SECTION 2.9 SPILL PREVENTION AND CONTROL
(WAC 463-42-205)

This section provides information on applicable spill regulations, risk and cause of spills, the release history of the existing pipeline system, and a description of spill prevention and detection measures for the proposed pipeline system. Additional information on spill response can be found in Section 7.2 Emergency Plans.

2.9.1 REGULATORY REQUIREMENTS

Olympic Pipe Line Company (OPL) will prepare an oil spill prevention, control and contingency plan in accordance with all state and federal laws. A summary of the regulatory requirements is presented below.

2.9.1.1 Federal Regulations

There are two federal regulations that apply to pipeline operations, the Oil Pollution Act of 1990 and 40 CFR 112.

Oil Pollution Act of 1990

The Oil Pollution Act of 1990 (OPA 90) was signed into law on August 18, 1990. In accordance with this law, OPL will be required to prepare a detailed, comprehensive oil spill response plan (OSRP) for the pipeline and the Kittitas Terminal. The OSRP will also satisfy the requirements set forth by the:

- United States Department of Transportation (DOT), Research and Special Programs Administration requirements found within 49 CFR Part 194, Response Plans for Onshore Oil Pipelines
- State of Washington WDOE requirements found in WAC 173-181, Facility Contingency Plan and Response Contractor Standards

A completed OSRP will be submitted at least 180 days prior to commencing operations.

40 CFR 112

OPL will be required to comply with the Environmental Protection Agency requirements outlined under 40 CFR 112, Spill Prevention, Control, and Countermeasures (SPCC) Plan which apply to the non-transportation related facilities associated with the pipeline operations, which may include storage tanks and site-specific pump stations. A completed individual plan for each facility is to be submitted at least 65 days prior to commencing operations.

The SPCC plan will describe the facilities' physical plant including:

- facility diagram
- unit-by-unit storage capacities
- type and quantity of product stored
- spill pathways
- spill prevention measures
- spill countermeasures
- spill notification procedures

2.9.1.2 Washington State Regulations

In addition to the federal regulations, the State of Washington has promulgated regulations that are similar to the federal requirements. The applicable state regulations are outlined below.

WAC 173-181, Facility Contingency Plan and Response Contractor Standards

The purpose of WAC 173-181 is to establish onshore and offshore facility oil spill contingency plan requirements and response contractor standards. This regulation will be applicable to the pipeline and associated facilities. Since this regulation is most applicable to spill response, see Section 7.2 Emergency Plans for more information.

2.9.2 POTENTIAL RISKS FOR LIQUID PIPELINE RELEASES

In 1993, the California State Fire Marshal prepared a Hazardous Liquid Pipeline Risk Assessment (California State Fire Marshal, 1993). The report included the analysis of pipeline data in regard to releases and the characterization of risk levels associated with pipelines in general. The study found that external corrosion was the largest cause of leak incidents, representing 59 percent of the total. Third party damage accounted for 27 percent of the total releases during the study period (1981 through 1990). The incidence of a release caused by external corrosion was directly correlated to the age of the pipeline and operating temperatures. The older the pipeline and the higher the operating temperature, the greater the risk for a release. The study found that pipelines constructed before 1940 had a leak incident rate 20 times higher than pipelines constructed later than 1980. External corrosion rates were 8 to 23 times higher in pipelines operated above 130° than those operated at ambient temperatures.

The study found little statistical correlation between spill size and block valve spacing. Data indicated that 50 percent of the spill volume represented only 0.75 percent of the pipeline volume between adjacent block valves; 80 percent of the spill volumes were less than 8.5 percent of the pipeline volume between adjacent block valves. Other factors often contribute significantly to the potential spill volume such as local terrain and low leak rates.

The study determined there was no correlation between normal operating pressure and the probability of a rupture.

Risks from damage to the pipeline from seismic activity were also evaluated. The study found that seismic ground movements often caused damage to buried pipelines, but in evaluating pipe damage it was essential to differentiate between damage to segmented pipe (bell and spigot or flange) and continuous pipelines (welded). Water pipelines are normally segmented while oil and gas pipelines are continuous. The California Fire Marshall study found that "various earthquakes have shown that damage to segmented pipelines is much more common than damage to continuous pipelines. Of the roughly 500 leak incidents on California's regulated hazardous liquid pipelines during the study period, only 3 were judged to be due directly to earthquake effects."

