildlife Branch activities, Marine Mammal Recovery and Rehabilitation personnel will include a high proportion of federal trustee personnel including members of the marine mammal stranding networks. Terrestrial mammal personnel generally will involve professional wildlife rehabilitators from federal and state approved organizations. Trained, qualified volunteers can be used as long as they comply with the Northwest Area Volunteer Policy including ensuring appropriate training requirements and Occupational Safety and Health Administration standards are met.

Duties of the Mammal Recovery and Rehabilitation Group Supervisor include:

- Contact/coordinate with federal and state agencies as appropriate to species involved.
- Ensure safety plans are developed and understood by Group personnel.
- Develop mammal reconnaissance, search and collection, field stabilization (if needed), transport, deterrence, euthanasia, rehabilitation, and release plans.
- Announce marine mammal stranding contact information (if appropriate).
- Estimate type and number of marine mammals that will be recovered.
- Determine where rehabilitation facilities will be located.
- Determine personnel needs (capture, transport, rehabilitation, facility support/development, security, etc.).
- Determine waste handling needs (liquid and solids) and incorporate into the Environmental Unit Disposal Plan.
- Develop incident specific killer whale deterrence and monitoring plans.
- Develop sea otter response plans.

9321.8.1 Mammal Recovery, Field Stabilization, and Transport Unit

The Mammal Recovery and Transport Unit is responsible for recovering live and dead impacted mammals and transporting them to rehabilitation facilities. The Mammal Recovery and Transport Unit evaluates the need to capture impacted mammals on a case-by-case basis. If oiled pinnipeds, sea otters, or cetaceans are determined to be ill and require retrieval, capture will be instituted by the Mammal Recovery and Transportation Unit, in conjunction with NOAA National Marine Fisheries Service (for pinnipeds), USFWS (for sea otters), and sufficiently trained and experienced capture personnel (members of the Marine Mammal Stranding Network). Success at recovering mammals depends on proper technique and timing. Trained staff should recover live mammals. Once captured, impacted live mammals should be transported to the designated field stabilization site or rehabilitation facility as soon as possible. Appropriate measures must be undertaken by the Wildlife Branch to insure that dead animals are recovered appropriately, identified, documented and held until the trustees approve disposal. The prompt removal of disabled and dead oiled animals from the environment can be critical to minimize the effects of secondary oiling such as poisoning of predators and scavengers. All live, disabled, and freshly dead animals, oiled and unoiled, should be recovered and processed for triage and rehabilitation or for processing and storage, as appropriate. A Marine Mammal Stranding Report must be submitted for dead marine mammal sightings and upon capture and prior to transport of live marine mammals.

9321.8.2 Mammal Rehabilitation Unit

The Mammal Rehabilitation Unit is responsible for ensuring that pinniped, sea otters, cetaceans (limited circumstances), and terrestrial mammals exposed to oil receive the best achievable care and for ensuring that oiled mammals are properly documented, sampled and tracked. Wildlife care includes triage, stabilization, intake/documentation, treatment, rehabilitation and release.

When rehabilitated animals are ready for release, clean, non-impacted release sites should be chosen after consulting the appropriate trustee agency or agencies. While exceptions can be made during spill emergencies, some agencies have specific requirements or policies regarding releasing animals on their properties. As a part of spill response actions, marine mammals are tagged and, in some cases, fitted with telemetry equipment for post-release monitoring. To guide the Mammal Rehabilitation Unit in the treatment of remaining animals, wildlife pathologists may conduct necropsies on selected animals during a spill response. However, the Wildlife Branch Director or his designee must obtain pre-approval from the Unified Command for such examinations. In addition, representatives of the appropriate federal trustee agency may need to be present and have specific samples collected and analyzed.

9321.8.3 Mammal Deterrence Unit

The Mammal Deterrence Unit is responsible for determining when and if mammal deterrence operations should take place. Deterrence of mammals is very similar in nature and function to that of birds, as detailed earlier. Deterrence activities must take place only under the authority and oversight of trustee agencies, in coordination with the Environmental Unit. The Wildlife Branch Director will make the deterrence recommendation to the Unified Command through the Operations Section Chief. The recommendation will be guided by site-specific and species-specific factors present at the time of the spill, and availability of proven deterrence techniques. Deterrence activities, observations, and results are to be reported to the Mammal Recovery and Rehabilitation Group Supervisor, who will report to the Wildlife Branch Director and the Planning Section's Environmental Unit Leader. Specific information on killer whale deterrence equipment possessed by WDFW, NMFS, and IOSA can be found in Chapter 9971 of the Northwest Area Contingency Plan.

9321.9 Volunteers

Spill incidents that impact wildlife often generate a significant interest from the general public to volunteer their efforts. Some of these volunteer workers will be assigned jobs where they are compensated; others will be assigned work where they do not receive compensation. Regardless of where and how this volunteer work force is put to use, they must be managed and appropriately trained. During a spill, the Wildlife Branch Director, in coordination with the Bird and/or Mammal Recovery & Rehabilitation Group Supervisors, will determine the need to request volunteer assistance. If volunteers are used during a spill response, a Volunteer Coordinator (reporting to the appropriate Recovery & Rehabilitation Group Leader and coordinating with the overall incident volunteer coordinator will be identified to direct volunteer notification, training and "employment" activities. The Northwest Area Committee policy on use of volunteers gives preference to those who have received previous training and are affiliated with an existing volunteer organization. Pre-trained, affiliated volunteers will be contacted and used before untrained and unaffiliated volunteers. Volunteers will

be brought into the incident in accordance with guidelines outlined in Section 4338 of the NWACP.

Duties of the Volunteer Coordinators include:

- Coordinating wildlife volunteer needs with the Incident Command.
- Providing logistical support for volunteers such as scheduling, training, PPE, food, lodging, etc.
- Communicating the need for volunteers to the Incident Command and general public.
- Coordinating with organized volunteer organizations.

9322 Demobilization of Wildlife Operations

Upon conclusion of Wildlife Branch operations, its activities are demobilized following the standard checkout procedures identified through the ICS and the Unified Command. Wildlife Branch demobilization only occurs after a conclusive determination by the Wildlife Branch Director, in consultation with the three Groups within the Wildlife Branch and other trustee agencies and land managers will determine when it is appropriate to suspend wildlife response operations.

Demobilization of the Wildlife Branch often lags behind that of other response operations for several reasons, such as animals remaining in rehabilitative care, the presence of residual oil, and the presence of visibly oiled animals. The last resource of the Unified Command to be demobilized may be rehabilitation personnel, equipment and facilities used during the spill. Because cleaning, treatment and rehabilitation of oiled wildlife may last several weeks to months, animals brought into the rehabilitation center late in the response may require care after other response resources have demobilized. During that time, as more animals are released and fewer animals remain in care, personnel and equipment resources will be gradually demobilized as appropriate.

G.1. CLEAN RIVERS DECONTAMINATION PLAN

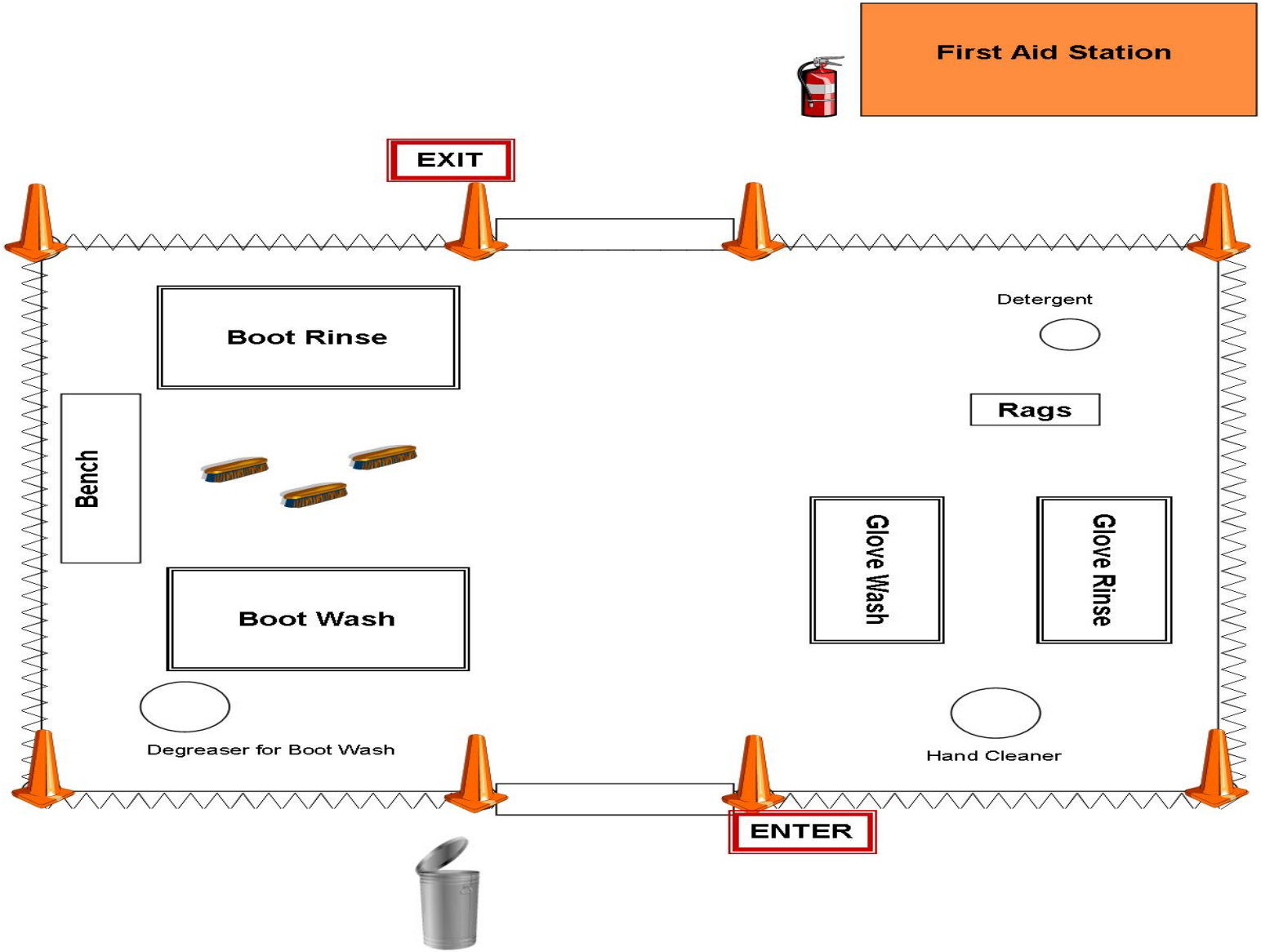
Crews will be assigned to set up and manage personnel decontamination stations. The primary concern will be the health and safety of all responders and to assure that contaminants remain in the exclusion and contamination reduction zones. It is not acceptable to allow oil contamination to spread into the support zone and beyond. Health monitoring requirements of personnel in decontamination will be determined by the Safety Officer. Decontamination will be in accordance with the requirements of 29 CFR 1910.

Decontamination kits are stocked and staged along the river system by CRC and MFSA. They are supplied to meet the needs of small to medium size spills. They are to be re-supplied and augmented with larger stations as dictated by the needs of responders. All wastes generated in the decontamination process will be containerized, labeled, transported with proper shipping papers and disposed in accordance with the disposal plan approved by the UC and in accordance with State and Federal regulations.

Figure G.1 DECONTAMINATION KIT CONTENTS

Quantity	Unit	Item
1	Box	Rags (5 lbs)
1	Gallon	Waterless Hand Cleaner
1	Each	Pop-up Garbage Can, 60 gallons
1	Roll	Barricade Tape
1	Roll	Visqueen (20'x 20')
1	Roll	Sorbent Blanket
2	Each	Wash Tubs
2	Each	Scrub Brushes
1	Gallon	Degreaser – Big O
1	Each	Water Cooler, 5 gallons
1	Each	Enter/Exit Sign
2	Roll	Duct Tape
1	Box	Plastic Bags
1	Each	Air Horn
1	Quart	Detergent
2	Set	Decon Frame and Inserts
1	Each	Storage Box
1	Each	Aluminum Bench
1	Set	Decon Personnel PPE

Figure G.2 DECONTAMINATION STATION LAYOUT



Note: Layout may vary depending on each individual response and space available for set-up.

Figure G.3 - SITE WORK ZONES

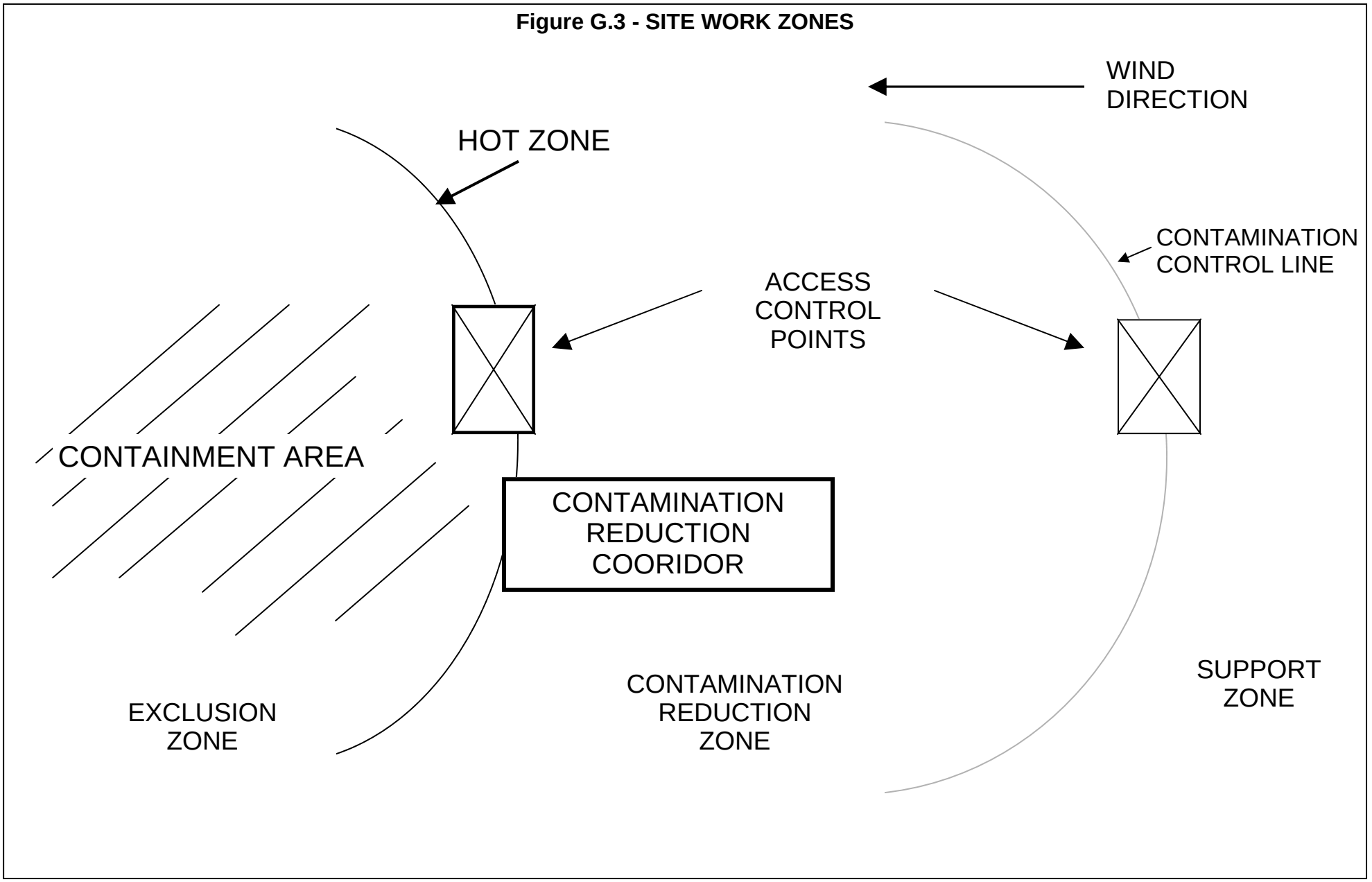


Figure H.1 DISPOSAL MATRIX

The table below summarizes the available sites for waste disposal and the type of material accepted by them. The Primary Response Contractor will choose a site best suited for the material collected during a response. More than one site may be used during a single response.

	HAZARDOUS	NON-HAZARDOUS
LIQUID	**Clean Harbors** 12402 SE Jennifer St, Ste 160 Clackamas, OR 97015 800-645-8265 503-785-0404 **PSC Environmental Services** 625 South 32nd St. Washougal, WA 98671 800-547-2436 360-835-8594	**Cascade General** 5555 North Channel Ave Building 71 Portland, OR 97217 503-285-1111 **ORRCO** 4150 N Suttle Road Portland, or 97217 800-367-8894 503-286-2352 **Thermo Fluids** 12533 SE Carpenter Dr. Clackamas, OR 97015 800-350-7565 503-788-4612
SOLID	**Clean Harbors** 12402 SE Jennifer St, Ste 160 Clackamas, OR 97015 800-645-8265 503-785-0404 **PSC Environmental Services** 625 South 32nd St. Washougal, WA 98671 800-547-2436 360-835-8594 **Waste Management** 7227 NE 55th Avenue Portland, OR 97218 (503) 331-2221	**Allied Waste** 10239 NE Marx Portland, OR 97220 503-253-5656 **Waste Management** 7227 NE 55th Avenue Portland, OR 97218 (503) 331-2221

A sample Incident Disposal Plan, per the NWACP, and hazardous material profiles sheets from approved companies are contained in the following pages.

Preliminary DISPOSAL PLAN

"Incident Name"

Responsible Party:
Spilled Material:
Spill Volume (estimate):
Spill Location:
Spill Date/Time:

Disposal Plan Authorization

This plan is written at the request of the Responsible Party ("RP"), US Coast Guard ("USCG") and/or US Environmental Protection Agency ("EPA"), the Oregon Department of Environmental Quality ("DEQ") and/or Washington State Department of Ecology ("ECY"). The RP will recover the maximum feasible amount of oil spilled during the above named incident. In addition, an unknown quantity of oily waste debris (including plastics, sands, etc.) will be recovered. When disposing of this material, the RP will abide by all applicable state, local and federal laws and regulations. Disposed material will be tracked to provide an accurate means of estimating total oil recovered. Each section of this incident specific disposal plan addresses and corresponds with the waste disposal "Guideline" found in Section 9405 of the Northwest Area Contingency Plan ("NWACP").

This plan may be amended as necessary to ensure compliance with all applicable laws and regulations. Amendment may occur only upon mutual agreement of the responsible party, the Federal On Scene Coordinator ("FOSC") (USCG/EPA), and the State On Scene Coordinator ("SOSC") (DEQ/ECY).

Submitted By: _____ Date: _____

Approved By SOSC: _____ Date: _____

Approved By SOSC: _____ Date: _____

Reviewed by FOSC: _____ Date: _____

Approved by Responsible Party: _____ Date: _____

Approved by other Local Government
Representative(s): _____ Date: _____

_____ Date: _____

_____ Date: _____

SECTION I WASTE HANDLERS

The following licensed transporters and approved treatment and disposal facilities are to be used for waste handling and disposition unless otherwise directed by the Unified Command ("UC"). All waste handlers have read and are working in accordance with this plan.

Name of Company	Disposal Functions	Company Representative Signature
NRC Environmental Services	Storage/Transport	
	Transport/Disposal	
	Final Disposition	
	Final Disposition	

SECTION II DESIGNATION

The spilled material was deemed (non-) dangerous waste based on the following:

The spilled oil was reviewed as per WAC 173-303 and based on chemical info from the vendor/manufacturer, is not a dangerous waste. The spilled oil is a solid waste and will be disposed of in compliance with RCW 70.95

SECTION III INTERIM STORAGE, SEGREGATION, and TRACKING

A. INTERIM STORAGE OF SOLID MATERIAL

Interim storage sites will be located at:

Site Designation ***(ex: Interim Storage #1, Div A, etc.)***	**Site Address/Lat&Long**

All interim storage sites will be lined with plastic tarps and or visqueen prior to receiving loose and bagged debris.

All interim storage sites will be set up to accommodate waste collected from additional cleanup area as needed. These sited will be set up, as those above, so as to prevent the contact of oil with the subsequent absorption by the soil.

B. SEGREGATION OF WASTE

Segregate as follows:

- Oil collected from sources other than state waters/shorelines (e.g. on vessels or pier).
- Oil and oil/water mixtures recovered from state waters/shorelines.
- Oiled organic debris: wood, aquatic vegetation… Debris will be placed in clear plastic bags and kept with similar items as best as possible.
- Oiled sorbent materials: snare, pads, and booms.
- PPE and other non-sorbent materials.

C. WASHINGTON STATE OIL RECOVERY CREDIT FOR NATURAL RESOURCE DAMAGES

Detail measurements will be taken of all oily waste collected in the first 24 hours from on water and kept separate from waste collected after the first 24 hour period. The measurements will be taken at regular intervals during the operational period with representatives of UC. These actions will be taken to ensure segregation as per oil spill recovery credit. See Washington Department of Ecology document "Compensation Schedule Credit for Oil Recovery, RDA Committee Resolution 96-1".

D. TRACKING

All waste will be tracked on the attached “Waste Management Tracking Form”.

E. DECANTING

See attached form if applicable and approved.

SECTION IV DECONTAMINATION

All equipment and personnel will be decontaminated prior to demobilization. Oiled PPE and decon waste will be segregated from recovery wastes.

SECTION V ANIMAL CARCASSES

All Animal Carcasses will be collected by special designated teams and will follow the NWACP guidelines.

SECTION VI WASTE DISPOSITION and FINAL DISPOSAL

ICS Form 209 Final Waste Status Summary

Type	Recovered	Stored	Disposed of
Oil (bbl)			
Oily Liquids (bbl)			
Oily Solids (tons)			
Solids (tons)			

Include copies of waste tracking forms for final disposal if used. Also include copies of receipts from disposal facilities.

A. RECOVERABLE OIL

Oil recovered will be transported by _____to_____.

Company names, contact, and number:

_____

_____

_____

B. BURNABLE MATERIAL

Burnable material includes oily wood, debris, PPE, sorbents, and other suitable organic material collected during cleanup operations. The debris will be transported from the interim storage site by _____to_____.

Transporter(s)	Facility

C. OTHER MATERIAL

This material may consist of sand and tar balls and other assorted material that has been collected from the cleanup effort and has been stored at interim storage sites. All of this material will be transported to a licensed facility

Transporter(s)	Facility

Attached (when applicable):

1: Waste Management Tracking Forms
2: Decanting Form

Please print or type.
(Form designed for use on elite (12-pitch) typewriter.)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of
. . . . .	. . . . .	

GENERATOR

3. Generator's Name and Mailing Address

4. Generator's Phone ( )

5. Transporter 1 Company Name	6. US EPA ID Number	A. Transporter's Phone
	. . . . .	
7. Transporter 2 Company Name	8. US EPA ID Number	B. Transporter's Phone
	. . . . .	
9. Designated Facility Name and Site Address	10. US EPA ID Number	C. Facility's Phone
	. . . . .	

11. Waste Shipping Name and Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a.	. .	.	. . . .	
b.	. .	.	. . . .	
c.	. .	.	. . . .	
d.	. .	.	. . . .	

D. Additional Descriptions for Materials Listed Above	E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

TRANSPORTER

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
		.	.	.

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
		.	.	.

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
		.	.	.

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
		.	.	.

Printed by P.I. KELLER & ASSOCIATES, INC.
Marion, IN 46952-0869

ORIGINAL - RETURN TO GENERATOR

12-81-0115

77097

MINI DATA FORM 6A-73N

BILL OF LADING

STRAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

DESIGNATE WITH AN (X)
BY - TRUCK ☐ FREIGHT ☐

RECEIVED, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and shipper, if applicable, otherwise to the rates, classifications and rules that have been established by the carrier and are available, on request, the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western and Illinois Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

FROM

AT

ON COLLECT ON DELIVERY SHIPMENTS, THE LETTERS "C.O.D." MUST APPEAR BEFORE CONSIGNEE'S NAME – OR AS OTHERWISE PROVIDED IN ITEM 430, SEC. 1.

CONSIGNEE AND DESTINATION

(Mail or street address of consignee – For purposes of notification only.)

DATE

SHIPPER'S NO.

CARRIER

CARRIER'S NO.

BY (SCAC)

ROUTE

DELIVERING CARRIER

CAR OR VEHICLE INITIALS & NO.

No. Units	* H/M	KIND OF PACKAGE, DESCRIPTION OF MATERIALS, SPECIAL MARKS, AND EXCEPTIONS	* WEIGHT (Sub. to Cor.)	Class or Rate	Ck. Col.

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

If charges are to be prepaid write or stamp here, "To be Prepaid."

Received $ _____ to apply in prepayment of the charges on the property described hereon.

Generator's Nonhazardous Waste Profile Sheet

Requested Disposal Facility _____ Profile Number

❑ Renewal for Profile Number _____ Waste Approval Expiration Date _____

A. Waste Generator Facility Information (must reflect location of waste generation/origin)

1. Generator Name: _____
2. Site Address: _____
3. City/ZIP: _____
4. State: _____
5. County: _____
6. Contact Name/Title: _____
7. Email Address: _____
8. Phone: _____
9. FAX: _____
10. NAICS Code: _____
11. Generator USEPA ID #: _____
12. State ID# (if applicable): _____

B. Customer Information ❑ same as above

P. O. Number: _____

1. Customer Name: _____
2. Billing Address: _____
3. City, State and ZIP: _____
4. Contact Name: _____
5. Contact Email: _____
6. Phone: _____ FAX: _____
7. Transporter Name: _____
8. Transporter ID # (if appl.): _____
9. Transporter Address: _____
10. City, State and ZIP: _____

C. Waste Stream Information

1. DESCRIPTION
   a. Common Waste Name: _____ State Waste Code(s): _____
   b. Describe Process Generating Waste or Source of Contamination:

   c. Typical Color(s): _____
   d. Strong Odor? ❑ Yes ❑ No Describe: _____
   e. Physical State at 70°F: ❑ Solid ❑ Liquid ❑ Powder ❑ Semi-Solid or Sludge ❑ Other: _____
   f. Layers? ❑ Single layer ❑ Multi- layer ❑ NA
   g. Water Reactive? ❑ Yes ❑ No If Yes, Describe: _____
   h. Free Liquid Range (%): _____ to _____ ❑ NA(solid)
   i. pH Range: ❑ ≤2 ❑ 2.1-12.4 ❑ ≥12.5 ❑ NA(solid) ❑ Actual: _____
   j. Liquid Flash Point: ❑ < 140°F ❑ ≥ 140°F ❑ NA(solid) ❑ Actual: _____
   k. Flammable Solid: ❑ Yes ❑ No
   l. Physical Constituents: List all constituents of waste stream - (e.g. Soil 0-80%, Wood 0-20%): ❑ (See Attached)

Constituents *(Total Composition Must be ≥ 100%)*	Concentration %	Constituents *(Total Composition Must be ≥ 100%)*	Concentration %
1.		4.	
2.		5.	
3.		6.	

2. ESTIMATED QUANTITY OF WASTE AND SHIPPING INFORMATION
   a. ❑ Event ❑ Base/Ongoing (Check One)
   b. Estimated Annual Quantity: _____ ❑ Tons ❑ Cubic Yards ❑ Drums ❑ Gallons ❑ Other (specify): _____
   c. Shipping Frequency: _____ Units per ❑ Month ❑ Quarter ❑ Year ❑ One Time ❑ Other
   d. Is this a U.S. Department of Transportation (USDOT) Hazardous Material? (If yes, answer e.) ❑ Yes ❑ No
   e. USDOT Shipping Description (if applicable): _____
3. SAFETY REQUIREMENTS (Handling, PPE, etc.): _____

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Generator's Nonhazardous Waste Profile Sheet

D. Regulatory Status (Please check appropriate responses)

1. Is this a USEPA (40 CFR Part 261)/State hazardous waste? If yes, contact your sales representative. ❑ Yes ❑ No
2. Is this waste included in one or more of categories below (Check all that apply)? If yes, attach supporting documentation. ❑ Yes ❑ No
   - ❑ Delisted Hazardous Waste
   - ❑ Excluded Wastes Under 40 CFR 261.4
   - ❑ Treated Hazardous Waste Debris
   - ❑ Treated Characteristic Hazardous Waste
3. Is the waste from a Federal (40 CFR 300, Appendix B) or state mandated clean-up? If yes, see instructions. ❑ Yes ❑ No
4. Does the waste represented by this waste profile sheet contain radioactive material? ❑ Yes ❑ No
   a. If yes, is disposal regulated by the Nuclear Regulatory Commission? ❑ Yes ❑ No
   b. If yes, is disposal regulated by a State Agency for radioactive waste/NORM? ❑ Yes ❑ No
5. Does the waste represented by this waste profile sheet contain concentrations of regulated Polychlorinated Biphenyls (PCBs)? ❑ Yes ❑ No
   a. If yes, is disposal regulated under TSCA? ❑ Yes ❑ No
6. Does the waste contain untreated, regulated, medical or infectious waste? ❑ Yes ❑ No
7. Does the waste contain asbestos? ❑ Yes ❑ No If Yes, ❑ Friable ❑ Non Friable
8. Is this profile for remediation waste from a facility that is a major source of Hazardous Air Pollutants (Site Remediation NESHAP, 40 CFR 63 subpart GGGGG)? ❑ Yes ❑ No
   If yes, does the waste contain <500 ppmw VOHAPs at the point of determination? ❑ Yes ❑ No

E. Generator Certification (Please read and certify by signature below)

By signing this Generator's Waste Profile Sheet, I hereby certify that all:

1. Information submitted in this profile and all attached documents contain true and accurate descriptions of the waste material;
2. Relevant information within the possession of the Generator regarding known or suspected hazards pertaining to this waste has been disclosed to WM/the Contractor;
3. Analytical data attached pertaining to the profiled waste was derived from testing a representative sample in accordance with 40 CFR 261.20(c) or equivalent rules; and
4. Changes that occur in the character of the waste (i.e. changes in the process or new analytical) will be identified by the Generator and disclosed to WM (and the Contractor if applicable) prior to providing the waste to WM (and the Contractor if applicable).
5. Check all that apply:
   - ❑ Attached analytical pertains to the waste. Identify laboratory & sample ID #'s and parameters tested: _____ # Pages: _____
   - ❑ Only the analyses identified on the attachment pertain to the waste (identify by laboratory & sample ID #'s and parameters tested). Attachment #: _____
   - ❑ Additional information necessary to characterize the profiled waste has been attached (other than analytical). Indicate the number of attached pages: _____
   - ❑ I am an agent signing on behalf of the Generator, and the delegation of authority to me from the Generator for this signature is available upon request.
   - ❑ By Generator process knowledge, the following waste is not a listed waste and is below all TCLP regulatory limits.

Certification Signature: _____ **Title:** _____

Company Name: _____ **Name (Print):** _____

Date: _____

FOR WM USE ONLY

Management Method: ❑ Landfill ❑ Bioremediation ❑ Non-hazardous solidification ❑ Other: _____

Approval Decision: ❑ Approved ❑ Not Approved

Waste Approval Expiration Date: _____

Management Facility Precautions, Special Handling Procedures or Limitation on approval:

- ❑ Shall not contain free liquid
- ❑ Shipment must be scheduled into disposal facility
- ❑ Approval Number must accompany each shipment
- ❑ Waste Manifest must accompany load

WM Authorization Name / Title: _____ **Date:** _____

State Authorization (if Required): _____ **Date:** _____

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This appendix intentionally blank.

J.1. SERVICE AGREEMENTS

All signed agreements are confidential, but available for review by government agencies at the offices of MFSA.

Agreement & Type	Description	Effective Date	Expiration/ Renewal Date
Clean Rivers Cooperative (CRC)	MFSA maintains an ongoing agreement with CRC for PRC services on behalf of its Covered Vessels, and sharing and listing of mutually owned equipment.	10/1/1994	None
NRC Environmental Services (NRCES)	MFSA and CRC have entered into a 5 year agreement with NRCES. In accordance with this agreement, NRCES will provide sub-contractor services to the MFSA on behalf of its Covered Vessels in the area of interest, with CRC remaining the Primary Response Contractor. NRCES is an approved OSRO and a Washington State PRC.	10/1/2012	10/1/2017
International Bird Rescue (IBR)	Through CRC, MFSA pays a retainer fee to maintain IBR services including oiled wildlife rescue, rehabilitation and documentation services on an assured response basis.	1/1/2007	None

Agreement & Type	Description	Effective Date	Expiration/ Renewal Date
Tidewater Barge Lines	MFSA has an agreement with Tidewater Barge Lines for dedicated use of certain emergency oil spill response equipment and services available to Covered Vessels. Equipment includes Grade "D" tank barges.	10/22/2001	None
Witt | O'Brien's	MFSA maintains an agreement with Witt | O'Brien's for 6 hour Incident Commander response, and 6 -12 hour Spill Management Team Response.	12/1/2004	None
NexusNW	Crisis communications response during the incident. Lead or support to a joint information center. Serves as spokesperson support, media relations, community relations, etc.	6/9/2014	None
Tri-County HAZMAT	Access to pre-packaged spill response trailers on response by convenience basis. Either Tri-County or MFSA can deploy the equipment.	10/22/2009	None

J.2. LETTERS OF INTENT

Clean Rivers maintains Letters of Intent with various organizations for the response resources listed below. Details can be found in CRC's PRC application.

- Salvage Resources
- Workboats
- Vacuum Trucks
- Tank Barges
- Portable Storage
- Shoreside storage
- Aerial Surveillance

All signed Letters of Intent are confidential, but available for review by government agencies at the offices of Clean Rivers Cooperative.

J.3. MUTUAL AID AGREEMENTS

Agreement & Type	Description
MSRC	CRC has entered into a mutual aid agreement with MSRC commencing on July 21, 2009 for making mobile wildlife response equipment available to each entity on a pooled, mutual aid basis.
Coos Bay Response Cooperative	MFSA maintains a mutual assistance agreement with Coos Bay Response Cooperative, the purpose of which is to define equipment and resources each may utilize in responding to oil spills.

The following is a list of abbreviations and definitions that are commonly used in spill response scenarios and throughout the MFSA Vessel Response Plan:

K.1 ABBREVIATIONS

ACP	Area Contingency Plan
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COTP	Captain of the Port (USCG)
CRC	Clean Rivers Cooperative
CRSOA	Columbia River Steamship Operators Association
CWA	Clean Water Act (Federal)
DEQ	Oregon Department of Environmental Quality
ECY	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERT	Emergency Response Team
FEMA	Federal Emergency Management Administration
FOSC	Federal On-Scene Coordinator
F-PAAC	Fire Protection Agencies Advisory Counsel
GRP	Geographic Response Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IAC	Incident Action Plan
IBR	International Bird Rescue
IC	Incident Commander
ICS	Incident Command System
IMO	International Maritime Organization
ISRC	Interim Spill Response Coordinator
IO	Information Officer
JIC	Joint Information Center
LO	Liaison Officer
LOI	Letter of Intent
LOSC	Local On Scene Coordinator
LRT	Local Response Team
LSC	Logistics Section Chief
MFSA	Maritime Fire & Safety Association
MOU	Memoranda of Understanding
MSDS	Material Safety Data Sheet
MSRC	Marine Spill Response Corporation
NCP	National Contingency Plan
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center (USCG)
NRCES	National Response Corporation Environmental Services
NRDA	National Resources Damage Assessment

NRT	National Response Team
NTVRP	Non-Tank Vessel Response Plan
NWAC	Northwest Area Committee
NWACP	Northwest Area Contingency Plan
OAR	Oregon Administrative Rule (State)
OEMD	Oregon Emergency Management Division
OPA	Oil Pollution Act (of 1990)
ORM	O'Brien's Response Management
ORS	Oregon Revised Statute (State)
OSC	Operations Section Chief
OSHA	Occupational Safety and Health Administration
OSRO	Oil Spill Removal Organization
PIO	Public Information Officer
P&I Club	Property and Indemnification (Association of Insurers for Vessel coverage)
PPE	Personal Protective Equipment
PRC	Primary Response Contractor
PSC	Planning Section Chief
QI	Qualified Individual
RCRA	Resource Conservation and Recovery Act
RM	Response Manager
RP	Responsible Party
RPOSC	Responsible Party On Scene Coordinator
RRT	Regional Response Team
SAR	Search and Rescue
SMT	Spill Management Team
SERO	Shipboard Emergency Response Organization
SCAT	Shoreline Cleanup Assessment Technique
SO	Safety Officer
SOPEP	Shipboard Oil Pollution Emergency Program
SOSC	State On-Scene Coordinator
SPCC	Spill Prevention, Control and Countermeasure Plan
SRT	Spill Response Team
UC	Unified Command
USCG	U.S. Coast Guard
VRP	Vessel Response Plan
WAC	Washington Administrative Code (State)
WCD	Worst Case Discharge
WEMD	Washington Emergency Management Division (State)
WRRL	Western Response Resource List

K.2 DEFINITIONS

Agent: The local representative who acts as a liaison among ship Owners, local port authorities, terminals and supply/service companies, handling all details for getting the ship into port; having it unloaded and loaded; inspected and out to sea quickly.

Area of Coverage: The geographic areas covered by this Plan as detailed in Chapter 1.6.

Authority to Implement Plan: The authority granted to MFSA by (a) the Enrollment Agreement, and (b) the MFSA Arrival Notice to implement the Plan and carry out response actions under the Plan, which is triggered by a Notification. This authority is effective for up to the first 24 hours following MFSA receiving Notification, by which time a Transition of Authority must occur as defined in Chapter 4 and Appendix B.

Authorized Representative: The individual authorized by the Owner to act on the Owner's behalf with respect to the Plan, including the Master, the Agent, the QI, and P&I Club representative or another person specifically authorized by the Owner.

Best Achievable Protection: The highest level of protection that can be achieved through the use of the best achievable technology and those staffing levels, training procedures, and operational methods that provide the greatest degree of protection available.

Binding Agreement. That agreement required pursuant to WAC 173-182-220 to be entered into between a vessel Owner and Ecology, which for Covered Vessels is in the form set forth in Appendix M and signed by MFSA as an authorized designee for the Owner.

Blanket Agreement: The Blanket Enrollment Agreement by which a member of CRSOA can enroll multiple vessels.

Bulk: Material that is stored or transported in a loose, unpackaged liquid, powder, or granular form capable of being conveyed by a pipe, bucket, chute, or belt system.

Clean-up: For the purposes of this document, clean-up refers to the removal and/or treatment of oil, hazardous substances, and/or the waste or contaminated materials generated by the incident. Clean-up includes restoration of the site and its natural resources.

Command: The act of directing, ordering, and/or controlling resources by virtue of explicit legal, agency, or delegated authority. May also refer to an IC or to the UC.

Contingency Plan: A document used by (1) federal, state, and local agencies to guide their planning and response procedures regarding spills of oil, hazardous substances, or other emergencies; (2) a document used by industry as a response plan to spills of oil, hazardous substances, or other emergencies occurring upon their vessels or at their facilities.

Covered Vessel: A vessel that enrolls for coverage under the Plan, its Owners and operators, their successors-in-interest, and all other owners and/or operators receiving services on behalf of the enrolled vessel under the Plan.

Decontamination: The removal of hazardous substances from personnel and their equipment necessary to prevent adverse health effects.

DEQ: The Oregon Department of Environmental Quality.

Discharge: Any spilling, leaking, pumping, pouring, emitting, emptying, or dumping.

Division/Group Supervisor: The supervisor of an organizational level established to divide the incident into functional areas of operation. Groups are composed of resources assembled to perform a special function not necessarily within a single geographic division. A Group is located between Branches (when activated) and Resources in the Operating Section.

Ecology: State of Washington Department of Ecology.

Enrollment Agreement – either the Vessel Enrollment Agreement or the Blanket Enrollment Agreement.

Environmentally Sensitive Area: A delicate or sensitive natural resource that requires protection in the event of a pollution incident.

Facility: (a) Any structure, group of structures, equipment, pipeline, or device, other than a vessel, located on or near the navigable waters of the state that transfers oil in bulk to or from a tank vessel or pipeline, that is used for producing, storing, handling, transferring, processing, or transporting oil in bulk. (b) Does not include any of the following: (i) railroad car, motor vehicle, or other rolling stock while transporting oil over the highways or rail lines of the state; (ii) underground storage tank regulated by the department or a local government under chapter 90.76 RCW; (iii) a motor vehicle motor fuel outlet; (iv) a facility that is operated as part of an exempt agricultural activity as provided in RCW 82.04.330; or (v) a marine fuel outlet that does not dispense more than three thousand gallons of fuel to a ship that is not a covered vessel, in a single transaction.

Federal VRP: Vessel Response Plan required under federal law.

Federal On-Scene Coordinator: The pre-designated Federal On-Scene Coordinator operating under the authority of the National Contingency Plan (NCP). USCG for coastal waters; EPA for inland waters and lands.

Field Guide: The MFSA Shipboard Field Guide - Emergency Procedures, which is required to be carried on board the vessel when the vessel is in the Area of Coverage, the form of which is located in Appendix (A).

General Staff: The group of incident management personnel reporting to the UC and are comprised of: OSC, PSC, LSC, and FSC. They may each have a deputy/deputies.

Geographic Response Plans: Maps and descriptions of sensitive natural and cultural resources, used to identify strategies to minimize damage to those resources, and set priorities for various spill scenarios. They act as the first priorities until real time information and decision making begins to occur in a spill response.

Implement or Implementation: The initiation of and continuation of oil spill response actions under the Plan, once Notification has occurred.

Incident: An event that results in a spill or threat of a spill or release of oil or hazardous materials.

Incident Command Agency: The government agency that assumes the lead for directing and/or monitoring response activities.

Incident Commander: The person responsible for coordinating and directing all phases and functional components of a spill response. Also the on-scene representative of the Incident Command Agency.

Incident Command System: A standardized on-scene emergency management concept specifically designed to allow its users to adopt an integrated organizational structure equal to the complexity and demands of the situation without being hindered by jurisdictional boundaries.

Inland Waters: State waters not considered coastal waters, incluidng lakes, rivers, ponds, streams, underground water, etc.

Interim Spill Response Coordinator: An Individual designated by MFSA to fill the role of Incident Commander and advise the covered vessel on response in the, assist the spill management team and response contractors, and coordinate the response and/or assistance required with the authorities, the operator, and all response resources deployed or otherwise involved during up to the first 24 hours..

Interim Storage Site: A site used to temporarily store recovered oil or oily waste until the recovered oil or oily waste is disposed of at a permanent disposal site. Interim storage sites include trucks, barges, and other vehicles used to store waste until the transport begins.

Navigable Waters of the State: Waters of the state, and their adjoining shorelines, that are subject to the ebb and flow of the tide and/or are presently used, have been used in the past, or may be susceptible for use to transport intrastate, interstate, or foreign commerce.

MFSA: Maritime Fire & Safety Association is the nonprofit corporation providing oil spill response and contingency planning overage under the Plan.

MFSA Arrival Notice: The notice which must be provided to MFSA at least 96 hours prior to the vessel's arrival in the Area of Coverage, or if the voyage time from the departure port is less than 96 hours, prior to departure, the form of which can be found on the MFSA website at http://www.MFSA.com.

MFSA Representative: The individual authorized to represent MFSA with respect to its role under the Plan. The MFSA designated IC is not the MFSA Representative.

Notification: Communication by the Covered Vessel or its Authorized Representative to MFSA of a spill or threat of a spill from the Covered Vessel.

Ocean Zone: The area from the mouth of the Columbia River (at river mile 0) extending 3 miles into the Pacific Ocean. This area includes (a) Oregon State waters that require open water capable response resources to meet regulatory planning standard requirements of OAR 340-141-0150(3)(f) – Covered Vessels Operating in the Open Ocean Zone; and (b) Washignton State waters that require open water capabale response resources to meet regulatory planning standard requirements of WAC 173-182-415 – Cathlamet Staging Area, WAC 173-182-450 – Planning Standards for the Washington Coast, WAC 173-182-325 – Planning Standards for Dispersants and WAC 173-182-330 – Planning Standards for In Situ Burning.

Ocean Zone OSRO: The OSRO named in the Covered Vessel's Federal Vessel VRP and approved by Ecology and DEQ as meeting planning standards for response in the Ocean Zone.

Ocean Zone Resources: The open water capable recovery, storage, in situ burn and dispersant resources that are available through the vessels Ocean Zone OSRO(s) meeting the planning standard requirements of (OAR 340-141-0150(3)(f) – Covered Vessels Operating in the Open Ocean Zone, WAC 173-182-415 – Cathlamet Staging Area, WAC 173-182-450 – Planning Standards for the Washington Coast, WAC 173-182-325 – Planning Standards for Dispersants, WAC 173-182-330 – Planning Standards for In Situ Burning).

Oil or Oils: Naturally occurring liquid hydrocarbons at atmospheric temperature and pressure coming from the earth, including condensate and natural gasoline, and any fractionation thereof, including, but not limited to, crude oil, petroleum gasoline, fuel oil, diesel oil, oil sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

Oil Spill Removal Organization: Oil Spill Removal Organization (OSRO) is an entity that provides oil spill response resources. For use in contingency plans, response contractors must be approved by the U.S. Coast Guard OSRO Program.

Oily Waste: Oil contaminated waste resulting from an oil spill or oil spill response operations.

On-Scene Coordinator: The person responsible for the spill response activities of a single entity, or a group of agencies. This person is responsible for coordinating that entity's or agency's activities with those of other OSC's. There may be more than one OSC at a spill.

Onshore facility: Any facility, as defined in this Plan, located in, on, or under any land of the state, other than submerged land, that, because of its location, could reasonably be expected to cause substantial harm to the environment by discharging oil into or on the navigable waters of the state or the adjoining shorelines.

Operations Section Chief: The chief of the section responsible for all operations directly applicable to the primary missions. Directs the preparation of Branch, Division and/or Unit operational plans, requests or releases resources, makes expedient changes to the IAP as necessary and reports such to the IC.

Owner or Operator: (i) in the case of a vessel, any person owning, operating, or chartering by demise, the vessel; (ii) in the case of an onshore or offshore facility, any person owning or operating the facility; and (iii) in the case of an abandoned vessel or onshore or offshore facility, the person who owned or operated the vessel or facility immediately before its abandonment. *Note: "Operator" does not include any person who owns the land underlying a facility if the person is not involved in the facility's operations.*

Plan: This oil spill response contingency plan developed and maintained by MFSA, referred to as the MFSA Vessel Response Plan, which is an umbrella plan covering eligible vessels entering the Columbia River that enroll for coverage.

Primary Response Contractor: For the purposes of this Plan the Primary Response Contractor (PRC) is the Clean Rivers Cooperative, Inc.. The PRC has contracted directly with the plan holder to provide equipment and/or personnel for the containment or cleanup of spilled oil. For use in contingency plans, response contractors must be approved by the Washington State Department of Ecology PRC Program.

Project Supervisor: Organizational title for individuals supervising projects. For the purposes of the Plan, a Project Supervisor fills the initial response role of Division/Group Supervisor.

Qualified Individual: An individual designated by an Owner or Operator on the vessel's Federal Vessel Response Plan who has full authority to implement clean up strategies, commit the financial resources necessary, communicate with the appropriate Federal officials and the persons providing personnel and equipment for the spill, and ensure the response resources arrive in a timely manner.

Responsible Party: The Owner or Operator of a Covered Vessel who is primarily responsible for an oil spill.

Spill: An unauthorized discharge of oil or hazardous substances into the waters of the state.

Spill Management Team: The professional teams with expertise in spill management engaged for responding to an oil spill.

Spill Response: All actions taken in carrying out responsibilities to spills of oil and hazardous materials, i.e., receiving and making notifications; information gathering and technical advisory phone calls; preparation for and travel to and from spill sites; direction of clean-up activities; damage assessments; report writing, enforcement investigations and actions; cost recovery; and program development.

Spill Response Team: Vessel, CRC and contractor personnel that may be activated in the event of an oil spill. The composition and level-of-effort of these component entities is dependent upon spill location, size, severity, potential hazards, and type and extent of assistance required.

Spill Response Personnel: Federal, state, local agency, and industry personnel responsible for participating in or otherwise involved in spill response. All spill response personnel will be pre-approved on a list maintained in each region.

State On-Scene Coordinator: Regional spill responder responsible for spills of oil and hazardous substances occurring in the state.

Strike Team: Are specified combinations of the same Kind and Type of resources with common communications and a leader.

Substantial Threat of Spill: Or a "vessel emergency" as described by Washington State, a substantial threat of pollution originating from a vessel, including loss or serious degradation of propulsion, steering, means of navigation, primary electrical generating capability, and seakeeping capability.
The following are examples of events that could result in a substantial threat of spill:

- Tank vessel grounding.
- Non-tank vessel grounding outside the channel on the Lower Columbia River.
- Loss of Propulsion (main) or Loss of Steering (primary) while underway on the LCR, for prolonged time.
- A marine casualty that results in unintended anchoring or safe harbor/berth of convenience (exclude crew issues that are unrelated to seaworthiness of vessel).

Qualified Individual: The person authorized by the responsible party to act on their behalf, authorize expenditures, and obligate resources.

Task Forces: A group of resources with common communications and a leader assembled for a specific mission.

Transition of Authority. Transition of the IC role, the process for which should involve use of the documents in Appendix B.

Trip Fee. The fee paid to MFSA as part of a vessel's enrollment in the Plan for each trip in the Columbia River, the fee schedule for which is set forth on MFSA's website at http://www.MFSA.com.

Unified Command: An application of ICS used when there is more than one agency with incident jurisdiction or when incidents cross political jurisdictions. Agencies work together through the designated members of the Unified Command to establish their designated Incident Commanders at a single ICP and to establish a common set of objectives and strategies and a single Incident Action Plan. This is accomplished without losing or abdicating authority, responsibility, or accountability.

Vessel Enrollment Agreement: The Vessel Enrollment Agreement used by individual vessels and also incorporated into the Blanket Agreement for enrollment under the Plan.

Western Response Resource List: An Oil Spill Response Equipment Inventory Database maintained by regional equipment owners and hosted by Genwest Systems, Inc.

Worst Case Spill: (a) In the case of a vessel, a spill of the entire cargo and fuel of the vessel complicated by adverse weather conditions; and (b) in the case of an onshore facility, the entire volume of the largest above ground storage tank at a covered facility site complicated by adverse weather conditions.

L1. INTRODUCTION AND GENERAL PLAN INFORMATION

L1.1. PLAN COVERAGE

This appendix to the MFSA Vessel Response Plan (the "Plan") is designed to minimize the potential impact to human health and the environment, due to a possible oil spill, from listed vessels below (for the purposes of this appendix all "listed vessels" will be referred to as a "Covered Vessel" and each listes vessels Owner/Operator will be referred to as the "Responsible Party" or "RP"). It provides coverage on the Columbia River from the I-205 Bridge in Portland, to its confluence with the Snake River, then up the Snake River from its confluence with the Columbia River to the eastern boundary of Clarkston, Washington (the "Up River Zone").

Listed Vessels

P/V COLUMBIA QUEEN, Majestic America Line

MFSA reserves the right to include other vessels under this appendix L coverage.

L1.2. REGULATORY MANDATE

As with the Plan, this appendix follows the requirements set forth in the Clean Waters Act as amended by the Oil Pollution Act of 1990; Oregon Revised Statute (ORS) Chapter 468B, Division 300-400; Oregon Administrative Rules (OAR) Chapter 340, Division 141; and Washington's Administrative Code (WAC) Chapter 173, Division 182, Sections 010-930. These regulations require an oil spill response plan for covered vessels that carry oil as fuel or cargo on the navigable waters of the states of Oregon and Washington.

L1.3. RELATIONSHIP TO OTHER PLANS

This appendix relies on the Plan to establish the organizational structure, overarching procedures, response equipment and personnel, and the general activities associated with an oil spill response within the Up River Zone. By letter of agreement with Tidewater Barge Lines Inc., it also provides additional pre-positioned equipment and personnel to the Up River Zone described above in L1.1. This appendix also serves as a companion plan to the Covered Vessel's federally required Non-Tank Vessel Response Plan ("NTVRP") and incorporates many of its features as shown in Figure L1.a.

Figure L1.a NTVRP REFERENCES

P/V Columbia Queen NTVRP

Appendix B, Vessel Specific Information
Appendix C, Emergency Procedures and Checklists
Sections 6 and 7, Training and Drill Procedures
Section 3, Shipboard Spill Mitigation Procedures
Section 8, Review and Update Procedures

Additionally, it relies on the Northwest Area Contingency Plan ("NWACP") and its associated Geographic Response Plans ("GRP") to provide risk assessments and to establish geographic, climatic, hydrographic, natural resources details. These details plus the GRP associated response strategies help to guide the response and minimize the potential effects of oil spills.