2.9.3 OLYMPIC PIPE LINE COMPANY CURRENT OPERATIONS AND SPILL HISTORY

OPL has an excellent record of maintaining and operating the existing system that minimizes the occurrence of spills along the pipeline system. Table 2.9-1 Petroleum Release History summarizes OPL's product releases and recoveries for the operation period of the existing mainline petroleum pipeline.

TABLE 2.9-1
PETROLEUM RELEASE HISTORY

Date	Location	Cause	Product	Loss (BBLs)	Recovered (BBLs)
8-24-66	12" Seattle	3rd Party	Gasoline	160	140
1-23-68	So Po DF	3rd Party	Gasoline	10	10
2-2-68	Seattle DF	2" Gasket	Turbine	5	0
2-19-70	Olympia Junction	12" Gasket	Diesel	19	10
3-15-71	Sea-Tac	12" Gasket	Turbine	30	20
3-8-72	Renton Station	16" Gasket	Diesel	5	4.5
3-17-72	Renton Station	Pressure Gauge	Turbine	6	5.5
7-23-72	Fern Station	16" Gasket	Diesel	5	4
9-6-72	Woodinville Station	Sample Line	Diesel	10	10
9-15-72	Olympic Junction	12" Gasket	Diesel	2	0
3-22-73	Sea-Tac	Prover Gasket	Turbine	4	1
3-26-73	MP 84.5 of 20" Line	3rd Party	Gasoline	215	180
12-21-73	Allen Station	16" Gasket	Diesel	8	8
8-8-75	Allen Station	20" Gasket	Diesel/Gasoline	570	502

TABLE 2.9-1 (CONTINUED)
PETROLEUM RELEASE HISTORY

Date	Location	Cause	Product	Loss (BBLs)	Recovered (BBLs)
12-1-75	65.5 MP of 20" Line	Sensing Line	Turbine	12	7
7-21-78	Renton Station	O-Ring Gasket	Gasoline	1.5	0
3-13-79	So Po DF	Corrosion	Diesel	1700	1590
6-19-80	Renton Station	Small Piping	Diesel	1	0
8-18-80	Allen Station	Pressure Cell	Diesel	4	0
2-24-81	Woodinville Station	Fitting	Gasoline	5	4
9-26-81	Vance Junction	3rd Party	Gasoline	5	2
8-14-83	Allen Station	Flange Gasket	Diesel/Turbine	1019	870
6-10-84	Olympia Lateral	3rd Party	Diesel	224	145
8-23-85	MP 46 of 20" Line	Sensing Line	Diesel	740	524
11-24-85	Sea-Tac	Filter Valve	Turbine	500	440
12-24-85	Seattle DF	Flange Gasket	Diesel	60+	60+
7-17-86	MP 114 of 14" Line	3rd Party	Diesel	820	740
9-30-86	MP 110 of 16" Line	Sensing Line	Mixture	2000	unknown
5-15-87	Vance DF	Operator Error	Diesel	5	5
8-23-88	Allen Station	Mainline Rupture	Diesel	4000	2300
8-12-89	MP 119.0 of 14" Line	Block Valve Plug	Unknown	Unknown	1
2-7-90	Woodinville Station	16" Gasket	Diesel	300	100
2-26-91	Sea-Tac Terminal	Differential Gauge	Turbine	10	8
1-24-92	Olympic Sta/Jct	Circulation Line	Diesel	75	60
2-17-92	Tacoma Station	Circulation Line	Diesel	2	2
3-1-92	Olympic Sta/Jct	Circulation Line	Diesel	10	unknown
10-30-92	Renton Station	T/I Gasket	Turbine	50	45
7-18-93	Renton Station	Gasket	Diesel	5	5
6-20-94	Tacoma Station	Thermo Well Failure	Diesel	55	50+
3-23-96	14" MP 227	Natural Forces	Diesel	10	5
6-17-96	20" MP 74.2	Buckle in Pipe	Diesel/Gasoline	20	11
05-27-97	Castle Rock Station	Seal Failure	Diesel/Gasoline	263	250

The summary of causes of releases are as follows:

- Third Party Damage 6
- Corrosion 1

- Sensing Line/Plug Leaks 4
- Facility Spills 29
  a) 16 gasket failure
  b) 13 other failures
- Natural Forces 1
- Other 1

The corrective action taken for the more recent releases (those dating to 1988) is discussed below.

Allen Station: The mainline pipe spill at the Allen Station was examined and determined to have been caused by construction damage which occurred during the initial installation. OPL has initiated a pipeline internal inspection program to locate and repair defects prior to failure.