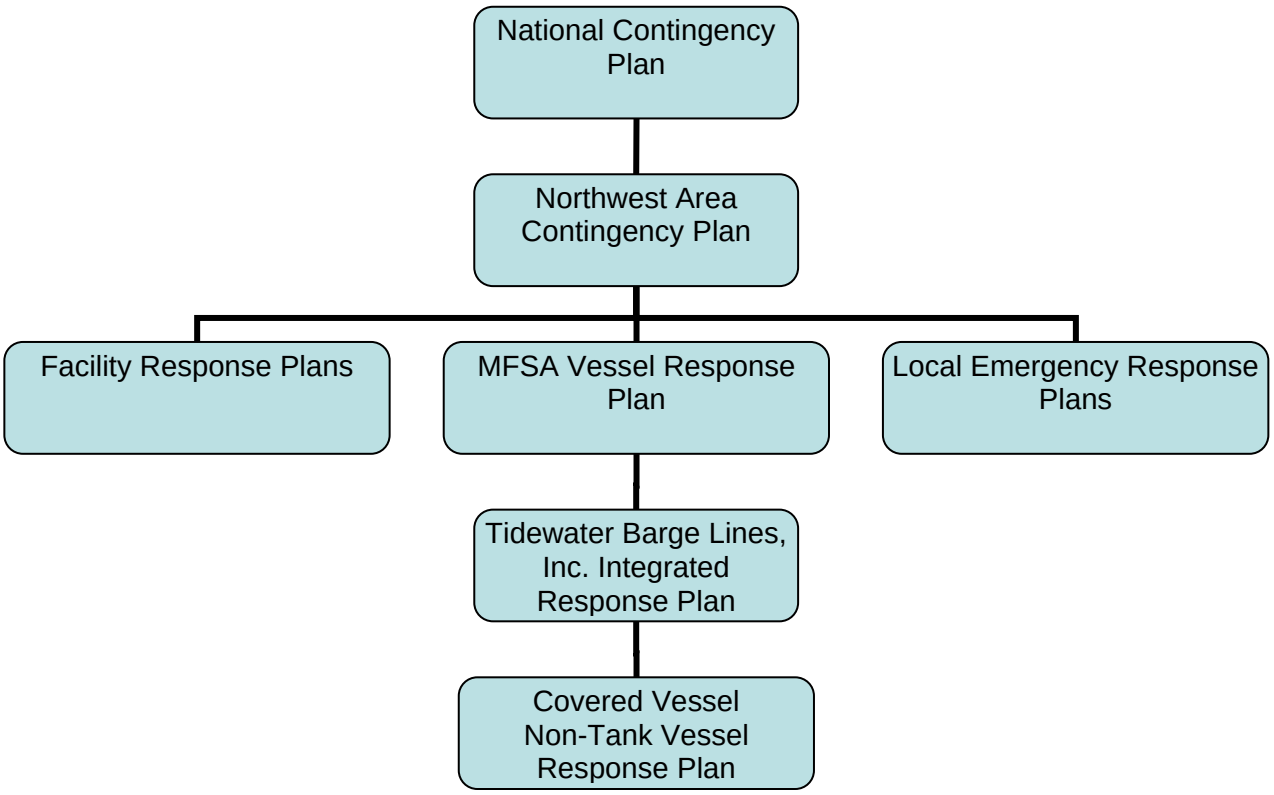
The National Oil and Hazardous Substances Pollution Contingency Plan (the "National Contingency Plan" or "NCP") is the federal government's plan for responding to oil spills and/or hazardous materials incidents. The NCP serves to promote overall coordination among the hierarchy of responders and contingency plans. It contains policies for regional response teams ("RRT") such as the Region 10 RRT, and area contingency plans such as the NWACP.

The NWACP contains response information and policies for the northwest region and includes further guidance regarding state approved umbrella plans in the northwest superceding Federal Vessel Response Plans ("Federal VRP").

Local Emergency Planning Committees work closely with the RRT for consistency with the NWACP. In the event a spill involves a Local Emergency Management Agency, the local response plan will be referenced in conjuction with the NWACP.

Figure L1.b

RELATIONSHIP OF CONTINGENCY PLANS



L2. NOTIFICATION PROCEDURES

L2.1. NOTIFICATIONS OF SPILL OR THREAT OF SPILL

Notifications shall be in accordance with the main portion of the Plan. These procedures are repeated here for clarity and to ensure proper and immediate reporting.

In addition to the Covered Vessel's regular obligations in the Area of Coverage (as defined in Section 1.6 of the Plan) under the Plan, all spills or threats of spills from a Covered Vessel into the Up River Zone, must be immediately reported to the States of Oregon and Washington as referenced in Chapter 1 of this Plan and in Section L3.2, in addition to the United States Coast Guard ("USCG") in accordance with regulation CFR 153.203 Procedures for the Notice of Discharge.

L2.2. VESSEL FIELD GUIDE – EMERGENCY PROCEDURES CHECKLIST

Each Covered Vessel must carry on board an MFSA Shipboard Field Guide - Emergency Procedures Checklist ("Field Guide") and must be available for use at all times when in the Area of Coverage and the Up River Zone of this appendix. The Field Guide must be placed on board the Covered Vessel by the Owner (or Authorized Representative) prior to the Covered Vessel's arrival in the Area of Coverage. The Field Guide is available upon request to MFSA or can be found on the MFSA website at http://www.MFSA.com and is located in Appendix (A) of this Plan. .

L2.3. SHIPBOARD REQUIRED NOTIFICATIONS

In the event of an oil spill or threat of an oil spill, the Covered Vessel (or Authorized Representative) is required to make the notifications as listed in the Field Guide (Appendix A, Figure A.1).

DO NOT DELAY INITIAL REPORT

If some items in the Field Guide spill reporting form are unknown, state in the report that this information will be provided when the facts are available.

L2.3.1. NOTIFICATION TO MFSA

In the event of a spill or threat of a spill from the Covered Vessel, the Covered Vessel (or Authorized Representative) is to Notify MFSA as soon as possible in accordance with the Field Guide in Appendix (A) and the procedures in Chapter (2) of the Plan.

L2.3.2. NOTIFICATION TO USCG

Initial reports by the Covered Vessel on any oil spill must be

immediately reported to the USCG National Response Center in accordance with the Field Guide in Appendix (A) and the procedures in Chapter (2) of the Plan.

L2.3.3. NOTIFICATION TO THE STATES OF OREGON AND WASHINGTON

The Covered Vessel (or Authorized Representative) must also report any spill or threat of a spill into the waters of Oregon or Washington to the emergency response centers for each state **immediately** using the emergency response center numbers listed in the Field Guide (Appendix A, Figure A.1).

Maritime Fire and Safety Association's
24-hour contact number is 503-220-2055

L2.4 MFSA NOTIFICATIONS

Upon Notification to MFSA of a spill or threat of a spill from a Covered Vessel, the Communications Center will document the information received on the Emergency Call Sheet found in Appendix (P), Figure P.1 of the Plan. They will then use the Response Activation Call Sheet found in Appendix (P), Figure P.2 of the Plan to make the following notifications:

a) the on-duty Incident Commander ("IC") who will lead response efforts as per the duties and responsibilities outlined in Chapter (3) of the Plan.
b) the on-duty Response Manager to provide incident information
c) the USCG National Response Center
d) the States of Oregon and Washington
e) the Covered Vessel's Agent and Qualified Individual ("QI")
f) the MFSA on-call representative

The notifications to the USCG National Response Center and the States of Oregon and Washington are follow-up notifications only. The Covered Vessel is still required to make notifications as per the Field Guide. Follow-up notifications provide MFSA immediately with incident reporting numbers, and verify calls made and information exchanged.

L2.7. INITIAL OIL SPILL REPORT - NOTIFICATION FORM

Upon the discovery of a spill or threat of a spill there will be a demand for as much information as possible, as quickly as possible. There must be a

balance of timeliness and thoroughness of the information. However, never delay reporting. Report as much information as possible and then follow up with additional information as it becomes available. Appendix A includes an initial notification form (Figure A.2) and should be filled out by the Covered Vessel (or Authorized Representative) as thoroughly as possible without delaying the information. The IC will collect the information recorded on this form when first contacting the Covered Vessel.

L2.8. ESTIMATING THE SIZE OF THE SPILL

Estimating the size of the spill is as difficult as it is necessary. This information is critical during the initial Notification (as defined in Section 2.2.1 of the Plan) to MFSA of a spill in order to determine the size of the response operation. It will be performed immediately upon discovery by the Covered Vessel and/or by dispatched observation personnel. The size can be estimated by direct observations and through cargo operation transfer rates and/or soundings of the vessel's tanks. Use Figure A.3 in Appendix (A) to estimate the size of the spill and report the information as it is available.

L2.9. FOLLOW UP INFORMATION

After the initial information has been reported there may be opportunity to provide additional details about the incident. This information may include additional details about the volume, type or spread of the incident. Other information that may be needed could include details on the status of the vessel and/or its crew.

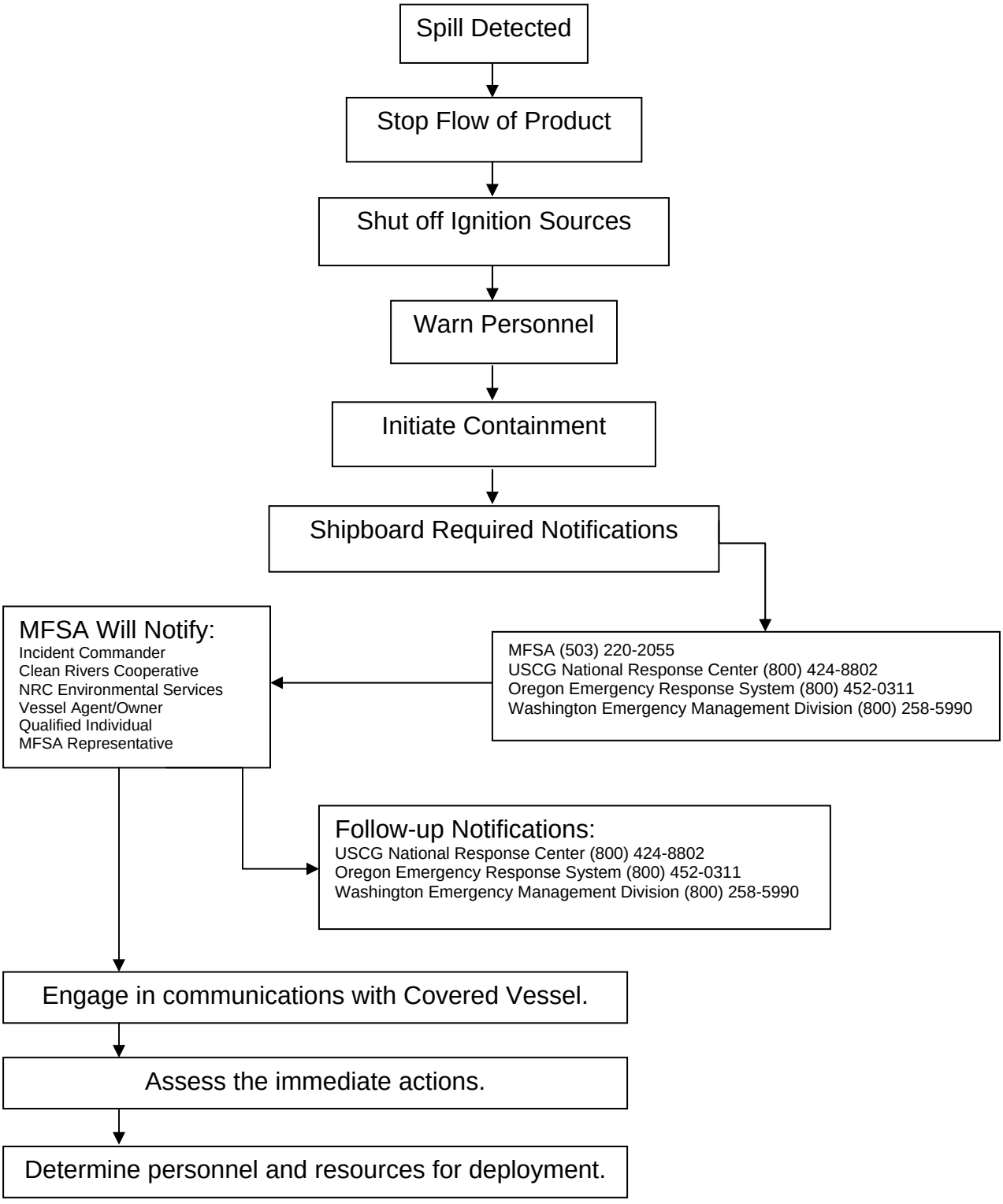
When significant changes to the initial information occur and a follow-up report is required, the IC should complete the Follow-up Report in Appendix (A), Figure A.5, and provide the updated information to the agencies notified on the Field Guide (see Appendix A, Figure A.1). The IC may discuss the contents of the Follow-up Report with the appropriate agencies onsite or by phone if necessary.

L2.10. EMERGENCY OPERATIONS FLOW CHART

An efficient plan and a rapid response require all parties involved to know exactly how the operation will transpire. Figure L2.a depicts how the emergency response under this plan will be managed.

FIGURE L2.a

EMERGENCY RESPONSE OPERATIONS FLOW CHART



L3. SHORE-BASED RESPONSE ACTIVITIES

L3.1. MFSA's RESPONSIBILITIES AND AUTHORITY

The Plan is the umbrella plan for Covered Vessels while operating in the Area of Coverage. This appendix specifically provides coverage to Covered Vessels listed in L1.1. while operating the Up River Zone (the mid-Columbia and Snake Rivers).

MFSA will provide Plan orientation and training to the Vessel Master (or designee(s)) on an annual basis.

Upon Notification of a spill or threat of a spill from a Covered Vessel, MFSA will immediately provide an IC via continuous telephone link to the Vessel Master and will provide an IC onsite for a period of up to 24 hours or until the Responsible Party's QI assumes duties as the IC; whichever occurs first.

L3.2. PROCEDURES FOR TRANSFERRING RESPONSIBILITY OF DIRECTING RESPONSE ACTIVITIES FROM THE VESSEL TO MFSA

The responsibility of spill response direction is transferred from the vessel to MFSA immediately upon Notification of a spill or threat of a spill from a Covered Vessel.

L3.3. MFSA's INITIAL ACTIONS

Upon Notification, MFSA will will Implement the Plan; this is the responsibility of the IC once notified. Initial actions primarily include, but are not limited to, equipment and personnel deployment, will be in accordance with the GRPs of the NWACP for the area of concern. The NWACP and associated GRPs are incorporated by reference into this plan including all risk and environmental variables identified. Recognizing that the priorities for booming and other response activities may change or require additional response measures outside of the GRPs, these strategies will be implemented at the discretion of the UC. Examples could include among others, air monitoring, alternative booming strategies, assessment measures, on-water recovery operations, and over flights.

L3.3.1. INITIAL RESPONSE ACTIVITIES

Upon Notification of a spill or threat of a spill from a Covered Vessel, MFSA will assign an IC to the incident. For additional information about IC availability, staffing, duties and responsibilities see Chapter (3) and Appendix (D) of the Plan.

Due to the geographic distance of response personnel and

resources to the Up River Zone, the IC will be available via continuous telephone link to the Vessel's Master until the IC arrives onsite. The IC will make assessments and provide initial response instructions to the Vessel Master. The IC has authority to contract and utilize any resources necessary to accomplish these steps and to direct the spill response based on his initial and follow up assessments.

The initial on-site assessment resources available to the IC, and the ones most commonly used by the IC, are the Clean Rivers Cooperative, Inc. ("CRC") Response Manager, the Project Supervisor, the Response Crew, the Tidewater Barge Lines Response Team ("Tidewater"), and the Vessel Master.

- CRC's Response Manager – The On-Duty Response Manager serves as the initial Operations Section Chief. The Response Manager can also provide a tracking device to mark the leading edge of the spill during low visibility situations.

- Project Supervisor – The Project Supervisor serves as the initial Division/Group Supervisor. The Project Supervisor works with the Operations Section Chief and directs assigned Strike Teams/Task Forces.

- Response Crew – The Response Crew serves as a Strike Team/Task Force or single resource. This crew, made up of two people, responds with a CRC response vessel equipped with a minimum of 1000 feet of oil spill containment boom.

- Tidewater Response Team – Tidewater will provide response resources along the Columbia and Snake Rivers to potential spill incidents from the Covered Vessel. They will respond within six hours with personnel and equipment as named in their plan. Tidewater will provide a minimum of 2-4 people to respond depending on the size of the incident. The response team will bring a boom trailer and a response boat to deploy the boom and contain a spill.

NOTE: Tidewater will meet the appropriate booming, recovery and oil storage planning standards for the Columbia River as described under WAC 173-182.

The IC and Response Managers will travel to the incident via

landside. Once on scene the IC and Response Managers will conduct a thorough assessment of the situation and begin or continue initial containment and collection operations. Additional equipment may be deployed as necessary depending on amount and type of product.

L4. STEPS TO CONTROL DISCHARGE

The Covered Vessel will refer to their NTVRP for steps to control the discharge of oil into the water. In addition, the IC, promptly following Notification of a spill or threat of a spill from a Covered Vessel, will use the Response Action Checklist to walk through these steps with the Vessel Master.

L4.1. SHIPBOARD RESPONSE TEAM DUTIES

Oil handling and accidental discharge duties of the crew are detailed in the Covered Vessels NTVRPs as referenced in Figure L1.a.

L4.2. STEPS TO STOP THE DISCHARGE

Additional emergency response procedures for numerous vessel casuality scenarios are detailed in the Covered Vessels NTVRPs as referenced in Figure L1.a.

L4.3. LOCATION OF VESSEL INFORMATION AND PLANS NECESSARY TO PERFORM ASSESSMENTS

The NTVRP contains specific vessel information including: Owner/Operator information, P & I Club information, the worst case discharge, tank capacity tables, vessel diagram and the amounts and types of oil on board the vessel. The NTVRP also identifies the location of other information such as the vessel's General Arrangement Plan, Midship Section Plan, Cargo and Fuel Piping Diagrams, Damage Stability Plan and Fuel Stowage Plan. Figure L1.a contains a list of references where this information can be found in each NTVRP for each Covered Vessel.

L5. LIST OF VESSEL INFORMATION AND EMERGENCY CONTACTS

L5.1. OWNER/OPERATOR/MANAGER AND OTHER BASIC VESSEL INFORMATION

Basic vessel information is specific to each listed vessel in this Appendix Figure L5.a below lists specific contact information.

L5.a VESSEL CONTACT INFORMATION

P/V COLUMBIA QUEEN, Majestic America Line

Vessel Operator
Majestic America Line
2101 4th Ave, Suite 1150, Seattle, WA 98121
Tel: 206-292-9606
Fax: 206-340-0975
Email: chris.volkle@majesticamericaline.com

Emergency Contact List

Contact	*Mobile Phone*	*Home Phone*
Chris Volkle, Dir. Compliance & Safety	425-210-3111	360-563-0828
Kelly Gordon, Marine Superintendent	503-799-7749	503-465-8409
Mike McGovern	503-382-7824	
Randy Burns, VP Marine Operations	503-784-5519	
Candy Westfall, Dir. Nautical Operations	206-660-7276	

MFSA 24-HOUR TELEPHONE: 503-220-2055
FAX: 503-295-3660

L5.2. DETAILED VESSEL INFORMATION

Detailed ship specific information is contained in the Annex B of the vessel's NTVRP.

L5.3. INCIDENT COMMANDER AND SPILL MANAGEMENT TEAM

The IC will activate the internal and/or contracted Spill Management Team ("SMT") as deemed necessary for a response. MFSA maintains a 24-hour duty schedule of all qualified ICs who can be assigned as IC upon Notification of a spill or threat of a spill from a Covered Vessel. ICs can be contacted during the course of a response for which the Plan has been Implemented on a 24-hour per day basis through the MFSA operations

center at the number noted above. A full list of available personnel to fill internal and/or contracted SMT duties is included in the personnel lists of Appendix (D).

L5.3.1.CONTRACTED SPILL MANAGEMENT TEAM

O'Brien's Response Management ("ORM") is the contracted SMT that will provide Command and General Staff as needed to augment the SMT of MFSA. A list of their personnel available and dedicated to spill response is included in Appendix (D). The agreement with the O'Brien's Response Management is available for review upon request at the offices of the Merchants Exchange.

O'Brien's Response Management
2929 E. Imperial Highway, Suite 290
Brea, CA 92821
985-781-0804 (24-Hour)

L5.3.2.PUBLIC AFFAIRS

Hill & Knowlton is the contracted Public Affairs organization that will provide an Information Officer or Joint Information Center staff as needed to augment the spill response team of MFSA. The agreement with Hill & Knowlton is available for review upon request at the offices of the Merchants Exchange.

Hill & Knowlton
221 Yale Avenue North, Suite 530
Seattle, WA 98109

Steve Boyer, Senior Vice President
Direct office: (206) 448-7642
Main office: (206) 728-1100
Cell: (206) 200-2989
Home (Seattle): (206) 782-7774
Email: steve.boyer@hillandknowlton.com

Will Ludlam, Executive Vice President/General Manager
Direct office: (206) 441-7340
Main office: (206) 728-1100
Cell: (206) 295-1887
Home (Kirkland): (425) 739-6903
Email: will.ludlam@hillandknowlton.com

Brian Coddington, Senior Account Executive
Direct Office: (509) 456-0885

Main Office: (509) 744-3350
Mobile: (509) 998-1279
Home (Spokane): (509) 892-6656
Email: brian.coddington@hillandknowlton.com

National Crisis Hotline: 646-318-8767

L5.4. CONTRACTED PRIMARY RESPONSE CONTRACTOR

The PRC for this Plan is CRC, Portland, Oregon. A list of their personnel and equipment is included in Appendix (D). CRC relies on several affiliated response contractors to meet all the planning standards required under federal and state law. Currently NRC Environmental Services ("NRCES"), with offices located in Portland, Oregon; and Seattle/ Tacoma, Pasco, and Spokane, Washington; is a sub-contractor to the PRC. A list of their personnel and equipment is also included in Appendix (D). The agreements with CRC and NRCES are available for review upon request at the offices of MFSA.

In addition to the spill response equipment immediately available through the PRC and NRCES, the PRC may call upon Tidewater response equipment and personnel as described in Chapter 7, pp 1-13 of the Tidewater Integrated Response Plan.

PRC
Clean Rivers Cooperative, Inc.
200 SW Market Street, Suite 190
Portland, OR 97201
503-220-2040 (24-Hour)

Sub-Contractors
NRC Environmental Services
6211 N. Ensign Street
Portland, OR 97217
503-283-1150 (24-Hour)

Tidewater Barge Lines, Inc.
Environmental Services
6305 NW Old Lower River Rd.
Vancouver, WA 98660
503-289-4274

L6. PLANNING STANDARDS

L6.1. WORST CASE DISCHARGE WCD AND TYPES AND AMOUNTS OF OIL

The Worst Case Discharge ("WCD") for Covered Vessels in the Up River Zone is 16,167 gallons or 385 bbls. There is no oil carried as cargo on any Covered Vessel in the Up River Zone. This WCD includes all oil from all sources including lube oils and waste oils. Over 94 % of this oil is number 2 diesel fuel. The remaining oil is lube oil captained within individual packages or within engine crankcases. A complete listing of all oil types, locations and tank diagrams can be found in the Covered Vessel's NTVRP.

L6.2. PLANNING STANDARDS BASED ON WCD

The Figures L6.a and L6.b represent the required planning standards based on the WCD of 385 bbls.

Figure L6.a OREGON PLANNING STANDARDS

Portland and Upper Columbia River Zones			
Hours	**Boom (in feet) Required Action (in bold)**	**Minimum Recovery Rate (in bbls)**	**Storage (in bbls)**
1	X	X	X
2	815.2 **Initial assessment**	N/A	N/A
6	10,000' available	7.7	N/A
12	40,000' available **Assess wildlife & shoreline**	19.25	Sufficient to support recovery operations
24	As dictated by response	46.2	Sufficient to support recovery operations
48	As dictated by response	65.45	Sufficient to support recovery operations

*Equipment may be from adjacent zone

Figure L6.b WASHINGTON PLANNING STANDARDS

Vancouver			
Hours	**Boom (in feet)**	**Minimum Recovery Rate (in bbls)**	**Storage (in bbls)**
2	1,000’		
3	1,815.2’		
6	8,815.2’ (3000’ calm water)	11.5 (at least 1.2 in shallow water < 10’)	11.5 (15 on land)* (4.1 on water)
12	28,815.2’ (5,000’ calm water)	38.5 (9.6 in shallow water < 10’)	57.8 (75.14 on land)* (20.2 on water)
24	48,815.2 (10,000 calm water)	53.9	107.8 (215.6 on land)* (37.7 on water)
48	As necessary	96.3	As Necessary
* Non-dedicated land side storage required to be doubled to meet requirements.			

TRI-CITIES			
Hours	**Boom (in feet)**	**Minimum Recovery Rate (in bbls)**	**Storage (in bbls)**
2	1,000’		
3	1815.2’		
6	8,815.2’ (4800’ calm water)	11.5 (at least 1.2 in shallow water < 10’)	11.5 (15 on land)* (4.1 on water)
12	29,815.2’ (5,000’ calm water)	38.5 (9.6 in shallow water < 10’)	57.8 (75.14 on land)* (20.2 on water)
24	48,815.2’ (10,000 calm water)	53.9	107.8 (215.6 on land)* (37.7 on water)
48	As necessary	96.3	As Necessary
* Non-dedicated land side storage required to be doubled to meet requirements.			

L6.3. PLANNING STANDARDS FOR ON-WATER STORAGE AND RESPONSE

On-water storage and response is provided by Tidewater's authorization letter with MFSA and/or the Covered Vessels P&I Club or Owner contracts with the OSRO named in their NTVRP. These agreements give MFSA access to Tidewater personnel and equipment for the Up River Zone.

L6.4. BOOM

Oil spill response containment boom is located in a variety of locations in the area of coverage and includes several strategic locations as listed in the WRRL for Tidewater. The inventory of Tidewater boom amounts to over 19,000 feet and initial deployment can occur anywhere in the zone within six hours. For spills requiring additional boom there are many sources throughout the region and throughout the United States, and can be brought into the area by a variety of transportation means. MFSA has, by contract, immediate access to NRCES's boom totaling at least 10,000 feet. MFSA has access to an additional 25,000 feet of various types of boom located in the Columbia River region and 68,000 feet of boom located throughout Puget Sound, the Straits of Juan de Fuca and Grays Harbor on an as-available basis. This additional equipment can be brought to the incident within 12 to 24 hours.

L6.5. MINIMUM RECOVERY RATE

The minimum daily recovery rate of all equipment was established by using the criteria laid out in WAC 173-182-348 and in 33 CFR 155, Appendix B, Section 6. The current recovery rates for CRC and NRCES are found in the WRRL.

L6.6. STORAGE

Storage is based on WAC 173-182-335. Sixty-five percent of the WCD is provided by shore side storage facilities. These facilities are listed with all other response equipment and storage on the WRRL web site for both Tidewater and CRC. An additional 35% of the WCD is provided by on-water storage equipment and includes both CRC and Tidewater owned barges and equipment and contracted or listed barges.

L6.7. TRANSPORTATION

All transportation standards for boom, storage and recovery capability are based on 35 miles per hour on land and 5 knots per hour on water for most equipment. However, CRC has been granted faster water travel times for specific equipment by the ECY. CRC and MFSA have an agreement with Tidewater Barge Lines for dedicated on water storage barges. These barges have also been granted faster travel times by ECY. These alternate travel speed approvals are kept on file at CRC and on the

WRRL.

L6.8. NON-DEDICATED WORK BOATS

Non dedicated workboats are provided through a letter of intent with several qualified providers as listed in Appendix (J).

L6.9. AERIAL SURVEILLANCE

The planning standard for aerial surveillance is met through Letters of Intent with several companies and these are included in Appendix (J).

L6.10. EQUIPMENT MAINTENANCE

All equipment is maintained in accordance with the respective Tidewater and CRC maintenance programs as described in the Tidewater and CRC PRC Approval. All maintenance records are kept on file at the CRC maintenance facility located at: 9420 NW St. Helens Road, Portland, Oregon 97210 or with Tidewater located at 6305 NW Old Lower River Road, Vancouver, Washington 98660.

L7. PERSONNEL TRAINING HEALTH AND SAFETY

Oil Spill Drills, internal call-outs, and safety and health training for all personnel will be in accordance with the Plan as described in Chapter (7).

L7.1. PERSONNEL TRAINING HEALTH AND SAFETY FOR COVERED VESSEL PERSONNEL

Covered Vessel crew members will be trained in accordance with their own internal safety and health policies. In addition, all crew members will receive 24-hour HAZWOPER training and both the Vessel Master and the First Mate will receive MFSA Plan orientation and training.

L7.2. PERSONNEL TRAINING AND SAFETY FOR TIDEWATER RESPONSE PERSONNEL

Personnel health and safety training shall be conducted in accordance with Tidewater company policies and procedures. Tidewater's personnel health and safety training is listed in Figure L7.a and personnel ICS training is listed in Figure L7.b.

Figure L7.a TIDEWATER PERSONNEL – HEALTH & SAFETY

Staff	Location	Hazwoper Training
Tim Berry	Snake River –Pasco	X
Danny Bond	Boardman Terminal – Boardman, OR	X
Marc Butler	Snake River –Pasco, WA	X
William Copeland	Snake River –Pasco, WA	x
Mark Davis	Snake River –Pasco, WA	X
Roy Drago	Boardman Terminal – Boardman, WA	X
Nick Farr	Snake River –Pasco, WA	X
Mark Fitzhugh	Snake River –Pasco, WA	X
Kelly Harding	Snake River –Pasco, WA	X
John Hinz	Snake River –Pasco, WA	X
Matt Hofbauer	Umatilla Terminal – Umatilla, OR	X
Pat Jensen	Snake River –Pasco, WA	X
Matt Jurcich	Boardman Terminal – Boardman, OR	X
Roger Kentch	Snake River –Pasco, WA	X
Pat Linja	Snake River –Pasco, WA	X
Ron McClary	Snake River –Pasco, WA	X
Doug Melton	Snake River –Pasco, WA	X
Tim Mether	Snake River –Pasco, WA	X
Doug Nelson	Snake River – Pasco, WA	X
Damon Remus	Snake River –Pasco, WA	X
George Robinson	Snake River –Pasco, WA	X
Karen Scott	Snake River –Pasco, WA	X
Dean Smith	Umatilla Terminal – Umatilla, OR	X
Jay Sullivan	Boardman Terminal – Boardman, OR	X
Billy Thomas	Snake River – Pasco, WA	X
Caleb Thonney	Snake River Terminal – Pasco, WA	X
Jeff Zitterkopf	Snake River – Pasco, WA	X
Tom Trutter	Wilma Terminal – Clarkston, WA	X

Figure L7.b TIDEWATER PERSONNEL – ICS TRAINING

TIDEWATER PERSONNEL – ICS ROLES	
Name	**Position**
John Pigott	Incident Commander - River
Pat Jensen	Incident Commander - Terminals
Dennis McVicker	Alternate Incident Commander
Carol Bua	Information Officer
John Pigott	Alternate Information Officer
Gary Stonewall	Safety Officer
Sam Pounds	Alternate Safety Officer
Greg Lines	Liaison Officer
Carrie Gaines	Alternate Liaison Officer
Pat Jensen	Operations Section Chief
Craig Nelson	Alternate Operations
Brian Fletcher	On-Water Recovery Group
Mark Davis	Shoreside Recovery Group
Mark Davis	Disposal Group
Pete Blohm	Salvage/Source Control Group
IBR/CRC	Wildlife
Dennis McVicker	Planning Section Chief
Sam Pounds	Alternate Planning
Greg Zanavich	Situation
Tina Rowsell	Resources
Donna Goddu	Documentation
Stu Sanborn	Demobilization
Ecology assigned	Environmental
Craig Nelson	Logistics Section Chief
Stu Sanborn	Alternate Logistics
Mary Ball	Supply/Purchasing
Kelly Harding	Facilities
Tim Berry	Ground Support
Gary Stonewall	Medical

L8. EXERCISES

All exercises will be in accordance with Chapter 8 of the Plan. In addition, MFSA will conduct a seasonal equipment deployment and training exercise specifically for Covered Vessels listed in this Appendix, at the start of each operating season.

L9. LOGISTICS

Logistic support is a critical element of an effective cleanup. The Logistics Section is encouraged to think creatively in identifying and accessing resources, including identifying resources through phone book and Internet searching. The information listed below is not considered an exhaustive list, nor could it be.

L9.1. EMERGENCY SERVICES

Emergency services for police, fire and ambulance for the entire area of interest of this plan can be reached by dialing 911. All 911 requests dialed on cell phones will be transferred to the nearest 911 dispatch center.

L9.2. COMMUNICATIONS

All initial communications shall be in accordance with the Tidewater Barge Lines, Inc. Combined Response Plan. As CRC equipment and personnel arrive on scene the MFSA initial communications plan included as Appendix (E) shall be added to the Tidewater communications plan.

L9.3. COMMAND POST LOCATIONS AND ACCOMMODATIONS

Command posts and accommodations will be located as close to the spill site as practically possible while affording the safety and infrastructure needed to manage the response. The incident command structure will be as large as necessary to manage the spill. It could be comprised of anything from a command trailer up to a convention center depending on the size and complexity of the spill. Figure L9.a a list of possible command posts but it should not be considered as exhaustive.

Figure L9.a UP RIVER COMMAND POST OPTIONS

River Lodge 6 Marine Drive Boardman, OR 97818 888-988-2009 541-481-6800	**Shilo Inn Suites Hotel** 3223 Bret Clodfelter Way The Dalles, OR 97058-9718 541-298-5502
Clover Island Inn Hotel 435 Clover Island Drive Kennewick, WA 99336 509-586-0541	**Quality Inn Conference Center** 700 Port Drive Clarkston, WA 99403 509-758-9500

L9.4.SECURITY

Protecting the public from dangerous environments and keeping the command post and associated support areas is an essential part of an effective response. The IC or the UC, if formed, will determine the need for and the scope of water and land side security measures.

The Coast Guard and Coast Guard Auxiliary, and the local County Sheriff's Departments are excellent sources for waterside security. There are numerous private landside security firms in the coverage area of this plan that can be contracted to provide security services.

Figure L9.b AREA SECURITY FIRMS

AAA SECURITY	(503) 977-9690 / (800) 375-3536
CASCADE ENFORCEMENT	(503) 291-5082
COLUMBIA GUARD SERVICE	(503) 284-1108
FIRST RESPONSE INC	(503) 207-5300 / (866) 686-1886
HARBOR SECURITY	(503) 262-5538
KNIGHTHAWK PROTECTION	(877) 487-4238 / (360) 892-4885 / (503) 723-5180
METRO WATCH	(503) 226-6561
PACIFIC RIVER MARITIME	866-696-1002 / (503) 519-6092
PERSONAL PROTECTIVE SVS	(503) 452-1698
SECURITAS SECURITY SVS	(503) 283-2481 / (877) 625-2387
RELIANT SECURITY SERVS	(503) 452-1050
G4S SECURE SOLUTIONS INC	(503) 291-1005

L9.5. RIVER ACCESS POINTS

MFSA SURVEY
Upriver Access Points, Staging Areas & Other Features

1. M. James Gleason Ramp
Multnomah County
Marine Drive, Portland, OR
Columbia River Mile 119
Large ramp and paved area for staging if not sport fishing season
Multnomah County Sheriff operates a river patrol from here

2. Chinook Landing
Metro Ramp
Marine Drive, Troutdale, OR
Columbia River Mile 119
Good, multiple paved ramps with a very large paved staging area
OK during sport fishing. Easy to secure, has guard gate

3. Rooster Rock State Park
Interstate 84, Mile 22
Columbia River Mile 129
Good protected ramp with several paved areas for staging. May be crowded in summer and on weekends. Restrooms and grass areas with shade and tables

4. Benson State Park
Interstate 84, Mile 32
* No Ramp * Possible wildlife rehab area with shade trees

5. Port of Cascade Locks Marina
Cascade Locks, OR
Columbia River Mile 149
12' rail bridge clearance at entrance – No semi trailers
Good protected boat ramp and paved staging areas
Grass areas with tables, shade and restrooms
Hotels, restaurants and other services in town
2 possible meeting rooms-conference room in community center and pavilion building

6. Port of Hood River
Hood River, OR
Interstate 84, Mile 62
Columbia River Mile 170
Good ramp and marina
Not a lot of paved area for staging
Lodging and services nearby (Best Western)
Port offices and ware yard
Several unpaved, gravel areas
Fuel dock
Separate dock (small) at gravel area is good spot to unload boats
Probably full of sail boarders in the summer

7. Mayer State Park-Oregon
Interstate 84, Mile 76
Columbia River Mile 181
Good ramp.
Small paved and gravel areas for staging

8. Columbia Gorge Discovery Center & Wasco County Museum
The Dalles, OR
Interstate 84, Mile 88
Good meeting facilities, meals, and parking
No river access

9. Port of the Dalles Marina
The Dalles, OR
Interstate 84, Mile 89
Columbia River Mile 190
Good ramp
Long and narrow paved area
Fuel dock
Some Moorage
Day use park area
Tourists in summer
Lodging and services available

10. Shilo Inn
The Dalles, OR
Interstate 84, Mile 89
Small meeting rooms are available
No river access

11. The Dalles Dam Visitor Center-USACE
The Dalles, OR
Interstate 84, Mile 89
Columbia River Mile 192
CP in off season with building
Paved parking with some staging
Shaded grass areas with tables
No boat ramp

12. Celilo Park-USACE
Interstate 84, Mile 97
Columbia River Mile 201
Good ramp, no moorage
Medium sized paved area for staging
Tribal fishing ramp adjacent and up river

13. Le Page Park-USACE
Interstate 84, Mile 112
Columbia River Mile 219
The ramp is on the John Day River at the mouth just above the John Day Dam
Good ramp and paved staging area
Grass areas with shade trees
Outhouses

14. Port of Arlington RV Park & Marina Ramp
Interstate 84, Mile 137
Columbia River Mile 242
Good ramp and large gravel staging area.
Limited lodging & services
Note: No ramp at Earl Small Park in City.

15. Boardman Marina & Park (River Mile 269.5)
Interstate 84, Mile 164
Columbia River Mile 242
Good ramp and marina with good paved staging
Grass areas with picnic shelters and camp sites
Services in town

16. River Lodge – Boardman
Best hotel in the area

17. River Center (next to River Lodge Hotel)
Possible Command Post. Port of Morrow

18. Tidewater Container Yard and Office-Boardman
Interstate 84, Mile 164
Columbia River Mile 270
Yard space and lift capability from the river to shore
Tie up for barges and tugs
Nice office and possible initial CP or for smaller events

19. Irrigon Park and Marina –USACE
Irrigon, OR
Highway 730
Columbia River Mile 283
Good ramp and Marina
Small paved area for staging
Motels and services in town

20. Umatilla Park (on the Umatilla River)
Umatilla, OR
Highway 730
Columbia River Mile 289
Small steep ramp
Sloped paved staging area, not very big
Bare bones facility; grass area, playground, ballpark

21. Umatilla Marina (on the Columbia River)
Umatilla, OR
Highway 730
Columbia River Mile 289
Good, large ramp, marina, fuel dock – diesel and gas
Large paved staging and grass areas.
Motels and services available
Marina has 500' of sorbent boom
Very large gravel area, RV parking, good freshwater supply
Hermiston motels are better but Desert River Inn is OK

22. Hat Rock State Park-Oregon
Highway 730
Columbia River Mile 289
Good ramp with limited tie up at ramp.
Four large paved areas for staging.
Ramp area is removed from camping areas.
Good Sam RV park and store are near entrance to park

23. Port Kelley
Wallula, WA
Highway 730
Columbia River Mile 312
Drive through grain terminal to private yacht club
Unknown facilities

24. Tidewater Terminal Pasco
Pasco, WA
Highway 12 and Tank Farm Road
Snake River Mile 3
1200 ' of boom in container, 600' in trailer with other response equipment
Workboat on site
Secure staging
Meeting rooms for initial CP and smaller incidents
On-water and land based storage available

25. Hood Park–USACE
Burbank, WA
Highway 12 and Highway 124
Snake River Mile 2
Opposite of Tidewater in Pasco
Good ramps and paved staging area with grass areas too.

26. Madame Dorion Park (State or Fed?)
Wallula, WA
Highway 730and Highway 12
Columbia River Mile 314
On the Walla Walla River just above the Columbia River
Small ramp and small gravel staging area and camp sites

27. Sacajawea State Park-Washington
Pasco, WA
Highway 12
Snake River Mile 0 (mouth of Snake River)
No Semi Trailers posted near entrance*
Small ramp and small gravel staging area and camping
Grass areas with shade trees and picnic tables
Restaurants and other services nearby

28. Ice Harbor Dam (North Side) USACE
Ice Harbor Road off Pasco-Kahlotus Road
Snake River Mile 10
Just above dam
Good ramp and large paved and gravel areas for staging
*Marked helispot on pavement
*14’3” clearance for vehicles
Outhouse

29. Levey Park USACE
Levey, WA
Pasco-Kahlotus Road
Closed for Season during visit but sign indicates a ramp

Also, Big Flat HMU (Habitat Management Unit) USACE
At mile 13 on Pasco-Kahlotus Rd. and then 1.5 Mile gravel road.
No ramp indicated but shows fishing and camping

30. Snake River Junction Habitat Management Unit (HMU) USACE
Access by Snake River Rd at Mile 24 Pasco-Kahlotus Rd
5% grade secondary paved curving road, 5.1 miles from Pasco Kahlotus Rd. Gravel ramp
OK turn around for one tons and utility or boat trailers.
Limited staging at ramp with small staging area just above
No cell phone service
Gated Washington State Parks access roads going up and down river from this site

31. Windust Park Recreation Area
Take Burr Canyon Rd. at Pasco-Kahlotus Rd Mile 29.1
Snake River Mile 39
5 miles to park from Pasco-Kahlotus Rd, paved road, 10% grade, open range
Good, small ramp
2 paved areas for staging
Shaded grass areas with tables, camping & restrooms
Just above CLD elevator
No cell service

32. Devils Beach (Just above Low Mo Dam)-USACE
Access by Highway 263
Snake River Mile 42
Good ramp, no moorage
Large paved gavel areas for staging
Outhouse
No Cell Service

33. Lyons Ferry State Park-Washington
Access by Highway 261
Snake River Mile 59
At the mouth of the Palouse River
Good smaller ramp.
Several large paved areas for staging.
Shaded grass areas with tables.
Restrooms, gate and camping.

34. Lyons Ferry Marina–Port of Columbia County

Access by Highway 261
Snake River Mile 59
Good ramp, moorage, store, gas, camping, supplies, restaurant, showers and restrooms
Good paved area for staging
Gravel trailer yard
Workboat with tow post at marina
No cell service

35. Ayer Boat Basin-USACE

Access by Highway 261
Snake River Mile 51
Good small ramp.
Small moorage – 4 boats.
Large paved and gravel staging areas.
Outhouse
Roads are paved all the way in.
Take Lyons Ferry Rd. near marina and head SW
Take Aver Rd. near elevator and head N. (Rt. Turn)
No cell service.
16.5 miles back to Highway 261.
12’ horizontal and vertical clearance at basin opening.
Good signage from river side of railroad tracks to help boats find opening

36. Little Goose Dam-USACE

Access from 261 N. of Starbuck, WA.
Snake River Mile 70
Limited services in Starbuck, cash only at café
Call 1-888-DAMINFO for crossing dam by vehicle; cross during business hours. Crossing the dam can save several miles of driving

37. Chief Timothy State Park-Washington
Access by Highway 193
Snake River Mile 131
Open May – October
Moorage buoys and docks near camp sites
Snack bar and groceries
Interpretive Center – Possible Command Post during the off season
Gate was locked and no ramp was observed

38. Hells Canyon Marina–Private Facility
Access by Highway 193
Snake River Mile 131
Good ramp
Moorage, gas, showers, bait shop, restaurant
Some staging

39. Tidewater Terminal–Port of Wilma
Access by Highway 193
Snake River Mile 135
Spill trailer and boom
Large secure staging area
Land storage and possible on-water storage
Barge and tug mooring

40. Nisqually John Landing USACE
Access by Highway 193
Snake River Mile 126
No Cell reception
Small ramp and gravel staging area
Grass area with tables
No Moorage
Outhouse

41. Blyton Landing–USACE
Access by Highway 193
Snake River Mile 119
No Cell Reception
Same comments as Nisqually John Landing

42. Wawawai Landing-USACE
Access by Highway 193 at Mile 14
Snake River Mile 111
Same as Blyton Landing but with rowing and sailboats staged; school or club
Laundry and showers
County Park just above

43. Boyer Park and Marina
Access by Highway 193
Snake River Mile 105
Good ramp, moorage, gas, groceries, restaurant and motel, laundry, bait and tackle
Large paved area for staging
Large gravel area

NOTE: There are several very good paved pullouts along Highway 193 (Wawawai Road) where boom trailers could be stopped to dump boom into the river.

44. Lower Granite State Airport
Access by Highway 194
Snake River Mile 106
Good airfield for small craft and helicopters
Paved strip 1.4 miles long
Just below Lower Granite Dam

45. Lower Granite Dam
Snake River Mile 108
Vehicle crossing hours Monday – Friday 0630 -1730.
No boat ramp access on lower side at locked gate

46. Penawawa Road Loop
Snake River Mile 92
From Highway 26 to Highway 127 between Dusty, WA and Colfax, WA
May have river access
The chart shows a basin with 12’ vertical clearance
Did not visit

47. Central Ferry State Park-Washington
At junction of Highway 127 and Snake River.
Snake River Mile 82
Ramp, camping, restrooms, looks like a large facility
Facility closed and could not visit

48. Port of Garfield Park
At junction of Highway 127 and Snake River.
Snake River Mile 83
Ramp just beyond Pomeroy Grain Growers elevators
Small gravel area for staging

49. Two Rivers Park-Benton Co.
Kennewick, WA
Columbia River Mile 323
Near mouth of Snake River
Good ramp, no moorage
Strong currents at spring
Medium sized gravel staging
Outhouse
Drive along residential area to access

50. Plymouth Park-USACE
Plymouth, WA
Access by Highway 14
Columbia River Mile 290
Good Ramp and paved staging area
Outhouse

51. Umatilla NWR-USACE
Paterson, WA
Access by Highway 14
Columbia River Mile 278
Muddy dirt ramp adjacent to large irrigation pump station (pumps just above). Limited gravel staging area

52. Whitcomb Island Intake
Highway 14, Exit near Mile 159
Columbia River Mile 267
Narrow canal to feed irrigation pump intake
Could dump skiffs in here; 6' bank
Protect with one piece of boom inside canal
Good gravel roads lead to site through farm land

53. Crow Butte Park–Port of Benton & USACE 800-628-PORT
Highway 14 and Sonova Rd, Exit near Mile 155
Columbia River Mile 262
Treaty Fishing Access Site-Restricted. Located in park
Public ramp and moorage too
Good small ramp and good moorage for small boats
in a protected basin
Camping and showers
Good paved staging areas
Grass areas with shade
No cell service or poor signal
Larger ramp too; just beyond and separate from small ramp
14' 9" bridge clearance on entry road

54. Access Point
Highway 14 at Mile 151,Gravel Rd.
Access past railroad tracks to rip rap bank
Steep gravel road with limited area to turn around.
No trailers
Very steep road

55. Alder Creek
Alderdale, WA
Highway 14
Columbia River Mile 259
Tribal fishing access
Just below creek
Gated "US Property"
Expect a ramp, some staging and moorage, restrooms

56. Pine Creek Treaty Fishing Access
Highway 14, Mile 142
Columbia River Mile 257?
Marked "US Property"
Ramp, moorage, outhouse, paved

57. Roosevelt Park-USACE
Roosevelt, WA
Columbia River Mile 242
Good ramp, paved and gravel staging areas
Very small moorage
Tribal access is adjacent
Outhouses
Irrigation intake pumps near entrance
Sail board park above tribal access area

58. Sundale Treaty Fishing Access
Highway 14
Columbia River Mile 238
Open to public during non-tribal fishing times*
Good ramp, no moorage, good clearance under tracks to well protected basin Paved staging
Tables and fire pits

59. Pasture Point Treaty Fishing Access Site
Highway 14, Mile 119
Columbia River Mile 229
Locked gate during visit
Just below Rock Creek
Nez Perce, Umatilla, Warm Springs, Yakima Ramp,
Ramp, paved area, etc.

60. Cliffs Park-USACE
Highway 14, Just below John Day Dam
Columbia River Mile 215
Gravel ramp and staging, no moorage
Tribal fishing platform at ramp
Outhouse
Paved and gravel roads

61. Mary Hill State Park
Highway 97 near Highway 14
Columbia River Mile 210
Good ramp and paved staging
Camping, restrooms, showers
Shaded grass areas with tables
Dock for loading gear, no moorage
5 mooring buoys
Good cell service
Good Sam Peach Beach RV Park is adjacent and just up stream

62. Avery Site Treaty Fishing Access-USACE
Wishram, WA
Columbia River Mile 198
Reserved for tribes but open to public during off season
Good Ramp gravel staging areas
Outhouse, shade trees and tables

63. Horsethief Lake State Park
Highway 14
Columbia River Mile 194
(Columbia Hills State Park)
1st Ramp – Closed basin
2nd Ramp – Good paved ramp, no staging area
Park has all features
Petroglyphs removed for dam pool formation are displayed near 2nd ramp. A place of quiet and worship for tribes. Not a good place to work from

64. Bingen Point Marina-Port of Klickitat
Bingen, WA
Columbia River Mile 172
A well protected basin
Large gravel staging area at port.
Good large ramp
Entrance marked with ATONS Red 4, Green 3
Grass area, shade trees, restrooms, street lamps for security

65. Big White Salmon Indian Fishery
Highway 14
Columbia River Mile 168
At mouth of White Salmon River
Old ramp, crowded boat yard
Not a good spot

66. Drano Lake-Skamania County
Highway 14
Columbia River Mile 162
Good ramp and paved staging area
Large protected basin
15' vertical clearance to enter Columbia.
No moorage but could tie outside ramp dock
Outhouses

67. Home Valley
Highway 14
Columbia River Mile 155
Small good ramp with staging on the Wind River
Gas, groceries camping
Drive by assessment|

68. City of Stevenson
Stevenson, WA
Columbia River Mile 150
Good ramp with limited staging
No Moorage
Landing pier with mooring dolphins for larger vessels downstream.
Pedestrian pier
Services in town

69. City of Vancouver Ramp
Vancouver, WA
At observation tower, in industrial park
Very large paved ramp
No moorage. Gravel or dirt staging
Marine Park with restrooms, tables, shade trees and grass area nearby. Very crowded and a poor location for spill work

70. Steamboat Landing Marina
Highway 14 to Ellsworth Ave then Evergreen Highway
Columbia River Mile 113
Inside gated community
No information gathered
Atlas indicates moorage by reservation

71. Port of Camas-Washougal
Camas, WA
Columbia River Mile 122
Good large ramp and gravel staging area
Commercial fishing boats staged
Marine mechanical service adjacent
Full moorage with gas, diesel, electric
Floating restaurant (Puffin Café)
Grass areas with tables
Good facility but very busy during sport fishing season
Port offices on site

72. Steamboat Landing-City of Washougal
Washougal, WA
Hwy 14 at 15th street
Columbia River Mile 123
Dock only, no boat ramp
Good moorage
Rest rooms
Parking for solo vehicles only

73. Cape Horn Road
Highway 14 at Mile 16.45
Columbia River Mile 131
Dead ends at private gate before river; Cape Horn Landing sign on gate

74. Beacon Rock State Park-Washington
Highway 14, Mile 34, Doetsch Ranch Rd
Columbia River Mile 142
Good ramp and moorage for several boats in a protected basin
Large paved staging area
Restrooms, showers, shade trees
Camping area across the road

75. North Bonneville-USACE
North Bonneville, WA
Columbia River Mile 145
Good steep ramp.
No moorage.
Ramp is just below BRZ at Bonneville Dam.
Paved, narrow staging area.
Outhouses. Take dam visitor road just east of N. Bonneville.

76. Dalton Point
Interstate 84, Mile 29
Columbia River Mile 134
Access by West Bound I-84 only
Small ramp and staging area
Drive by assessment from I-84 so limited details

77. Lewis and Clark State Park-Oregon
Troutdale, OR
Columbia River Mile 121
Small paved ramp on Sandy River near mouth
Large paved staging area across street
Shade trees and tables
May be busy in good weather

General Notes From Survey
This survey was completed over a period of four days and the route was not always linear because of the roads traveled to access the rivers by vehicle. The trip required travel of 1160 miles. The dates, routes and sites visited are described below.

March 31, 2008
The route covered the south or Oregon side of the river from Portland to Pasco, Washington. Sites 1-25 were visited.

April 1, 2008
This route started in Pasco, Washington on Pasco-Kahlotus Road and followed along the north bank of the Snake River. Highways 261, 127 and 12 were traveled as were some local roads.

The turnaround point was Lewiston, Idaho. Highway 193 was traveled to follow the Snake River. Sites 26-48 were visited.

April 2, 2008
The Washington side of the Columbia River was followed from Kennewick, Washington to Stevenson, Washington. Local roads and Highway 14 were traveled. Sites 49-68 were visited.

April 3, 2008
The route followed was Vancouver, Washington to Stevenson, Washington along Highway 14 and local roads. The Bridge of The Gods was crossed and Interstate 84 was followed downriver to Troutdale, Oregon. Sites 69-78 were visited.

Most of the access points are managed by government agencies and have similar features. The features generally include boat ramps, staging areas, sanitation and gates that can be secured at entrance roads. Not all have moorage available.

The Columbia River has good access because of the extensive highway systems and recreation sites that are present. Cellular telephone service

is generally good along the Columbia River and there are several lodging options because of larger cities and towns.

The Snake River has fewer access points when compared to the Columbia River. Highways and roads do not follow both banks for the entire length of the river. Cellular phone service is poor and does not work along most of the Snake. There are fewer cities and lodging options for response crews. The Snake does have recreation facilities and the dams provide good access points.