MP 119.0: It was determined that a block valve plug which has smaller stainless steel auxiliary piping had been installed improperly during initial construction. The plug eventually deteriorated until it started to leak. As a result of this failure all auxiliary piping which is installed or repaired is required to have thicker walls than standard specification piping.

Woodinville Station: The failure occurred in original gasket material. OPL policy has been changed to require the installation of a different composition gasket material in flanges for all new installations and repairs of existing flanges.

Renton Station: The packing material at an injection pump failed. The pistons in the pump leaked product during operation. Overflow of the pump sump resulted in a release. OPL ensured employees had correct training in operation and response procedures to ensure that the incident would not occur again.

Sea-Tac Terminal: A failure occurred due to a manufacturing defect at a newly installed differential pressure gauge. The gauge was removed and a different type of differential gauge was installed.

Olympia Station Junction (2) and Tacoma Station: These releases were caused by vibrational stress cracking of stainless steel circulation lines. OPL has initiated a program to reduce the amount of piping required on the pumps and vibration tolerant tubing is being retrofitted on all pumps.

Renton Station: A gasket was over-pressured resulting in a release. The piping has been modified to prevent the possibility of a reoccurrence.

Tacoma Station: A newly installed thermowell failed. It has been replaced with new fittings.

MP 227: On March 23, 1996, a pipeline spill occurred as a result of ground movement during a mudslide event. The line buckled at what is known as the "Kalama Slide Area", approximately .75 miles northwest of Kalama Washington. Olympic rerouted with a new segment of pipeline away from the slide area.

MP 74.2: On June 17, 1996, a buckle in the 20" pipeline crossing under Ebey Slough caused a small leak amounting to less than 20 bbls of mixed diesel and gasoline product. The apparent cause of the buckle was original construction (1972) damage. The section of line was cut out and replaced with approximately 250' of new pipe.

Castle Rock Station: On May 27, 1997, approximately 263 bbls of diesel fuel were released, of which 250 barrels were contained within a containment vault, and 13 bbls of diesel and gasoline leaked from the vault. The source of the release into the containment vault was a cut gasket on a control valve. The valve was repaired and the source of the leak eliminated.

In constructing and operating the proposed pipeline, the lessons learned and the corrective actions taken to prevent releases will be implemented. One of most common causes for releases, the improper installation of equipment at the time of initial construction, will receive special attention. OPL will have a very stringent construction QA/QC program for pipe, flanges, pumps, and other auxiliary equipment.

2.9.4 SPILL PREVENTION

2.9.4.1 Release Prevention Methods

The following pipeline release prevention methods will be incorporated into the engineering design of the proposed Cross Cascade pipeline system.

- Check and gate valves to control back flow in the event of a release.
- Pressure relieving valves will be installed at appropriate locations to avoid pressure build-up.
- Regular maintenance will be conducted.
- All valves, pipes, and fittings will be maintained at a working pressure suitable to the design requirements of the system.
- Cathodic protection will be installed and maintained.
- Line markers will clearly define pipeline right-of-way crossings of roads, rivers and streams.
- Work by third parties along the right-of-way will be monitored.
- All of the pipeline will be subject to periodic (minimum of every 5 years) inspections via an internal inspection tool (smart pig).

Block valves will be located at pump stations and at crossings of large rivers or streams that have a large number of water withdrawals. Block valve locations are shown on Table 2.9-2. Additional locations may be added based on further engineering studies.