This list should not be considered as complete. Other excellent sources for this information are contained in the Evergreen Pacific River Cruising Atlas for the Columbia, Snake and Willamette Rivers, various yacht cruising guides and the Geographic Response Plans of the NWACP. The following websites are probably the best sources for this information:

Columbia River Trail Website at:
http://www.columbiawatertrail.org/watertrail

Oregon State Marine Board at: http://159.121.106.106/osmb/

Washington State Recreation and Conservation Office:
Boating Facilities Maps Intro Page at
http://www.rco.wa.gov/maps/boat.htm

L9.6. CATERING

It is important that crews be fed meals during the response to a spill incident. The American Red Cross is an excellent source for this service. The yellow pages and the internet are also excellent sources for commercial caterers. Past experience indicates that the caterers in Figure L9.c are reliable.

Figure L9.c UP RIVER CATERING OPTIONS

Happy Day Catering 1021 Bryden Ave. Lewiston ID 83501 208-743-0179 http://www.happydaycatering.com	Lunch Box Deli and BBQ 602 20th Street North Lewiston, ID 83501 208-743-5616	The Wayback Cafe 2138 13th Avenue Lewiston, ID 83501 208-743-2396
Leo's Catering 20 N Auburn Street Kennewick, WA 99336 509-582-6598	Walla Walla Catering Co. 45 Terminal Loop, Suite 7 Kennewick, WA 99336 509-301-6251	Class Act Catering & Café 400 E Scenic Drive The Dalles, OR 97058 541-506-6196
Four C's Catering 414 Washington Street The Dalles, OR 97058 541-993-1704 www.4cscatering.com	Lady J's Catering PO Box 1252 Walla Walla, WA 99362 (509) 301-7223	

L9.7. EQUIPMENT RENTAL

As with accommodations and catering, the largest, most accurate sources for information on equipment rentals are the yellow pages and the internet. However, Figure L9.d contains a list of sources for reference.

Figure L9.d UP RIVER EQUIPMENT RENTAL OPTIONS

Your Rental Center 1113 Trucker Road Hood River, OR (541) 386-2062	Budget Truck Rental 2375 Highway 35 Hood River, OR (541) 386-1193
RSC 2358 N 1st Street Hermiston, OR 97838 (541) 567-1052	United Rentals 2358 N 1st St. Hermiston 97838 (541) 567-3456
OXARC 80492 N Hwy 395 Hermiston, OR 97838 (541) 567-7377	United Rentals 1901 E Frontier Loop Pasco, WA (509) 546-2100
Star Rentals 1912 W a St. Pasco, WA 99301 (509) 545-8521	Rowand Machinery Co. 1907 E James Pasco, WA 99301 (800) 338-1052 / (509) 547-8813
Labor Ready 221 E Columbia Dr. Kennewick, WA 99336 (509) 582-3454	Sun Rental 116 North Morain Kennewick, WA 99336 (509) 783-8665
Hahn Rental 2121 Main St Lewiston, ID 83501 (208) 748-4246	

L10. Administration

Administration of this plan will be in accordance with Chapter (10) of the Plan. This will include all aspects of Implementation, response actions, the spill and exercise review process, and the documentation and update procedures.

Sections of this plan that are included by reference will be maintained per the administration sections of those specifically referenced plans. This includes the NWACP and GRPs, Covered Vessel's NTVRP and the administration producers of the Tidewater Integrated Response Plan outlined in their Authorization letter to MFSA dated April 4, 2007.

MFSA Vessel Response Plan – Binding Agreement
MFSA Vessel Response Plan – Submittal Agreement

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MARITIME FIRE & SAFETY ASSOCIATION

Columbia and Willamette Rivers · Oregon and Washington

Re: MFSA Vessel Response Plan - Binding Agreement

Maritime Fire & Safety Association ("**MFSA**") is the nonprofit corporation providing oil spill response and contingency plan coverage under the MFSA Vessel Response Plan (the "**Plan**"), an umbrella plan for vessels entering the Columbia River that enroll for coverage under the Plan. Upon enrolling under the Plan, through both the Enrollment Agreement and the MFSA Arrival Notice, which form a part of the Plan, each vessel and its owner/operator (collectively "**Covered Vessel**"), makes the following binding agreement pursuant to WAC 173-182-220 and authorizes MFSA to make this binding agreement on behalf of the Covered Vessel as part of the Plan:

- Verifies acceptance of the Plan and commits to a safe and immediate response to spills or substantial threats of spills in Washington;
- Commits to having an incident commander in the state within six hours after notification of a spill or substantial threat of spill;
- Commits to the implementation and use of the Plan during a spill or substantial threat of spill, and to the training of personnel (through MFSA) to implement the Plan;
- Commits to working in unified command within the incident command system; to ensure that all personnel and equipment resources necessary to the response will be called out; and
- Verifies authority and capability of the plan holder to make necessary and appropriate expenditures in order to implement plan provisions.

MFSA hereby verifies acceptance of the Plan and commits to (a) training of personnel to implement the Plan and (b) Implementation of the Plan upon Notification, including: (i) a safe and immediate response to spills or substantial threats of spills in Washington; (ii) having an Incident Commander in the state within six hours after Notification; and (iii) the authority and capability to make the necessary and appropriate expenditures in order to implement Plan provisions. The individual signing this Agreement on behalf of MFSA does so in a representative capacity only, and assumes no personal liability in an individual capacity on behalf of Covered Vessels or the MFSA, which liability is expressly disclaimed and denied. Capitalized terms not otherwise defined in this letter have the meaning defined in the Plan.

Submitting Party Information

Umbrella Plan Holder: Maritime Fire & Safety Association	
Contact Name: Elizabeth Wainwright, Executive Director	
Address: 200 SW Market Street, Suite 190, Portland, OR 97201	
Phone Number: (503) 228-4361; (503) 220-2091	**Fax Number**: 503-295-3660
Email: wainwright@pdxmex.com	**Website**: www.mfsa.com

Maritime Fire & Safety Association, as authorized designee with authority to bind Covered Vessels

By: _____ June 27, 2013

Elizabeth Wainwright, Executive Director — Date

Maritime Fire & Safety Association, as the umbrella plan holder

By: _____ June 27, 2013

Elizabeth Wainwright, Executive Director — Date

MARITIME FIRE & SAFETY ASSOCIATION

Columbia and Willamette Rivers · Oregon and Washington

Re: MFSA Vessel Response Plan - Submittal Agreement

Maritime Fire & Safety Association ("**MFSA**") is the nonprofit corporation providing oil spill response and contingency plan coverage under the MFSA Vessel Response Plan (the "**Plan**"), an umbrella plan for vessels entering the Columbia River that enroll for coverage under the Plan (each a "**Covered Vessel**"). The owner or operator of a Covered Vessel or a person with authority to bind the corporation that owns or operates a Covered Vessel has signed an Enrollment Agreement, which forms a part of the Plan. Through the Enrollment Agreement, each owner or operator of a Covered Vessel:

- Verifies acceptance of the Plan;
- Commits to execution of the Plan; and
- Verifies authority for the plan holder to make appropriate expenditures in order to execute Plan provisions.

Evidence of a Covered Vessel's coverage under the Plan is maintained by MFSA on an ongoing basis as each Covered Vessel enrolls in the Plan and can be provided to the Oregon Department of Environmental Quality upon request.

Submitting Party Information:

Umbrella Plan Holder: Maritime Fire & Safety Association	
Contact Name: Elizabeth Wainwright, Executive Director	
Address: 200 SW Market Street, Suite 190, Portland, OR 97201	
Phone Number: (503) 228-4361; (503) 220-2091	**Fax Number**: 503-295-3660
Email: wainwright@pdxmex.com	**Website**: www.mfsa.com

This Submittal Agreement is incorporated in the Plan in accordance with OAR 340-141-0140(1).

Maritime Fire & Safety Association, submitting party as umbrella plan holder

By: _____ June 27, 2013

Elizabeth Wainwright, Executive Director — Date

Excel spreadsheets of equipment and resources used to meet the Washington State Planning Standards of WAC 173-182 follow this page.

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Washington State Department of Ecology
WAC 173-182 Planning Standard Calculations

WAC 173-182-420 Vancouver planning standard. Those covered vessel and facility plan holders that transit or operate on the Columbia River between statute mile 99 and statute mile 107.

NOTE: Planning standard calculations shown indicate resources listed on the WRRL and information provided through the Primary Response Contractor applications as of plan approval (conditional) date. This information is subject to change as equipment is acquired and relocated.

NOTE: This equipment does not necessarily represent the equipment that would be deployed in the event of a spill. This is not a response standard, this is only a representation of equipment that would be available based on the guidelines set forth in WAC 173-182 for planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance will depend on traffic, weather, safety considerations, and operator discretion.

NOTE: WAC 173-182-335 Planning standards for storage: For freshwater environments, shoreside storage can be identified to meet sixty-five percent of the storage requirements in the planning standards if the plan holder can demonstrate that recovered oil can be transported to the shoreside storage. Access to fixed temporary storage is verified through plan review, letters of intent between companies, and primary response contractor applications.

Plan Holder: **Marine Fire & Safety Association (MFSA)**
PRC: **Clean River Cooperative (CRC)**
Worst Case Volume: **300,000 bbls [PRODUCT]**
Mutial Aid: **N/A**
Shoreside storage available: **PRC dependant**

Category Definitions

Mobilization Times	Boom Type
Dedicated, plan holder owned = 30 mins	**B1**: boom > 42"
Dedicated, PRC owned = 1 hour	**B2**: boom between 18" and 42"
Non-Dedicated = 3 hour	**B3**: boom < 18"

Planning Transit Distance = [(hour benchmark - mobilization time) x transit speed]

Distance to Planning Standard = miles/nautical miles from staging area to the applicable planning standard.

Distance to Planning Standard <1m: The equipment is staged within the planning standard area.

Product: oil group(s) in which skimmers can be effective. Definition - 33CFR155.1020

Assets in italics are available for a response however no transportation or dedicated support platform is associated.

Benchmark Calculations

Hr 2 A safety assessment of the spill by work boat with trained crew and appropriate air monitoring, with 1000 feet of boom could have arrived

Organization	Asset	Home Base	Mobilization Time	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product Type (I,II, III, IV, V)	Storage (BBLS)	People
CRC	40' Trailer (35-112)	Port of Vancouver	1	n/a	< 1	-	4,100	-	-	-	-	-	-
CRC	16' Boston Whaler w/40hp	Portland, OR	1	35 m	10 m	-	-	-	-	-	-	-	2

Hr 3 Additional 2000 feet of boom, or four times the length of the largest vessel whichever is less, to be used for containment , protection or recovery could have arrived

Organization	Asset	Home Base	Mobilization Time	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product Type (I,II, III, IV, V)	Storage (BBLS)	People
CRC	40' Trailer (35-112)	Port of Vancouver	1	n/a	< 1	-	3,100	-	-	-	-	-	-

Hr 6	**Boom:** Additional 6000 feet of boom with at least 3000 feet of boom being calm water - current capable, for containment, protection or recovery could have arrived	**6,000' boom including 3,000' calm water/ current capable**
	Recovery: Capacity to recover the lesser of 3% of worst case spill volume or 12,000 barrels within 24-hr period could have arrived. 10% must be able to working in shallow water environments - depth of 10 feet or less.	**9,000 bbls on water recovery required**
	Storage: 1 times the EDRC (65% on water).	**4,050 bbls on water storage required.**

Organization	Asset	Home Base	Mobilization Time	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product Type (I,II, III, IV, V)	Storage (BBLS)	People
CRC	40' Trailer (35-112)	Port of Vancouver	1	n/a	< 1	-	1,100	-	-	-	-	-	-
CRC	Shallow Water Recovery Barge (29-233)	Tesoro Vancouver	1	n/a	< 1	-	-	400	2,473	-	-	100	2
TBL	Tidewater Barge 4 (57-302)	Tidewater, Vancouver	1	n/a	< 1	-	-	-	-	-	-	12,958	3
CRC	22' Boston Whaler w/150 hp	Portland, OR	1	105 m	10 m	-	-	-	-	-	-	-	2
CRC	20' Alumaweld w/115 hp	Portland, OR		105 m	10 m	-	-	-	-	-	-	-	2
CRC	Douglass 18000	Tidewater Barge 4	1	n/a	< 1	-	-	-	2,057			-	-
CRC	Douglass 18000	Tidewater Barge 4	1	n/a	< 1	-	-	-	2,057			-	-
CRC	CounterVac 3315	Tidewater Barge 4	1	n/a	< 1	-	-	-	4,457			12	1
CRC	Slickbar "High Capacity Oil Skimmer"	Tidewater Barge 4	1	n/a	< 1	-	-	-	1,714			-	-
CRC	OSRV HW ZARLING (22-202)	Fred's Marina, Portland	1	110 nm	4 nm	-	1,000	-	3,720	-		24	2
CRC	OSRV MFSA 1 (20-200)	Chevron Dock, Portland	1	110 nm	7 nm	-	1,000	-	3,720	-		24	2
CRC	Trailer	A-1 Moorage	3	105 m	14 m	-	-	3,000	-	-	-	-	-
CRC	Trailer, (41-50)	Portland Base	3	105 m	12 m	-	-	2,000	-	-	-	-	-
CRC	Trailer (29-235)	PFB Fire Station 6	3	105 m	15 m	-	-	2,000	-	-	-	-	-
					6 Hour Totals:	**-**	**3,100**	**7,400**	**20,198**	**0**	**0**	**13,118**	**14**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is <u>able</u> to meet the 3-6 hour planning standards.**

Washington State Department of Ecology
WAC 173-182 Planning Standard Calculations

Hr 12	**Boom:** Additional 20,000 feet of boom with at least 5,000 feet of boom being calm water - current capable, for containment, protection or recovery could have arrived	**20,000' additional boom**
	Recovery: Capacity to recover the lesser of 10% of worst case spill volume or 36,000 barrels within 24-hr period could have arrived. 25% must be able to working in shallow water environments - depth of 10 feet or less.	**21,000 bbls additional on water recovery including 5,250 bbls shallow water recovery**
	Storage: 1.5 times the EDRC (65% on water).	**16,200 bbls additional on water storage required**

Organization	Asset	Home Base	Mobilization Time	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product Type (I,II, III, IV, V)	Storage (BBLS)	People
		Available equipment remaining from 6 hour requirements:				-	100	4,400	11,198		-	9,068	-
CRC	SWRB (29-227)	Longview, WA	3	105 m	45 m	-	-	400	2,473	-		100	2
CRC	SWRB (29-226)	Longview, WA	3	105 m	45 m	-	-	400	2,473	-		100	2
CRC	SWB (29-230)	Longview, WA	3	105 m	45 m	-	-	0	-	-	-	100	-
CRC	FRV Columbia Responder	Longview, WA	1	45 nm	35 nm	-	-	-	-	-	-	-	2
CRC	Boom, 48' Trailer (35-105) 8x12	Longview, WA	3	105 m	45 m	-	4,200	-	-	-	-	-	-
CRC	Boom, 48' Trailer (35-107) 8x12	Longview, WA	3	105 m	45 m	-	5,300	-	-	-	-	-	-
CRC	20' Work Boat	Portland, OR	3	105 m	10 m	-	-	-	-	-	-	-	2
CRC	Elizabeth Furse	Portland, OR	3	105 m	10 m	-	-	-	-	-	-	-	2
CRC	14' Skiff	Portland, OR	3	105 m	10 m	-	-	-	-	-	-	-	2
CRC	14' Skiff	Portland, OR	3	105 m	10 m	-	-	-	-	-	-	-	2
NRCES	SRV 6035, Munson 25'	Rainier, FMC	1	125 nm	35 nm		600	-	-	-		50	2
NRCES	Marco skimmer, 6160??????	Rainier, FMC	3	105 m	45 m	-	-	-	1,740	-		43	2
NRCES	Boom, American Marine 8x12	Trailer 6168, Rainier, OR	3	105 m	46 m	-	1,300	-	-	-	-	-	-
NRCES	FRV #6028	Portland, Moorage	1	125 nm	12 nm	-	1,000	-	-	-	-	-	2
NRCES	Boom, Kepner 8x12	Portland Base	3	105 m	12 m	-	700	-	-	-	-	-	-
NRCES	Marco skimmer, 6160	Portland Base	3	105 m	12 m	-	-	-	1,740	-		43	2
NRCES	Boom, Kepner 8x12	Portland Base	3	735 m	12 m	-	2,300	-	-	-	-	-	-
CRC	Shallow Water Recovery Barge (29-235)	Portland Base	3	105 m	12 m	-	-	400	2,473	-		100	2
CRC	Shallow Water Barge (29-234)	Portland Base	3	105 m	12 m	-	-	-	-	-	-	100	-
CRC	Shallow Water Barge (29-232)	Portland Base	3	105 m	12 m	-	-	-	-	-	-	100	-
CRC	Shallow Water Barge (29-228)	Portland Base	3	105 m	12 m	-	-	-	-	-	-	100	-
CRC	Sause Bro's (LOI) - Barge Alesa Bay	Columbia River	3	LOI	LOI	-	-	-	-	-	-	45,000	-
					12 Hour Totals:	**0**	**15,500**	**5,600**	**22,097**	**-**	**0**	**54,904**	**24**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is able to meet the 12 hour planning standards.**

Hr 24	**Boom:** Additional 20,000 feet of boom with at least 10,000 feet of boom being calm water - current capable, for containment, protection or recovery could have arrived	**20,000' additional boom**
	Recovery: Capacity to recover the lesser of 14% of worst case spill volume or 48,000 barrels within 24-hr period could have arrived.	**12,000 bbls additional recovery required**
	Storage: 2 times the EDRC (65% on water).	**17,550 bbls additional on water storage required**

Organization	Asset	Home Base	Mobilization Time	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product Type (I,II, III, IV, V)	Storage (BBLS)	People
		Available equipment remaining from 12 hour requirements:				-	1,100	-	1,097	-	-	38,704	-
NRCES	Boom, American Marine 8x12	Portland Base	3	735 m	12 m	-	400	-	-	-	-	-	-
NRCES	Boom, American Marine 8x12	Portland Base	3	735 m	12 m	-	4,400	-	-	-	-	-	-
NRCES	Boom, American Marine 8x12	Portland Base	3	735 m	12 m	-	1,000	-	-	-	-	-	-
NRCES	Boom, American Marine 8x12	Portland Base	3	735 m	12 m	-	500	-	-	-	-	-	-
NRCES	Boom, American Marine 8x12	Portland Base	3	735 m	12 m	-	1,000	-	-	-	-	-	-
NRCES	Boom, American Marine 8x12	Portland Base	3	735 m	12 m	-	400	-	-	-	-	-	-
NRCES	Boom, American Marine 8x12	Portland Base	3	735 m	12 m	-	1,200	-	-	-	-	-	-
NRCES	Boom, American Marine 12x24	Portland Base	3	735 m	12 m	-	2,200	-	-	-	-	-	-
CRC	14' Skiff	Portland, OR	3	735 m	10 m	-	-	-	-	-	-	-	2
CRC	16' Skiff	Portland, OR	3	735 m	10 m	-	-	-	-	-	-	-	2
CRC	16' Skiff	Portland, OR	3	735 m	10 m	-	-	-	-	-	-	-	2
CRC	FRV Independence	Astoria, OR	1	575 nm	85 nm	-	-	-	-	-	-	-	2
CRC	Douglass 18000	Tidewater Barge 1728	1	168 nm	38 nm	-	-	-	2,057	-		-	-
CRC	CounterVac 3315	Tidewater Barge 1728	1	168 nm	38 nm	-	-	-	4457	-	-	12	-
CRC	Douglass 18000	Tidewater Barge 1728	1	168 nm	38 nm	-	-	-	2,057	-		-	-
CRC	Slickbar "High Capacity Oil Skimmer"	Tidewater Barge 1728	1	168 nm	38 nm	-	-	-	1,714	-		-	-
NRCES	Monark 6018	Portland, OR	3	735 m	12 m	-	-	-	-	-	-	-	2
NRCES	Munson 6035	Portland, OR	3	735 m	12 m	-	-	-	-	-	-	-	2
NRCES	"Sea Kite" 6604	Portland, OR	3	735 m	12 m	-	-	-	-	-	-	-	2
NRCES	LUND skiff 6461	Portland, OR	3	735 m	12 m	-	-	-	-	-	-	-	2
NRCES	"Raider" 6028	Portland, OR	3	735 m	12 m	-	-	-	-	-	-	-	2
TBL	Tidewater Barge 1728	Wauna, OR	1	168 nm	38 nm	-	-	-	-	-	-	5,356	3
CRC	OSRV Mark O. Hatfield, 20" boom	Cathlamet, WA	1	105 nm	40 nm	-	1,000	-	3720	-	-	24	2
CRC	OSRV Clean Rivers 1	Rainier, FMC	1	105 nm	35 nm	-	-	-	3720	-	-	24	2
CRC	48' Trailer (35-102), 20" boom	Astoria, OR	3	735 m	88 m	-	3,800	-	-	-	-	-	-
CRC	48' Trailer (35-103), 20" boom	Astoria, OR	3	735 m	88 m	-	4,100	-	-	-	-	-	-
CRC	Sause Bro's (LOI) - Barge Monterey Bay	Columbia River	3	LOI	LOI	-	-	-	-	-	-	45,000	-
					24 Hour Totals:	**0**	**21,100**	**0**	**18,822**	**-**	**0**	**89,120**	**25**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is able to meet the 24 hour planning standards.**

WAC 173-182-420 Vancouver Planning Standard: **MFSA**

Washington State Department of Ecology
WAC 173-182 Planning Standard Calculations

Hr 48	**Boom:** More boom as necessary for containment, recovery or protection					**as needed**								
	Recovery: Capacity to recover the lesser of 25% of worst case spill volume or 60,000 barrels within 24-hr period could have arrived.					**18,000 bbls additional recovery required**								
	Storage: More as necessary to not slow the response.					**as needed**								
Organization	**Asset**	**Home Base**	**Mobilization Time**	**Planning transit distance**	**Distance to Planning Standard**	**Boom Type B1 (feet)**	**Boom Type B2 (feet)**	**Boom Type B3 (feet)**	**EDRC (BPD) shallow / calm capable**	**EDRC (BPD) open water capable**	**Product Type (I,II, III, IV, V)**	**Storage (BBLS)**	**People**	
		Available equipment remaining from 24 hour requirements:				-	1,100		6,822	-	-	71,570	-	
CRC	48' Trailer (35-109), 20" boom	Wauna, OR	3	1575 m	38 nm	-	6,300	-	-	-	-	-	-	
CRC	48' Trailer (35-101), 40" boom	Astoria, OR	3	1575 m	88 m	-	1,000	-	-	-	-	-	-	
CRC	48' Trailer (35-101), 20" boom	Astoria, OR	3	1575 m	88 m	-	5,100	-	-	-	-	-	-	
CRC	Shallow Water Recovery Barge (29-231)	Astoria, OR	3	1575 m	88 m	-	-	-	2,473	-		100	2	
CRC	Shallow Water Recovery Barge (29-229)	Astoria, OR	3	1575 m	88 m	-	-	-	2,473	-		100	2	
NRCES	MARCO 1C	Seattle, WA	3	1575 m	178 m	-	-	-	3,678	-		43	2	
CRC	*API Drum Skimmer*	*Portland, OR*	*3*	*1575 m*	*11 m*	-	-	-	*1,800*	-	-	-	-	
CRC	*API Drum Skimmer*	*Portland, OR*	*3*	*1575 m*	*11 m*	-	-	-	*1,800*	-	-	-	-	
					48 Hour Totals:	**0**	**13,500**	**0**	**19,046**	**0**	**0**	**71,813**	**6**	
Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is <u>able</u> to meet the 48 hour planning standards.**														

Washington State Department of Ecology
Planning Standard Calculation
- DRAFT-

WAC 173-182-415 Cathlamet planning standard. Those covered vessel and facility plan holders that transit or operate on the Columbia River between statute mile 36 and statute mile 42. The resource to meet the two and three hour planning standards must be resident.

NOTE: Planning standard calculations shown indicate resources listed on the WRRL and information provided through the Primary Response Contractor applications as of plan approval (conditional) date. This information is subject to change as equipment is acquired and relocated.

NOTE: This equipment does not necessarily represent the equipment that would be deployed in the event of a spill. This is not a response standard, this is only a representation of equipment that would be available based on the guidelines set forth in WAC 173-182 for planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance will depend on traffic, weather, safety considerations, and operator discretion.

NOTE: WAC 173-182-335 Planning standards for storage: For freshwater environments, shoreside storage can be identified to meet sixty-five percent of the storage requirements in the planning standards if the plan holder can demonstrate that recovered oil can be transported to the shoreside storage. Access to fixed temporary storage is verified through plan review, letters of intent between companies, and primary response contractor applications.

NOTE: Distances in this spreadsheet were calculated using multiple web-based mapping tools. Ecology will allow +/- 5 miles/nautical miles for planning standard distance calculations.

Plan Holder: **Maritime Fire & Safety Association (MFSA)**
PRC: **Clean River Cooperative (CRC)**
Worst Case Volume: **300,000 bbls**
Mutual Aid: **Mutual aid available through CRC member agreement**
Shoreside storage available: **PRC dependent**

Category Definitions

Mobilization Times	Boom Type
Dedicated, plan holder owned = 30 mins	**B1**: boom > 42"
Dedicated, PRC owned = 1 hour	**B2**: boom between 18" and 42"
Non-Dedicated = 3 hour	**B3**: boom < 18"

Planning Transit Distance = [(hour benchmark - mobilization time) x transit speed]
Distance to Planning Standard = miles/nautical miles from staging area to the applicable planning standard.
Distance to Planning Standard <1m: The equipment is staged within the planning standard area.
Product: oil group(s) in which skimmers can be effective. Definition - 33CFR155.1020
Assets in italics are available for a response however no transportation or support platform is associated to be counted toward the planning standards.

Benchmark Calculations

Hr 2 A safety assessment of the spill by work boat with trained crew and appropriate air monitoring, with 1,000 feet of boom could have arrived.

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
CRC	OSRV Mark O. Hatfield (8"x12")	Cathlamet, WA	1	22 nm	< 1 nm	-	1,000	-	3,720	-	-	24	2
					2 Hour Totals	**0**	**1,000**	**0**	**3,720**	**0**	**0**	**24**	**2**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is able to meet the 2 hour planning standards.**

Hr 3 Additional 2,000 feet of boom, or 4 times the length of the largest vessel whichever is less, to be used for containment, protection or recovery could have arrived.

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
		Available equipment remaining from 2 hour requirements:				-	-	-	3,720	-	-	24	-
TBL	TBL Barge 1728	Wauna, OR	n/a		< 1 nm	-	-	-	-	-	-	12,958	3
CRC	Douglas 18000	TBL Barge 1728	n/a		< 1 nm	-	-	-	2,057	-	-	-	-
CRC	Douglas 18000	TBL Barge 1728	n/a		< 1 nm	-	-	-	2,057	-	-	-	-
CRC	Slickbar High Cap Skimmer	TBL Barge 1728	n/a		< 1 nm	-	-	-	1,714	-	-	-	-
CRC	Trailer (35-109)	Wauna, OR	1		< 1 m	-	6,300	-	-	-	-	-	-
CRC	FRV Columbia Responder (8"x12")	Longview, WA	1	33 nm	20 nm	-	1,000	-	-	-	-	-	2
					3 Hour Totals	**0**	**7,300**	**0**	**9,548**	**0**	**0**	**12,982**	**5**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is able to meet the 3 hour planning standards.**

Hr 6	Additional 7,000 feet of boom with at least 4,200 feet of boom being calm water - current capable for containment, protection or recovery could have arrived.	**7,000 feet of boom required**
	Capacity to recover the lesser of 3% of worse case spill volume or 12,000 barrels within 24-hour period could have arrived. 10% must be able to work in shallow water environments - depth of 10 feet or less.	**9,000 bbls recovery required including 900 bbls shallow water capable.**
	1 times the EDRC	**3,150 bbls on water storage required**

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
		Available equipment remaining from 3 hour requirements:				-	5,300	-	9,548	-	-	12,982	-
CRC	Trailer A-1 Moorage (6"x6")	Portland, OR	3 hr	105 m	75 m	-	-	3,000	-	-	-	-	-
CRC	BPF Fire Station Trailer (6"x6")	Portland, OR	3 hr	105 m	75 m	-	-	2,000	-	-	-	-	-
CRC	FRV Independence (6"x6")	Astoria, OR	1 hr	45 nm	36 nm		-	2,000	-	-	-	-	2
CRC	SWRB (29-226) (6"x6")	Longview, WA	3 hr	105 m	24 m	-	-	400	2,473	-	-	100	2
NRCES	WB Monarch 6185	Portland, OR	3 hr	105 m	75 m	-	-	-	-	-	-	-	2
CRC	SWRB (29-227) (6"x6")	Longview, WA	3 hr	105 m	24 m	-	-	400	2,473	-	-	100	2
CRC	14' skiff (28-212)	Portland, OR	3 hr			-	-	-	-	-	-	-	2
NRCES	WB Monarch 6016	Portland, OR	3 hr	105 m	75 m	-	-	-	-	-	-	-	2
NRCES	WB Monarch 6020	Portland, OR	3 hr	105 m	75 m	-	-	-	-	-	-	-	2
					6 Hour Totals	**0**	**5,300**	**7,800**	**14,494**	**0**	**0**	**13,182**	**14**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is able to meet the 6 hour planning standards.**

Washington State Department of Ecology
Planning Standard Calculation
- DRAFT-

Hr 12	Additional 20,000 feet of boom with at least 5,000 feet of calm water - current capable for containment, protection or recovery could have arrived.	**20,000 feet of boom required**
	Capacity to recover the lesser of 10% of worse case spill volume or 36,000 barrels within 24-hour period could have arrived. At least 25% of the skimming capability must be able to work in shallow water environments - depth of 10 or less and 25% must be open water capable.	**21,000 bbls additional recovery required including 7,500 bbls open water**
	1.5 times the EDRC	**12,600 bbls additional on water storage required**

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
		Available equipment remaining from 6 hour requirements:				-	3,500	3,600	5,494	-	-	9,132	-
CRC	Boom Utility Trailer (6"x6")	Portland, OR	3 hr	105 m	75 m	-	-	2,000	-	-	-	-	-
TBL	TBL Barge 1?	Vancouver, WA	1 hr	88 nm	57 nm	-	-	-	-	-	-	5,356	3
CRC	Douglas 18000	TBL Barge 1?	1 hr	-	-	-	-	-	2,057	-	-	-	-
CRC	Douglas 18000	TBL Barge 1?	1 hr	-	-	-	-	-	2,057	-	-	-	-
CRC	Slickbar High Cap Skimmer	TBL Barge 1?	1 hr	-	-	-	-	-	1,714	-	-	-	-
CRC	16' boston whaler	Portland, OR	3 hr	105 m	75 m	-	-	-	-	-	-	-	2
CRC	SWB (29-230)	Longview, WA	3 hr			-	-	-	-	-	-	100	-
CRC	22' Boston Whaler w/150 hp	Portland, OR	3 hr	105 m	75 m	-	-	-	-	-	-		2
CRC	Trailer (8"x12")(35-110)	St. Helens, WA	3 hr	315 m		-	5,100	-	-	-	-	-	-
CRC	20' Alumaweld w/115 hp	Portland, OR	3 hr	105 m	75 m	-	-	-	-	-	-	-	2
CRC	Trailer (8"x12")(35-112)	Vancouver, WA	3 hr	315 m		-	4,100	-	-	-	-	-	-
CRC	48' Trailer (8"x12")(35-105)	Longview, WA	3 hr			-	4,200	-	-	-	-	-	-
CRC	48' Trailer (8"x12")(35-107)	Longview, WA	3 hr			-	5,300	-	-	-	-	-	-
NRCES	32' FRV #7 (8"x12")	Aberdeen, WA	1 hr	275 nm	153 nm	-	1,000	-	-	-	-	-	2
NRCES	Lamor/OPC2 w/ LiquidTote o/b FRV 7	Aberdeen, WA	1 hr	275 nm	153 nm	-	-	-	-	3,019	-	8	-
NRCES	Trailer Seattle, Lamor Brush Skimmer, tank	Kent, WA	1 hr			-	-	-	-	3,019	-	8	-
NRCES	FRV 1 (8"x12")	Rainier, OR	1 hr	125 nm	20 nm	-	1,000	-	-	-	-	-	2
		12 Hour Totals:				**0**	**24,200**	**5,600**	**11,322**	**6,038**	**0**	**14,604**	**13**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is <u>able/unable</u> the 12 hour planning standards.**

Hr 24	Additional 20,000 feet of boom with at least 10,000 feet of boom being calm water - current capable for containment, protection or recovery could have arrived.	**20,000 feet of boom required**
	Capacity to recovery to the lesser of 14% of worse case spill volume or 48,000 barrels within 24-hour period could have arrived. At least 25% must be open water capable.	**12,000 bbls additional recovery required including 3,000 open water capable.**
	2 times the EDRC	**13,650 bbls additional on water storage required**

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
		Available equipment remaining from 12 hour requirements:				-	9,200	600				2,004	
CRC	28' Trailer (35-106) (20)	Skamokawa, WA	3		4	-	2,500	-	-	-	-	-	-
CRC	SWRB (Tongue Point) (29-229)(12")	Astoria, OR				-	-	400	2,473	-	-	100	-
CRC	16" Skiff (28-211)	Portland, OR	3			-	-	-	-	-	-	-	2
NRCES	WB JETCRAFT 6464	Portland, OR	3			-	-	-	-	-	-	-	2
CRC	SWRB (Tongue Point) (29-231) (12")	Astoria, OR	3			-	-	400	2,473	-	-	100	-
NRCES	WB 6461	Portland, OR	3			-	-	-	-	-	-	-	2
CRC	16" Skiff (28-210)	Portland, OR	3			-	-	-	-	-	-	-	2
NRCES	Spokane Trailer	Spokane, WA	3			-	-	1,000	-	-	-	-	
NRCES	Pasco Trailer	Pasco, WA	3			-	-	1,000	-	-	-	-	
CRC	48' Trailer (35-101) (20")	Astoria, OR	3			-	5100		-	-	-	-	
CRC	48' Trailer (35-102) (20")	Astoria, OR	3			-	3800		-	-	-	-	
CRC	48' Trailer (35-103) (20")	Astoria, OR	3			-	4100		-	-	-	-	
CRC	OSRV HW Zarling (20")	Portland, OR	1			-	1000		3,720			24	2
NRCES	SEA KITE 6604	Portland, OR	1			-	-	-	-	-	-	-	2
CRC	MFSA 1 (20")	Portland, OR	1			-	1000	-	3,720			24	2
NRCES	RAIDER # 6028 (20")	Portland, OR	1			-	1000	-	-	-	-	-	2
NRCES	Munson SRV #6035, (12")	Portland, OR	1			-	-	600	-	-	-	-	2
CRC	48' Trailer (35-101) (40")	Astoria, OR	3			-	1000		-	-	-	-	
LOI	non-dedicated barge	Columbia River	3			-	-	-	-	-	-	25,000	-
CRC	WB ELIZABETH FURSE	Portland, OR	3			-	-	-	-	-	-	-	2
		24 Hour Totals:				**0**	**28,700**	**4,000**	**12,386**	**0**	**-**	**27,252**	**20**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is <u>able</u> the 24 hour planning standards.**

Hr 48	More boom as necessary for containment, recovery or protection	**as needed**
	Capacity to recover the lesser of 25% of worst case spill volume or 60,000 barrels within 24-hour period could have arrived.	**18,000 bbls additional recovery required**
	More as necessary to now slow the response.	**as needed**

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
		Available equipment remaining from 24 hour requirements:				-	3,700	-	3,386	-	-	14,022	
NRCES	Marco Class X1	Richmond, CA	3			-	-	-	-	24,000	-	-	2
LOI	non-dedicated barge w/Tug	Columbia River	3	-	-	-	-	-	-	-	-	25,000	-
NRCES	SEA HAWK 6479	South Park, WA	3			-	-	-	-	-	-	-	2
NRCES	43" Inflatable Abasco (18"x25")	Astoria, OR	3			-	2500	-	-	-	-	-	-
NRCES	42" Containment Systems (18"x24")	Astoria, OR	3			-	2000	-	-	-	-	-	-
NRCES	American Marine (20")	Astoria, OR	3			-	1800	-	-	-	-	-	-
NRCES	Versatek Inflatable Boom (12"x18")	Astoria, OR	3			-	1000	-	-	-	-	-	-
NRCES	SEA FALCON 6602	South Park, WA	3			-	-	-	-	-	-	-	2
NRCES	WS 4	Seattle, WA	3			-	-	-	-	-	-	-	2
NRCES	WS 5	Seattle, WA	3			-	-	-	-	-	-	-	2
		48 Hour Totals:				**0**	**11,000**	**0**	**3,386**	**24,000**	**0**	**39,022**	**10**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard, **plan holder is <u>able</u> the 48 hour planning standards.**

WAC 173-182-415 Cathlamet staging area: **MFSA**

Washington State Department of Ecology
Planning Standard Calculations
DRAFT

WAC 173-182-450 Planning standards for the Washington coast. These standards apply to covered vessels that enter Washington waters at the **Columbia River**, Gray's Harbor or the Strait of Juan de Fuca, and offshore facilities.

NOTE: Planning standard calculations shown indicate resources listed on the WRRL and information provided through the Primary Response Contractor applications as of approval (conditional) date. This information is subject to change as equipment is acquired and relocated to meet the planning standards.

NOTE: This equipment does not necessarily represent the equipment that would be deployed in the event of a spill. This is not a response standard, this is only a representation of equipment that would be available based on the guidelines set forth in WAC 173-182 for planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance will depend on traffic, weather, safety considerations, and operator discretion.

NOTE: WAC 173-182-335 Planning standards for storage: For marine environments, shoreside storage can be identified to meet fifty percent of the storage requirements in the planning standards if the plan holder can demonstrate that recovered oil can be transported to the shoreside storage. Access to fixed temporary storage is verified through plan review, letters of intent between companies, and primary response contractor applications.

NOTE: Distances in this spreadsheet were calculated using multiple web-based mapping tools. Ecology will allow +/- 5 miles/nautical miles for planning standard distance calculations.

Plan Holder: **Maritime Fire and Safety Association**
PRC: **CRC**
Worst Case Volume: **300,000 bbls**
Mutual Aid: n/a
Available shoreside storage: **PRC Dependent**

Category Definitions

Mobilization Times	Boom Type
Dedicated, plan holder owned = 30 mins	**B1**: boom > 42"
Dedicated, PRC owned = 1 hour	**B2**: boom between 18" and 42"
Non-Dedicated = 3 hour	**B3**: boom < 18"

Planning Transit Distance = [(hour benchmark - mobilization time) x transit speed]
Distance to Planning Standard = miles/nautical miles from staging area to the applicable planning standard.
Distance to Planning Standard <1m: The equipment is staged within the planning standard area.
Product: oil group(s) in which skimmers can be effective. Definition - 33CFR155.1020
Assets in italics are available for a response however no transportation or support platform is associated to be counted toward the planning standards.

Plan holders shall be capable of sustaining a worst case spill response and shall develop and addendum specific to Washington's coast including;

(1) The capability, if applicable, for in-situ burning, dispersant, and mechanical recovery;	**PRC dependent**
(2) Surveillance equipment (including fixed wing, helicopters and low visibility equipment) to provide for aerial assessment of spill within six hours of spill awareness;	**Reference Oil Spill Contingency Plan**
(3) Time frames and mechanisms to cascade in equipment and other resources for up to seventy-two hours.	**See below**

Hr 12 — 10,000' of boom appropriate for shoreline protection, containment **and/or** 10,000' of open water boom for enhanced skimming, containment or other use to arrive within twelve hours. **20,000' boom for shoreline protection and open water skimming and /or containment**

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
CRC	SWRB 29-231, 12" boom	Astoria, OR	3	105 m	< 1 m	-	-	400	2,473	-	-	100	2
CRC	SWRB 29-229, 12" boom	Astoria, OR	3	105 m	< 1 m	-	-	400	2,473	-	-	100	2
CRC	48' Trailer (35-101), 40" boom	Astoria, OR	3	315 m	< 1 m	-	1,000	-	-	-	-	-	-
CRC	48' Trailer (35-102), 20" boom	Astoria, OR	3	315 m	< 1 m	-	3,800	-	-	-	-	-	-
CRC	48' Trailer (35-103), 20" boom	Astoria, OR	3	315 m	< 1 m	-	4,100	-	-	-	-	-	-
CRC	FRV INDEPENDENCE, 12" boom	Astoria, OR	1		< 1 nm	-	-	2,000	-	-	-	-	2
CRC	OSRV Mark O. Hatfield, 20" boom	Cathlamet, WA	1		17 nm	-	1,000	-	3720	-	-	24	2
NRCES	Trailer 3054, 20" boom, 30" boom	Astoria, OR	3	315 m	< 1 m	-	2,800	-	-	-	-	-	-
NRCES	FRV 1 (8"x12") boom	Astoria, OR	1	275 nm	< 1 nm	-	1,000	-	-	-	-	-	-
NRCES	Trailer, 42" boom	Portland, OR	3	315 nm	100 m	-	2,200	-	-	-	-	-	-
NRCES	FRV#6028, 20" boom	Portland, OR	1	275 nm	84 nm	-	1,000	-	-	-	-	-	2
NRCES	WB RAIDER	Portland, OR	1		84 nm	-	-	-	-	-	-	-	2
NRCES	Container 3065, 30" boom	Rainier, OR	3	315 nm	48 m	-	3,500	-	-	-	-	-	-
NRCES	FRV BEAVER, 30" boom	Westport, WA	1	275 nm	43 nm	-	1,000	-	-	-	-	-	2
NRCES	Spill Trailer, 30" boom	Aberdeen, WA	3	315 nm	84 m	-	4,000	-	-	-	-	-	-
NRCES	FRC #7, 20" boom	Aberdeen, WA	1	275 nm	53 nm	-	1,000	-	-	-	-	-	2
NRCES	SRV Munson 6035, 20" boom	Rainier, OR	1		55 nm	-	1,000	-	-	-	-	-	2
					12 Hour Totals:	**0**	**27,400**	**2,800**	**8,666**	**0**	**0**	**224**	**18**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard**, plan holder is able meet the 12 hour planning standards**

Hr 24 — 20,000' of boom appropriate for containment, protection or recovery to arrive within twenty-four hours. **20,000' of boom required**

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
					Available equipment remaining from 12 hour requirements:	-	10,200	-	-	-	-	-	-
CRC	A-1 Moorage	Portland, OR	3			-	-	3,000	-	-	-	-	-
CRC	Boom UtilityTrailer (41-50)	Portland, OR	3			-	-	2,000	-	-	-	-	-
CRC	PFB Fire Station 6 (29-235)	Portland, OR	3			-	-	2,000	-	-	-	-	-
NRCES	Container #3073, 30" boom	Milton, WA	3			-	3,000	-	-	-	-	-	-
					24 Hour Totals:	**0**	**13,200**	**7,000**	**0**	**0**	**0**	**0**	**0**

Based on location of contracted assets, mobilization time, transit distance, and distance to planning standard**, plan holder is able meet the 24 hour planning standards**

Based on resources referenced in the MFSA oil spill contingency plan, primary response contractor applications, and response equipment referenced on the Western Response Resource List (WRRL), MFSA can plan to cascade in equipment and other resources for up to seventy-two hours. The capability, if applicable, for in-situ burning, dispersant, and surveillance equipment (including fixed wing, helicopters and low visibility equipment) will be tested during drills.

Washington State Department of Ecology
Planning Standard Calculations

WAC 173-182-430 Tri Cities Planning Standard. Those covered vessel and facility plan holders that transit or operate on the Columbia River between statute mil 316 and statue mile 322 must meet the following standards.

NOTE: Planning standard calculations shown indicate resources listed on the WRRL and information provided through the Primary Response Contractor applications as of plan approval (conditional) date. This information is subject to change as equipment is acquired and relocated.

NOTE: This equipment does not necessarily represent the equipment that would be deployed in the event of a spill. This is not a response standard, this is only a representation of equipment that would be available based on the guidelines set forth in WAC 173-182 for planning standards, determining effectiveness of recovery systems, documenting compliance with planning standards, and plan evaluation criteria. Actual times and performance will depend on traffic, weather, safety considerations, and operator discretion.

NOTE: WAC 173-182-335 Planning standards for storage: For freshwater environments, shoreside storage can be identified to meet 45% percent of the storage requirements in the planning standards if the plan holder can demonstrate that recovered oil can be transported to the shoreside storage. Access to fixed temporary storage is verified through plan review, letters of intent between companies, and primary response contractor applications.

NOTE: Distances in this spreadsheet were calculated using multiple web-based mapping tools. Ecology will allow +/- 5 miles/nautical miles for planning standard distance calculations.

Plan Holder: **Maritime Fire and Safety Association**
PRC: **CRC, Tidewater**
Worst Case Volume: **14,474 gallons (345 bbls) diesel**
Mutual Aid: n/a
Shoreside storage available: **shoreside storage as available**

Category Definitions

Mobilization Times	Boom Type
Dedicated, plan holder owned = 30 mins	**B1**: boom > 42"
Dedicated, PRC owned = 1 hour	**B2**: boom between 18" and 42"
Non-Dedicated = 3 hour	**B3**: boom < 18"

Planning Transit Distance = [(hour benchmark - mobilization time) x transit speed]
Tidewater Barge Lines has been granted at 45 mph alternate travel speed over land.
Distance to Planning Standard = miles/nautical miles from staging area to the applicable planning standard.
Distance to Planning Standard <1m: The equipment is staged within the planning standard area.
Product: oil group(s) in which skimmers can be effective. Definition - 33CFR155.1020
Assets in italics are available for a response however no transportation or support platform is associated to be counted toward the planning standards.

Benchmark Calculations

Hr 2 A safety assessment of the spill by work boat with trained crew and appropriate air monitoring, with 1,000 feet of boom could have arrived

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
TBL	28' LAMPLIGHTER	Pasco, WA	0.5	67.5 m	< 1 m	-	-	-	-	-	-	-	2
TBL	Pasco Trailer (8"x12")	Pasco, WA	0.5	67.5 m	< 1 m	-	1,200	-	-	-	-	-	-

Based on location of contracted assets, mobilization time, transit distance and distance to planning standard, **plan holder is able to meet the 2 hour planning standard.**

Hr 3 Additional 2000 feet of boom, or four times the length of the largest vessel whichever is less, to be used for containment , protection or recovery could have arrived

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
		Available equipment remaining from 2 hour requirements:				-	200	-	-	-	-	-	-
TBL	Pasco Trailer (8"x12")	Pasco, WA	.5 hr	112.5	< 1 m	-	600	-	-	-	-	-	-
TBL	15' Boom Boat	Pasco, WA	.5 hr	112.5	< 1 m	-	-	-	-	-	-	-	2
TBL	Response Trailer, Boom (8"x12")	Tidewater Terminal, Pasco	.5 hr	112.5	< 1 m	-	1,200	-	-	-	-	-	-
					3 hour totals:	**-**	**800**	**-**	**-**	**-**	**-**	**-**	**2**

Based on location of contracted assets, mobilization time, transit distance and distance to planning standard, **plan holder is able to meet the 3 hour planning standard.**

6 HR	**Boom:** Additional 8,000 feet of boom with at least 4,800 feet of boom being calm water - current capable for containment, protection or recovery could have arrived.	**8,000 feet additional boom required**
	Recovery: Capacity to recover the lesser of 3% of worst case spill volume or 12,000 barrels within a 24-hr period could have arrived. 10% must be able to work in shallow water environments - depth of 10 feet or less.	**10 bbls on water recovery required**
	Storage: 1 times the EDRC (45% on water)	**5 bbls on water storage required**

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
		Available equipment remaining from 3 hour requirements:				-	-	-	-	-	-	-	-
TBL	14' Boat	Tidewater Terminal, Pasco	.5 hr	247.5 m	< 1 m	-	-	-	-	-	-	-	2
TBL	14 Boat	Tidewater Terminal, Pasco	.5 hr	247.5 m	< 1 m	-	-	-	-	-	-	-	2
TBL	Tank Barge #1	Tidewater Terminal, Pasco	.5 hr	247.5 m	< 1 nm	-	-	-	-	-	-	25,083	
TBL	Response Trailer, Boom (8"x12")	Tidewater Terminal, Pasco	.5 hr	247.5 m	< 1 m	-	600	-	-	-	-	-	-
TBL	Response Trailer, Port-a-tank	Tidewater Terminal, Pasco	.5 hr	247.5 m	< 1 m	-	-	-	-	-	-	29	-
TBL	Douglas 2" Skim Pak	Tidewater Terminal, Pasco	.5 hr	247.5 m	< 1 m	-	-	-	480	-		-	-
TBL	Douglas 2" Skim Pak	Tidewater Terminal, Pasco	.5 hr	247.5 m	< 1 m	-	-	-	2,059	-		-	1
NRCES	Trailer, (6"x6")	Spokane, WA	1	225 m	136 m	-	-	1,000	-	-	-	-	-
NRCES	Trailer, (6"x6")	Pasco, WA	1	225 m	3 m	-	-	1,000	-	-	-	-	-
NRCES	Trailer 3196, Lund Skiff 6548	Pasco, WA	1	225 m	3 m	-	-	-	-	-	-	-	2
NRCES	Trailer 6447, Lund Skiff 6547	Pasco, WA	1	225 m	3 m	-	-	-	-	-	-	-	2
NRCES	Trailer 6599, WS 1, 6606	Pasco, WA	1	225 m	3 m	-	-	-	-	-	-	-	2
TBL	Response Trailer, Boom (8"x12")	Umatilla, OR	3 hr	135 m	36 m	-	600	-	-	-	-	-	-
TBL	Response Trailer, Port-a-tank	Umatilla, OR	3 hr	135 m	36 m	-	-	-	-	-	-	29	-
TBL	Storage, Boom (8"x12")	Umatilla, OR	3 hr	135 m	36 m	-	1,200	-	-	-	-	-	-
TBL	Douglas 2" Skim Pak	Umatilla, OR	3 hr	135 m	36 m	-	-	-	480	-		-	-
TBL	15' Boom Boat	Umatilla, OR	3 hr	135 m	36 m	-	-	-	-	-	-	-	2
CRC	Connex Box (8"x12") Connex Box	Boardman, OR	3 hr	135 m	61 m	-	2,000	-	-	-	-	-	-