TABLE 2.9-2
PRELIMINARY IDENTIFIED BLOCK VALVE LOCATIONS

Valve Number	Water Source	Location	County	Sec/Tw/Rn	MP
1	Thrasher Station	Maltby Road	Snohomish	SEC21/T27N/R5	0
2	Snoqualmie River, West	Lake Crest/High Bridge Rd.	Snohomish	SEC26/T27N/R6E	8.10
3	Snoqualmie River, West	West Side of Hwy 203	Snohomish	SEC25/T27N/R6E	9.30
4	Cherry Creek	North Side of Cherry Creek Road	King	SEC9/T26N/R7E	16.19
5	Cherry Creek	South of road on edge of property line	King	SEC14/T25N/R7E	23.42
6	Tolt River	Top of hill	King	SEC14/T25N/R7E	24.56
7	Tolt River	East Side of Tokul Creek Road	King	SEC20/T24N/R8E	31.86
8	Snoqualmie River	North of trestle bridge; north of Reinig Road	King	SEC29/T24N/R8E	34.06
9	North Bend Station		King		37.32
10	North Bend Station		King		37.34
11	S. Fork Snoqualmie River, West	East side of SE 145th SE	King	SEC23/T23N/R8E	39.42
12		North side of Homestead Road	King	SEC28/T23N/R9E	44.29
13		Near Exit 47 of I-90; north side of Homestead Road	King	SEC13/T22N/R10E	54.80
14	Stampede Station	Stampede Pass Road	Kittitas	SEC22/T21N/R12E	67.07
15	Cabin Creek	West side of Monihan Road; 35 meters south of BNR Railroad	Kittitas	SEC9/T20N/R13E	73.90
16		West side of Cle Elum Ridge	Kittitas	SEC4/T19N/R15E	87.56
17	Yakima River, East	Between I-90 and Thorpe Prairie Rd.	Kittitas	SEC10/T19N/R16E	95.26
18	Yakima River, West	30 meters east of Highway 10	Kittitas	SEC11/T19N/R16E	96.19
19	Currier Creek/North Branch Canal	East Side of Evans (Robbins) Road	Kittitas	SEC27/T19N/R18E	108.73
20	Kittitas Station	Badger Packet Road	Kittitas	SEC12/T17N/R19E	123.89
21	Kittitas Station		Kittitas		124.09
22	Park Creek/High Line Canal	West side of Stevens Road	Kittitas	SEC14/T17N/R20E	129.82

TABLE 2.9-2 (CONTINUED)
PRELIMINARY IDENTIFIED BLOCK VALVE LOCATIONS

Valve Number	Water Source	Location	County	Sec/Tw/Rn	MP
23	Columbia River, West	West side of Huntzinger Rd.	Kittitas	SEC18/T16N/R23E	148.39
24	Columbia River, East	East of Highway 243	Grant	SEC21/T16N/R23E	150.35
25	Beverly-Burke Station	Beverly Burke Rd.	Grant	SEC24/T16N/R23E	154.08
26	Unnamed Stream, West	Near Highway 26	Grant	SEC35/T16N/R27E	178.53
27	Lower Crab Creek, North	South side of Highway 26	Grant	SEC8/T15N/R28E	181.69
28	Othello Station		Adams	SEC3/T15N/R27E	189.15
29	Pasco Metering Station		Franklin		231.01

Release prevention methods will also be incorporated into the engineering design and operational procedures for the Kittitas Terminal. High level and independent high/high level alarms will be included on all storage tanks and they will be subject to daily visual inspections. Frequent visual inspection of the facility will include the secondary containment encompassing the above ground storage tanks and transmix tank to detect any unusual occurrences or the presence of a sheen. Visual inspections of the perimeter fencing will also be conducted to evaluate the integrity of the fencing to prevent unauthorized entry.

2.9.4.2 Spill Prevention, Control and Countermeasure (SPCC) Plan

OPL will prepare a separate SPCC plan for the required facilities of the proposed Cross Cascade Pipeline. The SPCC plans will be for the proposed pump stations at Thrasher, North Bend, and Kittitas, including the storage facilities at Kittitas. As new pump stations are constructed (Stampede, Beverly-Burke, and Othello), the plan will be amended to cover those facilities. The plan will also be updated as new storage tanks are constructed at the proposed Kittitas Terminal. The plan will be submitted no later than 65 days prior to the operation of the proposed facilities.

The pipeline will be a welded steel pipeline, operated at ambient temperatures, and protected from corrosion by an impressed current cathodic protection system and coating. Pipeline and pump station working and maximum operating pressures will be 1,440 pounds per square inch gauge (psig) and the test pressure will be 1,800 psig except for the North Bend Station. At the North Bend Station, the maximum operating pressure will be 1690 psig and the test pressure will be 2115 psig. Other general operating parameters are presented on Table 2.9-3 Estimated Flow Limits, Table 2.9-4 Estimated Minimum Flow Rates, and Table 2.9-5 Estimated Line Fills and Displacement.