Washington State Department of Ecology
Planning Standard Calculations

Organization	Asset	Home Base	Mobilization Time (hr)	Planning transit distance	Distance to Planning Standard	Boom Type B1 (feet)	Boom Type B2 (feet)	Boom Type B3 (feet)	EDRC (BPD) shallow / calm capable	EDRC (BPD) open water capable	Product (Group II, III, IV, V)	On Water Storage (BBLS)	People
TBL	Response Trailer, Boom (8"x12")	Boardman, OR	3 hr	135 m	61 m	-	600	-	-	-	-	-	-
TBL	Response Trailer, Douglas 2" Skim Pak	Boardman, OR	3 hr	135 m	61 m	-	-	-	480	-	-	-	-
TBL	Response Trailer, Port-a-tank	Boardman, OR	3 hr	135 m	61 m	-	-	-	-	-	-	29	-
TBL	15' Boom Boat	Boardman, OR	3 hr	135 m	61 m	-	-	-	-	-	-	-	2
TBL	Response Trailer, Douglas 2" Skim Pak	Little Goose Dam, OR	3 hr	135 m	70 m	-	-	-	480	-	-	-	-
TBL	Response Trailer, Boom (8"x12")	Little Goose Dam, OR	3 hr	135 m	70 m	-	600	-	-	-	-	-	-
TBL	Response Trailer, Port-a-tank	Little Goose Dam, OR	3 hr	135 m	70 m	-	-	-	-	-	-	29	-
TBL	15' Boom Boat	Little Goose Dam, OR	3 hr	135 m	70 m	-	-	-	-	-	-	-	2
TBL	TBL Barge (8"x12")	Columbia River	3 hr	-	-	-	1,200	-	480	-	-	-	-
					6 Hour Totals:	**0**	**6,800**	**2,000**	**4,459**	**0**	**0**	**25,199**	**17**
Based on location of contracted assets, mobilization time, transit distance and distance to planning standard, **plan holder is able to meet the 6 hour planning standard**.													
12 HR	**Boom:** Additional 20,000 feet of boom with at least 5,000 feet of boom being calm water - current capable, for containment, protection, ore recovery could have arrived.					**20,000 feet additional boom required**							
	Recovery: Capacity to recover the lesser of 10% of worst case spill volume or 36,000 barrels within 24-hr period could have arrived. At least 25% of the skimming capability must be able to work in shallow water environments - depth of 10 feet or less.					**25 bbls additional on water recovery required**							
	Storage: 1.5 times the EDRC (45% on water)					**18 bbls additional on water storage**							
Organization	**Asset**	**Home Base**	**Mobilization Time (hr)**	**Planning transit distance**	**Distance to Planning Standard**	**Boom Type B1 (feet)**	**Boom Type B2 (feet)**	**Boom Type B3 (feet)**	**EDRC (BPD) shallow / calm capable**	**EDRC (BPD) open water capable**	**Product (Group II, III, IV, V)**	**On Water Storage (BBLS)**	**People**
					Available equipment remaining from 6 hour requirements:	-	800	-	4,449	-	-	24,321	
TBL	Response Trailer, Boom (8"x12")	Hood River, OR	3 hr	405 m	155 m	-	600	-	-	-	-	-	-
TBL	Response Trailer, Douglas 2" Skim Pak	Hood River, OR	3 hr	405 m	155 m	-	-	-	480	-	-	-	1
TBL	Response Trailer, Port-a-tank	Hood River, OR	3 hr	405 m	155 m	-	-	-	-	-	-	29	-
TBL	15' Boom Boat	Hood River, OR	3 hr	405 m	155 m	-	-	-	-	-	-	-	2
CRC	Boom Utility Trailer (6"x6")	Portland, OR	3 hr	405 m	216 m	-	-	2,000	-	-	-	-	-
CRC	BPF Fire Station Trailer (6"x6")	Portland, OR	3 hr	405 m	216 m	-	-	2,000	-	-	-	-	-
CRC	16' Work Boat	Portland, OR	3 hr	405 m	216 m	-	-	-	-	-	-	-	2
CRC	SWRB (29-235)	Portland, OR	3 hr	405 m	216 m	-	-	400	2,473	-	-	100	2
CRC	20' Work Boat	Portland, OR	3 hr	405 m	216 m	-	-	-	-	-	-	-	2
CRC	SWRB (29-227)	Longview, WA	3 hr	405 m	257 m	-	-	400	2,473	-	-	100	2
CRC	22' Work Boat	Portland, OR	3 hr	405 m	216 m	-	-	-	-	-	-	-	2
CRC	SWRB (29-226)	Longview, WA	3 hr	405 m	257 m	-	-	400	2,473	-	-	100	2
CRC	Elizabeth Furse	Portland, OR	3 hr	405 m	216 m	-	-	-	-	-	-	-	2
CRC	SWRB (29-233)	Vancouver, WA	3 hr	405 m	216 m	-	-	400	2,473	-	-	100	2
CRC	Trailer A-1 Moorage (6"x6")	Portland, OR	3 hr	405 m	216 m	-	-	3,000	-	-	-	-	-
TBL	Response Trailer, Boom (8"x12")	Troutdale, OR	3 hr	405 m	201 m	-	600	-	-	-	-	-	-
TBL	Response Trailer, Douglas 2" Skim Pak	Troutdale, OR	3 hr	405 m	201 m	-	-	-	480	-	-	-	1
TBL	Response Trailer, Port-a-tank	Troutdale, OR	3 hr	405 m	201 m	-	-	-	-	-	-	29	-
TBL	15' Boom Boat	Troutdale, OR	3 hr	405 m	201 m	-	-	-	-	-	-	-	2
CRC	40' Trailer (35-112) (8"x12")	Vancouver, WA	3 hr	405 m	221 m	-	4,100	-	-	-	-	-	-
CRC	48' Trailer (35-107) (8"x12")	Longview, WA	3 hr	405 m	257 m	-	5,300	-	-	-	-	-	-
CRC	48' Trailer (35-105) (8"x12")	Longview, WA	3 hr	405 m	257 m	-	4,200	-	-	-	-	-	-
					12 Hour Totals:	**0**	**15,600**	**8,600**	**15,301**	**0**	**0**	**24,779**	**22**
Based on location of contracted assets, mobilization time, transit distance and distance to planning standard, **plan holder is able to meet the 12 hour planning standard**.													
24 HR	**Boom:** Additional 20,000 feet of boom with at least 10,000 feet of boom being calm water - current capable for boom containment, recovery or protection could have arrived.					**20,000 feet additional boom required**							
	Recovery: Capacity to recover the lesser of 14% of worst case spill volume or 48,000 barrels within 24-hr period could have arrived.					**13 bbls additional on water recovery required**							
	Storage: 2 times the EDRC (50% on water)					**20 bbls additional on water storage required**							
Organization	**Asset**	**Home Base**	**Mobilization Time (hr)**	**Planning transit distance**	**Distance to Planning Standard**	**Boom Type B1 (feet)**	**Boom Type B2 (feet)**	**Boom Type B3 (feet)**	**EDRC (BPD) shallow / calm capable**	**EDRC (BPD) open water capable**	**Product (Group II, III, IV, V)**	**On Water Storage (BBLS)**	**People**
					Available equipment remaining from 12 hour requirements:	-	600	3,600		-	-	21,269	-
NRCES	WB RAIDER (6"x6")	Portland, OR	1 hr	945 m	216 m	-	-	1,000	-	-	-	-	2
NRCES	Container 6167 (4"x4")	Portland, OR	3 hr	945 m	216 m	-	-	400	2,473	-	-	100	-
NRCES	Container 6174 (6"x6")	Portland, OR	3 hr	945 m	216 m	-	-	600	-	-	-	-	-
NRCES	Monark 6018	Portland, OR	3 hr	945 m	216 m	-	-	-	-	-	-	-	2
NRCES	Monark 6019	Portland, OR	3 hr	945 m	216 m	-	-	-	-	-	-	-	2
NRCES	Response 1 Boom (6"x6")	Seattle, WA	3 hr	945 m	227 m	-	-	1,000					
CRC	FRV Independence (6"x6")	Astoria, OR	1 hr	945 m	305 m	-	-	2,000	-	-	-	-	2
CRC	SWRB (29-229) (6"x6")	Astoria, OR	3 hr	945 m	305 m	-	-	400	2,473	-	-	100	2
NRCES	Monarch 6024	Portland, OR	3 hr	945 m	216 m	-	-	-	-	-	-	-	2
CRC	SWRB (29-231) (6"x6")	Astoria, OR	3 hr	945 m	305 m	-	-	400	-	-	-	-	2
NRCES	Monarch 6184	Portland, OR	3 hr	945 m	216 m	-	-	-	-	-	-	-	2
NRCES	WCMC	Portland, OR	3 hr	945 m	216 m	-	1,500	-	-	-	-	-	-
NRCES	Box on Dock	Portland, OR	3 hr	945 m	216 m	-	1,200	-	-	-	-	-	-
NRCES	Container #3094	Portland, OR	3 hr	945 m	216 m	-	1,000	-	-	-	-	-	-
CRC	42" Trailer (35-113)	Port Westward, OR	3 hr	945 m	275 m	-	3,300	-	-	-	-	-	-
CRC	48' Trailer (35-102)	Astoria, OR	3 hr	945 m	305 m	-	3,800	-	-	-	-	-	-
					24 Hour Totals:	**0**	**11,400**	**9,400**	**4,946**	**0**	**0**	**21,469**	**16**
Based on location of contracted assets, mobilization time, transit distance and distance to planning standard, **plan holder is able to meet the 24 hour planning standard.**													

WAC 173-182-430 Tri-cities planning standard: **MFSA**

Washington State Department of Ecology
Planning Standard Calculations

48 HR	**Boom:** More boom as necessary for containment, recovery or protection.					**as needed**							
	Recovery: Capacity to recover the lesser of 25% of worst case spill volume or 60,000 barrels within 24-hr period could have arrived.					**38 bbls additional on water recovery required**							
	Storage: More storage as necessary to not slow the response.					**as needed**							
Organization	**Asset**	**Home Base**	**Mobilization Time (hr)**	**Planning transit distance**	**Distance to Planning Standard**	**Boom Type B1 (feet)**	**Boom Type B2 (feet)**	**Boom Type B3 (feet)**	**EDRC (BPD) shallow / calm capable**	**EDRC (BPD) open water capable**	**Product (Group II, III, IV, V)**	**On Water Storage (BBLS)**	**People**
		Available equipment remaining from 24 hour requirements:				-	800	-		-	-	17,667	
CRC	48' Trailer (35-101)	Astoria, OR	3 hr	2025 m	305 m	-	5,100	-	-	-	-	-	-
CRC	48' Trailer (35-103)	Astoria, OR	3 hr	2025 m	305 m	-	4,100	-	-	-	-	-	-
NRCES	JETCRAFT 6464 (#9)	Portland, OR	3 hr	2025 m	216 m	-	-	-	-	-	-	-	2
NRCES	Monarch 6016	Portland, OR	3 hr	2025 m	216 m	-	-	-	-	-	-	-	2
					48 Hour Totals:	**0**	**10,000**	**0**	**0**	**0**	**0**	**17,667**	**4**
Based on location of contracted assets, mobilization time, transit distance and distance to planning standard, **plan holder is able to meet the 48 hour planning standard**.													

This Appendix contains

- A Plan Summary document, as detailed in Chapter (10), to aid various interested stakeholders in how to navigate the Plan.
- The general acknowledgement for Plan recipients, as detailed in Chapter (10), to indicate receipt of plan (electronic or paper);
- A specific acknowledgement for all participating QIs; and
- A list of QI companies who have agreements in place as of the date the plan was issued.

MARITIME FIRE & SAFETY ASSOCIATION

Columbia and Willamette Rivers • Oregon and Washington

MFSA Vessel Response Plan Summary - The MFSA Plan is accessible at www.mfsa.com.
The following table describes the Chapters and Appendices of the plan and indicates which sections will be of most interested to various parties.

Affected parties	**Plan Section**	**Description**
QIs Agents P&I Clubs	Chapter 1 – Introduction	Explains the regulations and authorities, details the process for enrollment, descriptions the rea of coverage and relationship to other plans.
QIs Agents	Chapter 2 – Notifications	Details notification process. Refers to Field Guide in Appendix A.
	Chapter 3 – Response Activities	Explains how MFSA stands up an immediate response, the adherence to the NIMS ICS system and Area Contingency Plan.
QIs Contractors	Chapter 4 – Response Checklist	Detailed checklist for responders.
QIs Contractors	Chapter 5 – Contacts	Contact information for contractors and other service providers.
	Chapter 6 – Planning Standards	Explanation of how the MFSA Plan meets state requirements.
Contractors	Chapter 7 – Safety & Training	Describes training.
Contractors	Chapter 8 – Exercises	How the plan is exercised.
QIs Contractors	Chapter 9 – Logistics	Lists service providers that might be used in an incident.
	Chapter 10 – Administration	
QIs Agents	Appendix A – Field Guide	All vessels must have a Field Guide onboard. This covers notification requirements under the plan.
QIs P&I Clubs	Appendix B – Transition of Authority	Document to transition from MFSA managing the incident to the vessel's designated representative.
QIs Contractors	Appendix C – Equipment	List of Clean Rivers' equipment.
QIs Contractors	Appendix D – Personnel	List of staff on contract to participate in spill management team.

Affected parties	Plan Section	Description
	Appendix E – Communications	Pre-filled ICS 205.
	Appendix F – Wildlife	NWACP Wildlife section.
Contractors	Appendix G – Decontamination	
Contractors	Appendix H – Disposal	Disposal service providers and sample disposal plan.
QIs Contractors	Appendix J – Agreements	Lists the agreements with service providers.
	Appendix K – Glossary	Includes common abbreviations and definitions of industry terms.
	Appendix L – Up River Zone	Currently inactive.
QIs Agents	Appendix M – Binding Agreement	
	Appendix N – Planning Standards	Detailed representation of how the MFSA plan would be implemented in a response in various locations within the AOR.
	Appendix O – Acknowledgements	
QIs Agents	Appendix P – Emergency Call Sheet	Shows the information that the Merchants Exchange Communications Center staff gathers and notifications they make when plan is activated.
Contractors	Appendix Q – Site Safety	Site Safety Plan and forms.
	Appendix R – Shipboard Response	A checklist that goes through standard shipboard responses to various types of emergencies. Not intended to replace vessel specific procedures.

For any questions on the MFSA Plan, please contact:

Holly Robinson
MFSA Oil Contingency Program Manager

MARITIME FIRE AND SAFETY ASSOCIATION
200 SW Market Street, Suite 190
Portland, OR 97201
503.220.2099 / 503.964.7161 Cell / 503.295.3660 Fax
robinson@mfsa.com

ACKNOWLEDGEMENT OF RECEIPT OF MFSA VESSEL RESPONSE PLAN

The undersigned acknowledges receipt of the MFSA Vessel Response Plan, as revised [date] (the "Plan"). Any previous versions of the Plan have been destroyed.
Furthermore, the undersigned acknowledges the Plan contains detailed information regarding roles or responsibilities that must be followed to comply with Oregon and Washington law during a response unless otherwise prescribed by the Unified Command.

This Acknowledgment is given as of the date listed below:

By: _____
[Signature]

Printed Name: _____

Title: _____

Company: _____

Date: _____

MARITIME FIRE & SAFETY ASSOCIATION

Columbia and Willamette Rivers · Oregon and Washington

«Date»

«First» «Last»
«Company»
«Address»
«City», «State» «ZipPostal_Code»

Dear «Last»:

Oregon and Washington state laws require tank vessels of any size and commercial vessels over 300 gross tons entering state waters to be covered by an oil spill contingency plan that meets the regulatory requirements of both states. This plan is in addition to the Federal Vessel Response Plan ("Federal VRP") required under U.S. federal law. Maritime Fire & Safety Association ("MFSA") is the nonprofit corporation providing oil spill response and contingency plan coverage through the MFSA Vessel Response Plan (the "MFSA Plan") for vessels entering the Columbia River that enroll for coverage under the MFSA Plan. The MFSA Plan is also required by Oregon and Washington regulation to cover three miles out from the mouth of the Columbia River into the Pacific Ocean (the "Ocean Zone"). Specifically, the Ocean Zone is regulated by the following regulations:

OAR 340-141-0150(3)(f) – Covered Vessels Operating in the Open Ocean Zone
WAC 173-182-415 – Cathlamet Staging Area
WAC 173-182-450 – Planning Standards for the Washington Coast
WAC 173-182-325 – Planning Standards for Dispersants
WAC 173-182-330 – Planning Standards for In Situ Burning

Required Ocean Zone Resources

To meet these regulations, vessels must have access under contract to a State approved Primary Response Contractor ("PRC") with open water capable response equipment meeting these planning standards (the "Ocean Zone Resources"). MFSA and the PRC under the MFSA Plan, Clean Rivers Cooperative ("CRC"), do not have direct contracted access to equipment that meets these recently enhanced requirements. MFSA has defined procedures in the revised MFSA Plan for accessing Ocean Zone Resources already on contract to enrolled vessels through the Oil Spill Removal Organization ("OSRO") identified in the vessels' Federal VRP. This method enables MFSA to meet Oregon and Washington regulations, without equipment duplication or added costs that would result in higher trip fees to vessels.

Under the revised MFSA Plan, which is pending approval by the State of Washington Department of Ecology ("Ecology") and the State of Oregon Department of Environmental Quality ("DEQ"), MFSA would access Ocean Zone Resources of an OSRO through the vessel's Qualified Individual, as identified in the vessel's Federal VRP. As such, in order for a vessel to be enrolled for coverage under the MFSA Plan, the vessel must have listed in its Federal VRP an

OSRO that is approved by Ecology and DEQ as meeting the planning standards for the Ocean Zone (an "Ocean Zone OSRO"). At this writing, MFSA understands that the Marine Spill Response Corporation ("MSRC") and National Response Corporation ("NRC") are both acceptable by DEQ and Ecology. It will be the vessel's responsibility to secure access to these resources and ensure that an Ocean Zone OSRO is listed in its Federal VRP.

As a regular provider of QI services, we are writing to inform you about this Plan requirement in the event a vessel for which you act as QI experiences an oil spill or threat of an oil spill in or potentially affecting the Ocean Zone.

Coordination with QI for Ocean Zone Response

In order to meet the regulatory requirements of Oregon and Washington, the MFSA Plan will contain the following statements of procedure which we bring to your attention:

1. Prior to the arrival of a vessel enrolling for coverage under the MFSA Plan into the Area of Coverage (as defined in the MFSA Plan), which starts 3 miles out from the mouth of the Columbia River into the Pacific Ocean, the vessel's operator or agent will provide an MFSA Arrival Notice informing MFSA of the identity of both the QI for the vessel and the OSRO listed in the vessel's Federal VRP. If the vessel identifies an OSRO that is not an Ocean Zone OSRO, the vessel will be denied enrollment under the MFSA Plan.

2. The Northwest Area Contingency Plan states that vessels enrolled with MFSA "are expected to follow the approved umbrella contingency plan throughout the duration of the spill response."

3. Upon notification to MFSA of a spill or threat of a spill by an authorized representative of a Covered Vessel, MFSA will assign an Incident Commander ("IC"). The MFSA designated IC will hold that position for a period of up to 24 hours or until the Responsible Party's ("RP")'s representative (e.g. the QI) assumes duties as the IC; whichever occurs first.

4. If the QI did not act as the vessel's authorized representative in contacting MFSA, MFSA will notify the QI of the spill or threat of a spill as soon as practicable.

5. If the IC determines that a response by an Ocean Zone OSRO in the Ocean Zone is required, the IC will require the QI to (a) immediately contact the pre-designated Ocean Zone OSRO on behalf of the vessel, and (b) under his or her authority as QI, direct that OSRO to deploy its services as requested within the established incident command structure under the direction of the IC.

Both MSRC and NRC are aware of this required structure and have agreed that if authorized by the QI, each will operate within the established incident command structure under the direction of the IC, including any MFSA designated IC until relieved by an IC appointed by the RP.

Acknowledgement and Agreement of QI

As part of the approval process for the MFSA Plan, Ecology has asked MFSA to obtain confirmation from persons or entities that regularly serve as QIs in the Columbia River area of their understanding of the above described procedure for spills or threats of spills in the Ocean Zone and their agreement to act in accordance with such procedure under the MFSA Plan.

We would appreciate your signing the QI Statement of Acknowledgement and Agreement below and returning the signed copy of this letter in the enclosed envelope prior to August 8th. Per the requirements imposed by the regulators for approval of the MFSA Plan, if you fail to timely sign and return this QI Statement of Acknowledgement and Agreement, we will be unable to enroll any vessel for which you are listed as the QI in their Federal VRP for coverage under the MFSA Plan.

Please feel free to call us with any questions.

Sincerely,
Maritime Fire & Safety Association

Elizabeth Wainwright,
Executive Director

QI Statement of Acknowledgement and Agreement

The undersigned acknowledges the above-described procedure and agrees to act in accordance with such procedure and the MFSA Plan, in the event a vessel for which the QI is the listed QI in such vessel's Federal VRP, experiences an oil spill or threat of an oil spill.

«Company»

By:_____

Printed Name:_____

Title:_____

LIST OF QI COMPANIES WITH ACKNOWLEDGEMENTS ON FILEWITH MFSA (as of date of plan submittal)

- Alaska Tanker
- Chevron Shipping
- Compliance systems Inc.
- ECM Maritime Services
- Foss Maritime
- Gallagher Marine Systems Inc.
- Hudson Marine Management Services
- Kirby Offshore Marine
- Norwegian Marine Services
- OSG Shipping
- Polar Tanker
- Seacoast Maritime Services, LLC
- SeaRiver Maritime, Inc.
- The Meredith Management Group, Inc.
- US Shipping Partners, LP
- Witt | O'Briens

LIST OF COMPANIES WITH FULL ENROLLMENT AGREEMENTS WHO ACT AS QI (as of date of plan submittal)

- Crowley Marine
- Olympic Tug & Barge
- Sause Bros.

The remainder of this page intentionally blank.

EMERGENCY CALL SHEET (Figure P.1)
VESSEL SPILL – MARITIME FIRE & SAFETY ASSOCIATION

Emergency Number: (503) 220-2055 / ER LD Code: 333

CALL INFO

Date: _____ **Time:** _____ **Call Taken by:** _____

Type of Call: ☐ Spill -or- ☐ Drill -or- ☐ Threat of Spill (see Figure P.3)

*If drill, specify: ☐ Internal -or- ☐ WA State Notification Drill -or- ☐ Other:

Notes: _____

VESSEL INFO

MFSA Covered Vessel? ☐ Yes -or- ☐ No

Vessel Name: _____

Vessel's Current Location: _____

REPORTED BY

Reporting Party (Name): _____

Company: _____

Phone Number(s): _____

Affiliation with Vessel: _____

Confirm Reporting Person is an Authorized Representative: ☐ Yes -or- ☐ No

Does Reporting Party want copy of Call Sheet? If yes, send to: _____

*An Authorized Representative is an individual authorized by the Owner to act on the Owners behalf with respect to the Plan, including the Master/Captain, the Agent, the QI and the P&I Club representative or another person specifically authorized by the Owner.

AGENT/QI

Vessel Agent Name / Company: _____

Agent Phone Number: _____

Vessel QI Name / Company: _____

QI Phone Number: _____

SPILL DETAILS

Were materials released into the water? ☐ Yes -or- ☐ No

*If so, how much? _____

Type of Product**:** _____

☐ Columbia River WA Side ☐ Columbia River OR Side ☐ Willamette River

River Mile of Spill/Approximate Location: _____

Has the release been controlled or stopped? ☐ Yes -or- ☐ No

When did this spill occur? _____

What caused this spill? _____

_____

Is a Material Data Safety Sheet (MSDS) Available? ☐ Yes -or- ☐ No

RESPONSE ACTIVATION CALL LIST (Figure P.2)					
Emergency Number: (503) 220-2055 / ER LD Code: 333					
Call List	**Phone No.**	✓	**Person Notified**	**Date / Time**	**Incident Reporting No.**
Incident Commander (IC)	See Schedule				
CRC on-duty Response Manager	See On-Duty List				
National Response Center (NRC)	(800) 424-8802				
If placed on hold, hang up and complete call after others have been made.					
Oregon Emergency Response System (OERS)	(800) 452-0311				
Washington Emergency Management Division (WEMD)	(800) 258-5990				
Vessel Agent	See Arrival Notice				
Vessel QI	See Arrival Notice				
US Coast Guard – Sector Columbia River	(503) 240-9311				
MFSA on-call Representative	See On-Duty List				
Note: NRC Environmental Services (NRCES) is only to be called at the direction/request of the on-duty Response Manager or IC.	(503) 283-1150				

*See Chapter (5) and Chapter (9) for additional contact information if requested by the IC.
*In the event you need additional assistance completing the Emergency Procedures, please contact the on-call MFSA Representative.

Additional Information:

Determination of Substantial Threat of Spill
(Figure P.3)

If a vessel representative calls with a vessel emergency and is uncertain if it meets the definition of a s**ubstantial threat of spill** walk through the following checklist with them. ***It is the vessel representative (master, agent, QI) that makes the determination***.

- ☐ Tank vessel grounding anywhere in within the Plan's Area of Coverage – ACTIVATE MFSA PLAN
- ☐ Broken tow wire between a towing vessel and tank barge that results in barge breaking free – ACTIVATE MFSA PLAN
- ☐ Any vessel grounding outside the channel on the Lower Columbia River – ACTIVATE MFSA PLAN
- ☐ Loss of main propulsion (LOP) or loss of primary steering (LOS) while underway on the Lower Columbia River, for prolonged time. – ACTIVATE MFSA PLAN
    - o If immediately regained full control of vessel – DOCUMENT CALL, NOTIFY MFSA REPRESENTATIVE.
- ☐ A catastrophic event at an adjacent property that puts the vessel at risk. – ACTIVATE MFSA PLAN
- ☐ A marine casualty that results in unintended anchoring or safe harbor/berth of convenience (exclude crew issues that are unrelated to seaworthiness of vessel) – ACTIVATE MFSA PLAN.
    - o Examples may include: uncontrolled fire or flooding, sinking, unplanned allisions, etc.
    - o This will be a judgment call by the vessel representative

Other emergencies may occur that, depending on location, vessel status and other conditions, may not reach level of significant threat of spill. It is always the responsibility of the vessel to decide. DOCUMENT CALL, NOTIFY MFSA REPRESENTATIVE. Some examples are:

- ☐ LOP/LOS while approaching or departing dock on the Lower Columbia River with assist tug in immediate vicinity.
- ☐ Non-tank vessel going aground while at anchor on the Lower Columbia River.
    - o If soft aground due to tide or shoaling and able to safely refloat without assistance.
- ☐ Soft grounding while underway, in the channel, on the Lower Columbia River. This will be a judgment call by the vessel representative.
    - o Is a pilot onboard? Is this area known to have issues with shoaling?

Additional Information – to determine the significance of an event it is important to know volumes of oil onboard that could potentially spill:

Petroleum as cargo:
Fuel onboard:

Although these events may not result in implementation of the MFSA Plan, the vessel still must make any required USCG notifications.

SAFETY MEETING REPORT FORM

Response Manager: _____ Date/Time: _____

Project Name: _____

I. Incident Information

Type of Incident: _____ **Location**: _____

II. Hazard Identification

❒ Flammable Liquids	❒ Compressed Gas Cylinder(s)	❒ Biohazard/Needles	❒ Confined Space
❒ Flammable Gas	❒ Noise	❒ Poisonous Gas	❒ Heat/Cold (temp _____·)
❒ Explosive	❒ Oxygen Deficiency	❒ Corrosives	❒ Slip/Trip/Fall
❒ Poison	❒ Working On or Near Water	❒ Oxidizers	❒ Flammable Solid
❒ Animals	❒ Radioactive	❒ Petroleum Spill	❒ Chemical Spill
❒ Cuts/Lacerations	❒ Pinch Points	❒ Overhead Hazards	❒ Collision
❒ Vacuum Trucks	❒ Pressure Washer	❒ LEL (_____)	

❒ Other (specify): _____

III. Personal Protective Equipment and Working Precautions

❒ Hard Hat	❒ Safety Glasses	❒ Gloves	❒ Tyvek
❒ Rain Gear	❒ Ear Plugs	❒ Steel Toe Shoes	❒ Rubber Boots (Steel Toe)
❒ Safety Vest	❒ Buddy System	❒ Goggles	❒ Respirator
❒ Face Shield	❒ Fall Protection	❒ Chemical Suit	❒ Heavy Equipment
❒ Flotation Devise	❒ Other (specify): _____		

IV. Medical and Other:

Closest Safety Shower: _____ **Closest Eye Wash:** _____

Decon Station(s): _____

In case of emergency: _____

Closest Medical Facility or Hospital: _____

Other: _____

_____

V. Meeting Summary:

_____

_____

_____

VI. Signatures:

Print Name	Signature	Print Name	Signature

NRC ENVIRONMENTAL SERVICES a SEACOR company	NRCES DAILY *MARITIME* SAFETY MEETING PRE-POST BOOMING OPERATIONS FROM WORK BOATS Vessel Name _____ Date:_____	NRC NATIONAL RESPONSE CORPORATION a SEACOR company

Vessel Master:	Project/Marine Supervisor:
Vessel Number:	Designated Safety Officer:

ACCIDENTS / INCIDENTS / INJURIES / NEAR MISS / PROPERTY DAMAGE / CREW SUGGESTIONS
Phone Safety Manager to report incidents regardless of severity

Before Shift (write in "none" if 0 to report)

Vessel Master signature acknowledging_____

After Shift: (write in "none" if 0 to report)

Vessel Master signature acknowledging_____

#	TASK	HAZARD	CONTROL
1	Embark/disembark work boat	Slip / fall / drown	Three point contact - PFD
2	Load / unload boom from trucks	Strain / struck by	Stay clear of equipment
3	Load /unload from vessel -crane	Struck by / suspended load	PPE/Clear of suspended load/tag line
4	Attach /Remove magnet from bow and stern [Seattle /Tacoma]	Strain / struck by	Proper lifting procedure / PPE
5	Attach /Remove anchors	Strain / open water / overhead hazards	PPE/Proper body position
6	Boom towing	Towline parting	Line condition & size; engine RPMs; PPE
7	Radio communication between vessels	Lack of communication	Designated working channel, Verify comms
8	Boom cleaning	High pressure spray & debris	Proper PPE

HAZARD COMMUNICATION - / CHEMICAL HAZARDS ☐
Call Safety Manager for separate chemical response / contact safety plan

Task #	*PPE (mark each box if required)			
2, 3, & 4	☒ Hard Hat / strap	☒ Safety Glasses	☒ PFD with Strobe	☐ coveralls
	☒ L.S. Shirt / Pants	☒ Gloves _____	☒ Safety toe footwear	
	☐ Hard Hat / strap	☐ Safety Glasses	☐ PFD	☐ coveralls
	☐ L.S. Shirt / Pants	☐ Gloves _____	☐ Safety toe footwear	
	☐ Hard Hat / strap	☐ Safety Glasses	☐ PFD with Strobe	☐ coveralls
	☐ L.S. Shirt / Pants	☐ Gloves _____	☐ Safety toe footwear	

PRE-DEPARTURE CHECKLIST ITEMS

☐ Horn ☐ Marine Radio, Designated Chnl____ ☐ Fire Extinguisher (charged/inspected)
☐ PFDs / strobes ☐ Weather forecast ☐ Bilge check ☐ Pike pole ☐ Navigation Lights
☐ _____

NRCES PNW SAFETY MANAGERS (only personnel authorized to downgrade PPE/ Action Levels)	
PNW: Ken Koppler: (971) 285-0450	Bill Walker: (206) 719-3739

NRC ENVIRONMENTAL SERVICES a SEACOR company	NRCES DAILY *MARITIME* SAFETY MEETING PRE-POST BOOMING OPERATIONS FROM WORK BOATS Vessel Name _____ Date:_____	NRC NATIONAL RESPONSE CORPORATION a SEACOR company

PHYSICAL HAZARDS / Job Hazard Analysis (JHA)
Check Hazard Category / Write specific hazard and prevention

	HAZARD CATEGORY	DESCRIBE SPECIFIC HAZARD(s)	PREVENTION
☒	Unsafe Conditions /Injuries		• Report to vessel operator/master
☒	Climbing into / out of boats	**Damaged ladders /pilings, wave action, slip/trip**	• 3-point contact; deck & pier surface awareness
☐	Slips /Trips /Falls on deck , rocks / shoreline	**Overall site conditions, oily rocks and waves, uneven terrain; cleats on deck; wet decks**	• Proper footwear and body positioning • Use caution when transiting
☐	Ladders / deck elevations	**Fall**	• Caution onboard, 3-pt contact; ladder secured; fall prevention
☐	Fall into Water	**Drowning/hypothermia**	• PFDs and proper clothing
☐	Handling tools	**Puncture/laceration, pike poles, scrapers**	• Caution/proper handling procedures
☐	Pinch Points	• **Trailer hitches,** • **retrieval lines** • **boat to boat on dock**	• use fenders between boats and boat to dock • Caution where placing hands
☐	Heat stress /Engine Room (on vessel > 100')	**Heat illness**	• Cooling devices; breaks, drink fluids
☐	Confined Space entry	• **access / egress** • **slip /trip / fall /unsafe atmosphere**	• Contact Safety Manager • Rescue plan for non entry removal of personnel
☐	Overhead Hazards	**Pier structure, ship's hull**	• Hardhat / proper PPE
☐	Cutting line	**Laceration**	• Appropriate knife; use with caution, cut away from body
☐	Collision	**Vessel Traffic i.e. vessel to vessel** **Multiple radio channels**	• USCG Navigation Rules of the Road • monitor channel 16 VHF for USCG
☐	Weather	**Storm / Gale Warnings** **Extreme tide / current**	• Safe booming matrix
☐			

EMERGENCY PROCEDURES http://www.hospitallink.com

NRC Emergency Numbers			
Hospital Name / Address and Phone			
Location of Emergency . Equipment:	First Aid Kit:	Fire Extinguisher:	Eye Wash:

DAILY SAFETY MEETING ATTENDANCE SIGNATURES:
I understand the topics outlined on pages 1 and 2 and will follow all the required safety rules.
****I am aware that I am to sign in at the beginning of the shift and sign out at the end of my shift.**
I must notify the on site supervisor of any injury /accident/ near miss that I had during my shift or that I observed**

PRINT NAME	SIGNATURE IN	DATE	SIGNATURE – SHIFT END *I have no incident or injuries to report*	DATE

NRCES PNW SAFETY MANAGERS
(only personnel authorized to downgrade PPE/ Action Levels)

PNW: Ken Koppler: (971) 285-0450	Bill Walker: (206) 719-3739

NRC ENVIRONMENTAL SERVICES a SEACOR company

NRCES DAILY *MARITIME* SAFETY MEETING
PRE-POST BOOMING OPERATIONS FROM WORK BOATS

Vessel Name _____ Date: _____

NRC NATIONAL RESPONSE CORPORATION a SEACOR company

HASP / DAILY SAFETY MEETING / MSDS	CORRECT	QUESTIONABLE	COMMENTS
1. Operation or Site Specific Safety Plan? / In use?			
2. Daily Safety Meeting held/documented-Revision ___			
3. JHA for all tasks / crew has reviewed them?			
4. MSDS Available / Employees Have Access			
PERSONAL PROTECTIVE EQUIPMENT	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
5. Hearing Protection (e.g. Ear Plugs)			
6. Head Protection (e.g. Hard Hat)			
7. Eye Protection (e.g. Safety Glasses)			
8. Protective Clothing / Minimum Long Sleeves			
9. Hand Protection (e.g. Gloves)			
10. Foot Protection (e.g. Rubber Safety-toed Boots)			
11. Respiratory Protection / Fit Test Certificates			
12. Reflective Vest / High Visibility Clothing			
13. Type III PFD for each person			
14. Personal Appearance			
BODY USE AND POSITIONING	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
15. Correct Body Use and Positioning When Lifting / Pushing / Pulling / Bending			
16. Unguarded Pinch / Scrape Point / Sharp Objects / Moving Equipment / Vessels			
LADDERS & STAIRS	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
17. Mounts/Dismounts Using 3-Point Stance?			
18. Ladders properly secured? In good condition?			
19. Stairs non-skidded and free of slipping hazards?			
WORK ENVIRONMENT/PROCESS	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
20. Dock / Pier / Deck walk-ways free of tripping hazards?			
21. Onboard / on-site Housekeeping / Storage / Accessibility?			
22. Vessel equipment properly functioning? (e.g. Engine, Radio, Nav. Lights, Horn)			
23. Decon area defined / functional?			
24. Communications between vessels? Line of sight during operations?			
CONFINED SPACE / FALL PROTECTION	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
25. Confined Space Supervisor / Permits / Retrieval gear?			
26. Fall Protection plan? / harness available			
AIR MONITORING	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
27. Meters Available / Correct Type / Calibrated?			
28. Results Documented / Reviewed With Crew?			
TOOLS / OTHER EQUIPMENT	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
29. Hand Tool Selection, Condition & Use			
30. Power Tool Selection, Condition & Use			
31. Equipment (inc heavy) Sel / Cond / Use			
32. GFCI for all Power Cords (if used)			
DESIGNATED SAFETY OFFICER	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
33. Designated Employee? / aware of duties ?			
34. DSO did pre-inspection? During ops frequency?			
35. Fire Extinguishers checked? / Accessible? / Inspected?			
36. Interviewed DSO? / Safety Comments?			
37. Review / Revise HASP / JHA / Daily Safety Meeting?			

NRCES PNW SAFETY MANAGERS (only personnel authorized to downgrade PPE/ Action Levels)	
PNW: Ken Koppler: (971) 285-0450	Bill Walker: (206) 719-3739

ENGINE	CORRECT	QUESTIONABLE	COMMENTS
38. Fuel - indicate amount of fuel in tank			
39. Oil - checked reservoir			
40. Is there spare oil on board?			
41. Is the tool kit readily available?			
42. Bilge pumps – Fore and Aft?			
43. Belts - Good condition? - Spare Belt?			
44. Batteries – charged and covered?			
45. Fuel shut offs – where located?			
46. Transmission fluid – checked?			
47. Engine coolant – checked?			
48. Fire extinguisher system?			
49. Pollution / oil placards mounted?			
50. Ventilation / bilge blower checked?			
NAVIGATION GEAR	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
51. Are the charts / GRP's on board?			
52. Is the navigation kit on board?			
53. Are the binoculars on board?			
54. Is a compass on board?			
55. Check radar for operation			
56. Check GPS for operation			
57. Is Depth Sounder operational?			
58. Is the tide table on board?			
59. Are the nav rules on board?			
SKIFF	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
60. Identify 2 stroke / 4 stroke engine?			
61. Are the nav lights working?			
62. Check the condition of the prop?			
63. Is the air horn on board?			
64. Is the tool kit on board?			
65. Kill switch lanyard on board?			
66. Are there magnets on board?			
67. Is there extra oil on board?			
68. Is there a radio on board?			
69. Fuel level - ½ tank or more?			
70. Check engine oil?			
71. Are there anchors on board?			
72. Anchor line?			
73. Poly line?			
74. Is the life ring on board? Throw bag on board?			
75. Are there tethers on board?			
76. Is there a pike pole on board?			
77. Is there a first aid kit on board?			
78. Noticeable damage to skiff?			
79. Inspect fire extinguisher			
BOAT GEAR	**CORRECT**	**QUESTIONABLE**	**COMMENTS**
80. Are there sufficient Anchors (2 min.)			
81. What is the length of the Anchor rode? ____ FT			
82. Are there mooring lines?			

NRCES PNW SAFETY MANAGERS (only personnel authorized to downgrade PPE/ Action Levels)	
PNW: Ken Koppler: (971) 285-0450	Bill Walker: (206) 719-3739

BOAT GEAR CONT.	CORRECT	QUESTIONABLE	COMMENTS
83. Are there sufficient Fenders?			
84. Is there a Horn/Loudhaller?			
85. Is there a Bell?			
86. Is a Pike pole available on deck?			
87. Cleanliness of boat?			
88. Radios are operational?			
89. Working channel: ____ Alternative channel:____			
90. Inspect mooring cleats?			
91. Inspect tow bit?			
92. Is there an alternate means of bailing?			
93. Is there a spotlight on board?			
94. Are there flash lights on board?			
95. Is there noticeable damage to vessel? Is it noted in the log?			
96. Is there a minimum of 2 fire extinguishers?			
97. Is there a first aid kit on board?			
98. Are PFDs available of sufficient quantity for all personnel on board?			
99. Is the life ring available?			
100. Is the throw bag on board?			
101. Are visual distress signals available?			
102. Are nav. lights operating properly?			
103. Are tow lights appropriate?			
104. Are there spare bulbs on board?			
105. Electrical system condition			
106. Are there spare fuses on board?			
107. Boat phone turned on?			
108. All logs and safety sheets on board?			
109. Does crew have knife in sheath or folding blade?			
110. Are there safety glasses on board?			
111. Are there nitrile gloves on board?			
112. Is there hearing protection on board?			
113. Is there raingear on board?			
114. Are there sorbents on board?			
115. Is towing line faked out on deck?			
116. Are tow bridles available on deck?			
117. Are there sufficient tethers on board?			
118. Are there boom lights on board?			

SHIPBOARD SAFETY OF PERSONNEL

- ❒ Warn all personnel in the immediate area.
  - ❒ Sound alarm.
  - ❒ Notify vessel's Master by radio, phone or any other means available.
- ❒ Eliminate ignition sources.
- ❒ Initiate evacuation of all non-essential personnel, vessels, or other equipment if applicable.
- ❒ Characterize initial hazards (consult Material Safety Data Sheet ("MSDS")).
- ❒ Don Personal Protective Equipment ("PPE") as required.

In the event of a spill or threat of a spill the vessel should take immediate and decisive action to stop or prevent the flow of oil or hazardous material, and prevent any free product on the deck of the vessel, its bilges or any other space from entering the water.

The following guides contain "action checklists" which vessels may use to ensure that they are taking effective action to mitigate oil spill or hazardous material incidents. The IC should walk the vessel through these guides if applicable.

PRIORITY CONSIDERATIONS – ALL CASUALTIES

- ❒ Isolate damaged tanks.
- ❒ Alter course so that the vessel is upwind of the spilled product and to reduce personnel exposure to toxic vapors if necessary.
- ❒ Eliminate all potential sources of fire and explosion.
- ❒ Close non-essential air intakes.
- ❒ Carry out detailed inspection, to include a visual inspection and bunker tanks sounded, with caution and regard for potential loss of buoyancy; and all outboard compartments/tanks inspected/sounded.
- ❒ Eliminate all possible sources of ignition and take action to prevent toxic vapors or flammable vapors entering accommodation and engine room spaces.
- ❒ Provide stress/stability data.
- ❒ In conjunction with the appropriate shore authorities, consider moving the ship to a more suitable location in order to facilitate emergency repair work or lightening operations; or to reduce the threat posed to a particularly sensitive shoreline area if necessary.

SPILLS CAUSED BY EQUIPMENT IN MACHINERY SPACES

If operational oil spills are caused by a failure of equipment in machinery spaces, any further operations of this equipment should be stopped immediately or measures are to be taken to avoid an oil spill (e.g. oily-water separating equipment, valves in pipes connecting ballast / bilge systems, stern tubes, rudder, glands/fittings).

TANK OVERFLOWS

- ❒ Stop all handling pumps and shut down all valves to stop the transfer. Operations should not be restarted until the fault has been rectified and all hazards from the released oil have been eliminated.
- ❒ Clean-up team will wear appropriate protective clothing, masks and /or breathing apparatus.

- ❒ If spilled oil is contained on-board, use sorbents and permissible solvents to clean-up spill.
- ❒ Prepare portable pumps for transfer of bunkers into empty or slack tank.
- ❒ Consider whether to stop air intake into accommodation or non-essential air intake into engine room.
- ❒ Transfer the oil from the overflow area to a sludge tank or drum.
- ❒ Retain the recovered oil and the used clean-up material on-board in proper containment units until it can be counted and discharged to a reception facility.

TRANSFER SYSTEM LEAKS

- ❒ Stop all handling pumps and shut down all valves to stop the product flow. If alongside, implement emergency stop procedure as agreed with loading Master.
- ❒ If a leakage occurs from a hydraulic pipeline, stop operations immediately.
- ❒ Clean-up team will wear appropriate protective clothing, masks and/or breathing apparatus.
- ❒ Consider whether to stop air intake into accommodation or non-essential air intake into engine room.
- ❒ Isolate defective pipe sections. Drain down affected sections to an available empty or slack tank. Prepare portable pumps where it is possible to transfer spilled oil into a slack or empty tank.
- ❒ If the source of the leakage is located in the pump room at the sea valves, take necessary measures to relieve the pressure from the relevant section of the pipeline.
- ❒ Activate the procedure to reduce, eliminate, evacuate and collect/disperse the polluted oil.
- ❒ Retain the recovered oil and the used clean-up material on-board in proper containment units until it can be counted and discharged to a reception facility.

SUSPECTED TANK OR HULL LEAK

If oil is noticed on the water near the vessel during bunkering operations and cannot be accounted for, the possibility of hull leakage should be considered. Measures to be implemented immediately:

- ❒ Stop bunkering operations and close manifold valves.
- ❒ Sound the emergency alarm and initiate emergency response procedures.
- ❒ Inform terminal/loading master/bunkering personnel about the incident.
- ❒ Consider whether to stop air intake into accommodation or non-essential air intake into engine room.
- ❒ When the source of leak is identified:
  - ❒ Reduce the head of bunker oil by dropping or pumping oil into an empty or slack tank, or if berthed, discharge ashore in suitable barges/ tanks.
  - ❒ Consider possibility of pumping water into the leaking tank to create a water cushion to prevent further loss of oil.
  - ❒ If the leakage source cannot be located on-board, use a diver/helmet diver to search for the leakage from the bottom.
- ❒ Take all appropriate actions while paying consideration to the effect the actions can have on the ship's stability and hull stress.
- ❒ Repair the leak, if practicable.

PROCEDURES TO REDUCE OR STOP OUTFLOW OF OIL

The IC should assess the possibility of damage to the environment and whatever action can be taken to reduce further damage from an oil release, such as:

- ❒ Transfer the tank(s) internally provided shipboard piping system if in operational condition.
- ❒ If the damage is fairly limited and restricted, i.e., to one or two tanks, consider transfer of bunkers internally from the damaged tank(s), taking into account the impact on the ship's overall stress and stability.
- ❒ Isolate damaged / penetrated tank(s) hermetically to ensure that hydrostatic pressure in tanks remains intact during tidal changes.
- ❒ Evaluate possibility of pumping water into a damaged tank in order to form a water bottom stopping the outflow of oil.
- ❒ Evaluate the necessity of transferring bunkers to barges or other ships and request such assistance accordingly.
- ❒ Evaluate the possibility of additional release of oil.
- ❒ If there is a possibility of the released oil vapors entering accommodation or an engine room intake, quickly take appropriate preventive steps.

CONTAINMENT SYSTEM FAILURE

- ❒ Determine full extent of any containment failures.
- ❒ Assess pump-over capabilities – i.e. are there any empty tanks onboard that can be used to stow the leaking product. Can liquid levels be reduced to below the height of the breach?
- ❒ Assess consequences of leaking product – reaction with other containment systems, e.g., sulfuric acid in mild steel spaces.
- ❒ Assess discharge requirements of the secondary containment system if applicable.
- ❒ Assess the cleaning requirements of the secondary containment system if applicable.
- ❒ Consider that leakage of oil into DB or cofferdams may allow vapor release due to differing vapor control systems.
- ❒ If leaking outboard, consider that spillage may taken into engine room sea water intakes.
- ❒ Consider that it may be necessary to steam astern.

HULL DAMAGE / FAILURE

In case of immediate danger of sinking or capsizing:

- ❒ Send out the distress signal.
- ❒ Evacuate the ship immediately.

In case of less imminent danger of sinking or capsizing:

- ❒ Determine the extent of the damage. Can the vessel maneuver on its own?
- ❒ If the ship has a list due to loss of ballast, bunker or buoyancy, is it necessary and possible to rearrange the bunker or ballast by internal transfer operation in order to bring the ship to an even keel?
- ❒ Is there an abnormal change in the ship's stability and stress situation?
- ❒ Can the change in the ship's stability and stress situation be monitored and calculated on board? If not, the Master should seek assistance from the Company's Technical Dept.
- ❒ Does the ship need assistance or escort to nearest port of refuge or repair port?
- ❒ Might it be prudent to salve part of the crew members in case the situation should worsen, or is it necessary to abandon the ship totally?

EXTENSION OF HULL DAMAGE

- ❒ Check for visible oil along the hull or in the wake of the ship during day light. At night, a stick with white cloth (sorbent) around it may be lowered into the water alongside the ship to check for oil leakages.
- ❒ Take soundings of all ballast / bunker / bilge oil / sludge tanks (ullage). Take soundings of all other compartments which may have contact with the sea to ensure that they are intact.
- ❒ Take soundings of all other compartments which may have contact with the sea to ensure that they are intact.
- ❒ Compare soundings of tanks with last soundings to check for possible leaks.
- ❒ Take sounding around the ship to establish the ship's position on the grounding area.
- ❒ When the ship is aground, due regard should be given to the indiscriminate opening of ullage plugs, sighting ports, etc., as loss of buoyancy could be the result of such actions.
- ❒ Note any list of the ship and include in the report for assistance.

FIRE AND / OR EXPLOSION

- ❒ Sound the GENERAL ALARM. Further actions should be in accordance with the ship's Muster List.
- ❒ Prioritize actions to rescue lives.
- ❒ Promptly locate the point where the fire/explosion originated.
- ❒ Determine the extent of the damage. Try to prevent environmental pollution.
- ❒ If there is a possibility of the released oil vapors entering accommodation or an engine room intake, quickly take appropriate preventive steps.
- ❒ Distribute the members of the ship's Emergency Team in the locations deemed most expedient to combat the fire.
- ❒ Use all means available to combat the fire.
- ❒ Try to minimize the fire and to prevent the spread to other parts of the ship.
- ❒ Call 911 if the vessel can no longer fight the fire. Utilize F-PAAC mutual aid if necessary.

HAZARDOUS VAPOR RELEASE

The release of hazardous vapors could put at risk the safety and health of the crew and others. It is very important that the IC discuss with the Master and immediately inform the authorities in order to protect and safeguard the health of all persons.

- ❒ Raise the general alarm.
- ❒ Stop all pumps and close all vents.
- ❒ If alongside, inform the loading Master and implement emergency stop procedures as agreed.
- ❒ If at sea, steer to avoid toxic gases to come close to the accommodation spaces.
- ❒ Assess if there are any casualties.
- ❒ Stop ventilation and close all unnecessary air intakes in order to stop toxic gases from entering accommodation and engine room.
- ❒ Ensure all personnel wear gas masks fitted with suitable filters if they have potential for exposure.
- ❒ Keep firefighting equipment ready.

GROUNDING / STRANDING / TOUCHING BOTTOM

- ❒ Obtain detailed information about the damages sustained by the ship.
- ❒ If there is a possibility of the released oil vapors entering accommodation or an engine room intake, take appropriate preventive steps.
- ❒ Take soundings around the vessel to determine the nature and gradient of the seabed.
- ❒ Check differences in tidal ranges at the grounding site.
- ❒ Take soundings of all ballast and bunker tanks and check all other compartments adjacent to hull: ullage plugs should not be opened indiscriminately as loss of buoyancy could result.
- ❒ Should the damage which the ship has sustained be of such an extent that the stability cannot be computed on board; seek assistance from the Company's Technical Manager.
- ❒ Minimize the risk of fire by removing all ignition sources.

REFLOATING BY OWN MEANS

The IC should evaluate the question of refloating the vessel by own means. Before such an attempt is made, it must be determined:

- ❒ Whether the ship is damaged in such a way that it may sink, break up or capsize after getting off.
- ❒ Whether the ship, after getting off, may have maneuvering problems upon leaving the dangerous area by own means.
- ❒ Whether machinery, rudder or propeller area damaged due to grounding or may be damaged by trying to get off ground by own means.
- ❒ Whether the ship may be trimmed or lightened sufficiently to avoid damage to other tanks in order to reduce additional pollution from oil spillage.
- ❒ Weather evaluation: whether there is time/reason to await improvements in weather or tide.

SECURING THE SHIP

If the risk of further damage to the ship is greater by attempting to refloat the ship by own means rather than remaining aground until professional assistance has been obtained, the IC should have the ship's Master secure the ship as much as possible by:

- ❒ Trying to prevent the ship from moving from present position.
- ❒ Dropping anchors (adequate water depth and anchor ground provided).
- ❒ Taking ballast into empty tanks, if possible.
- ❒ Trying to reduce longitudinal strain on hull by transferring ballast and/or bunkers internally.
- ❒ Reducing fire risk by removing all sources of ignition. If there is a possibility of the released oil vapors entering accommodation or an engine room intake, appropriate preventive steps must be taken quickly.

COLLISION (WITH FIXED OR MOVING OBJECT)

- ❒ Obtain detailed information about the damages sustained by the ship.
- ❒ Are any tanks penetrated above or below the waterline?
- ❒ If ships are dead in the water and interlocked, what is most prudent – to stay interlocked or separate?
- ❒ Is there any oil spill at present – small or large? Will a separation of the interlocked ships create a larger oil spill than if the ships stay interlocked?
- ❒ If there is an oil spill, will the separation of the ships cause sparks that can ignite the spilled oil or other flammable substances leaked out from the ship?
- ❒ Are the ships creating a greater danger to other traffic in the area if they are interlocked than if separated?
- ❒ Is there a danger to either ship of sinking after being separated?
- ❒ If the ships are separated, how is the maneuverability of their own ship?
- ❒ If separation of the ships takes place, alter course to bring own ship windward of any oil slick, if possible.
- ❒ Shut down all non-essential air intakes. If there is a possibility of the released oil vapors entering accommodation or an engine room intake, appropriate preventive steps must be taken quickly.
- ❒ Isolate damaged/penetrated tank(s) by hermetically closing the tank(s), if possible.
- ❒ When it is possible to maneuver, the Master, in conjunction with the appropriate shore authorities, should consider moving his ship to a more suitable location in order to facilitate emergency repair work or lightening operations, or to reduce the threat posed to any sensitive shoreline areas.

EXCESSIVE LIST

Ascertain cause of list. Examples include failure of hull plating; failure of a bulkhead between compartments; erroneous stowage of fuels, excessive number of slack tanks; flooding of the engine room where free surface can cause list; damage through grounding or collision; incorrect operations procedure.

- ❒ Sound GENERAL ALARM.
- ❒ Stop all ballast and/or bunker operations.

- ❒ Soundings/ullage to be taken in all tanks.
- ❒ Bunker and ballast pumps to be made ready.
- ❒ Act with the balance tanks in order to correct the situation, if listing occurs during loading or unloading or ballasting operations.
- ❒ Consider corrective actions: manual sounding of all tanks; internal transfers to press-up tanks and equalize distribution of bunkers; effect of the wind and sea conditions; effect on main propulsion and auxiliary equipment.
- ❒ If bunkering: Change to corrective tanks for rectifying the situation. If ballasting / de-ballasting: Change to corrective tanks for rectifying the situation.
- ❒ If necessary, determine assistance needed tugs/salvage/navy/rescue.
- ❒ If the ship's crew is in jeopardy, prepare the lifeboats for launching and notify authorities.

SUBMERGED / FOUNDERED

- ❒ If the ship is wrecked to the extent that it or part of it is submerged, take all measures to evacuate all persons on board.
- ❒ Avoid contact with any spilled oil. If there is a possibility of the released oil vapors entering accommodation or an engine room intake, appropriate preventive steps must be taken quickly.
- ❒ Place a Mayday, Urgency or Safety call via GMDSS equipment to alert other ships and/or the nearest coastal state for assistance in rescuing lives and the ship, as far as possible.
- ❒ Consider salvage requirements.
- ❒ Assess damages and determine whether breached space(s) can be isolated, and reserve buoyancy re-captured.
- ❒ Assess vessel's floating situation, and determine whether vessel can be listed or trimmed to minimize flooding. Carry out onboard assessment.
- ❒ If time and position allows – attempt to strand vessel. Consider nature of coast line and prevailing weather at this time.
- ❒ If time and position allows, bring vessel to shallow water for sinking to facilitate future bunker recovery. Consider nature of coast line and prevailing weather at this time.
- ❒ If vessel is likely to submerge, abandon ship.
- ❒ Engine room onto high sea suctions.

WRECKED / STRANDED

In event that the wreck is still manned, assess exposure of crew to environmental hazards, and to exposure of any released oils.

- ❒ Consider abandoning vessel.
- ❒ Assess damages to vessel.

In the event of stranding – determine water depths around vessel. Consider further ballasting down of vessel to prevent further movement of vessel.

- ❒ Determine likely drift of a floating wreck, and likely destination.
- ❒ Engine room to high sea suctions.
- ❒ Consider salvage requirements.