TABLE 2.9-3
ESTIMATED FLOW LIMITS

Location	Meter Size	Minimum Rate (BBLs/hour)	Maximum Rate (BBLs/hour)
Thrasher	8"	1,000	7,500
Kittitas (receiving)	8"	1,000	7,500
Kittitas (outgoing)	6"	500	4,000
Pasco	6"	500	4,000

TABLE 2.9-4
ESTIMATED MINIMUM FLOW RATES

Pipeline Diameter	Wall Thickness	Minimum Flow Rate (BBLs/hour)
14"	0.281"	947
12"	.250"	779

TABLE 2.9-5
ESTIMATED LINE FILLS AND DISPLACEMENT

Initial Mainline Segment	Length in Miles	Base Volume (BBLs)
14" Thrasher to North Bend	37.5	34,548
14" North Bend to Kittitas	86.6	80,210
12" Kittitas to Pasco	107.1	82,434

2.9.5 SPILL DETECTION

2.9.5.1 Continuous Monitoring

OPL personnel will continuously (24 hours per day) monitor operational performance and integrity throughout pipeline operations and terminal transfers. Monitoring will be performed through visual inspections and analysis of pipeline operational conditions, such as line pressures, flow volumes, and pump and valve actuation. Tank levels and operation conditions at the Kittitas Terminal will also be continuously monitored remotely from the Renton Control Center and visually by facility personnel during normal operating hours. The Renton Control Center will have the capability of remotely controlling pumps and valves and monitoring the pressures and flow volumes along the entire length of the proposed pipeline.

System controllers are responsible for the movement of petroleum products in a safe manner consistent with established protocols, schedules, and product integrity.

The controller on duty is responsible for the safe and efficient operation of the pipelines, tanks, and pumping equipment supervised from the control center. Facilities are designed to be used under certain operating limits. Protective devices are provided to minimize the hazards the facilities might pose to people and property. The controller monitors the operating limits established for these facilities and is familiar with the protective and control device settings, referenced procedures and instructions for the safe operation of these facilities. The controller is familiar with protocols and instructions dealing with normal, abnormal, and emergency situations at specific locations. These references are kept at the control center for immediate use.

The controller is often the contact for verbal reports of field conditions from air patrol pilots, station and maintenance personnel. Since the telephone number of the control center is widely published on pipeline markers, the controller is likely to receive calls from the public. Appropriate notes of such contacts are recorded. All reports of unusual operating conditions regardless of the source are recorded.

If abnormal operating conditions occur during pipeline operation, audible and visual alarms will activate, and an investigation will be initiated by system controllers to determine the source of the abnormal condition.

The control center has two computers dedicated to supervisory control assistance to the controller. One computer is used on line while the second serves as a spare which is automatically activated in case the online computer should fail.

<u>Renton Control Center Monitoring</u>

Pipeline pressures, flow rates and line balances for the proposed Cross Cascade Pipeline will be monitored at the Renton Control Center. Conditions deviating outside of normal (both low and high) operational standards will be immediately investigated. The tanks at the Kittitas Terminal will be equipped with high level alarm systems to prevent an overfill. If alarm levels are reached, the tank receipt valves will shut. In the event of the possibility of a tank overfill, alarms will signal both the Kittitas Terminal Office and the Renton Control Center. In such an event, transfer operations will be suspended and product diverted into an alternative storage tank. All equipment control and performance variations will receive immediate analysis in order to determine the source of the potential problem.

Listed below are several methods which will be utilized for determining leaks:

- pressure drop

- shortage trend evident in the over/short calculations on product delivery
- significant shortage in one checking period without a pressure drop
- computer comparison with pipeline operating history
- pipeline aerial surveillance
- land owner, third party, civil authorities, or company personnel reporting via telephone or other communication methods

A summary of abnormal operating conditions and the appropriate countermeasure to either eliminate or minimize the potential for release, are described in the following section.

Pipeline Operating Conditions and Countermeasures

The following description of detecting and evaluating abnormal conditions are summarized from procedures currently in use for the existing 400-mile OPL pipeline system. The abnormal operating procedures would apply to the operation of the Cross Cascade Pipeline.

In order to assure public safety and environmental protection in the event of a natural disaster or other major incident, a final emergency plan will be prepared prior to operation. The plan will describe the emergency response procedures that will be implemented during various emergency situations that may affect the project site or the surrounding environment. The plan, in compliance with WAC 296-62-3112, will be designed to minimize the effects of releases and to prevent personal injury. See Section 7.2 for Emergency Plans.

Procedures and Plans

Conditions can develop in the operation of the OPL system that are not anticipated, but are not immediately identified as emergencies. These conditions are considered abnormal. Situations of this type are taken seriously, and investigative and corrective actions will be taken immediately. Procedures to be followed to address abnormal conditions are outlined below to cover specific facilities of OPL.

Line Volume Overages and Shortages

One of two basic surveillance methods of determining the integrity of the pipeline system is comparison of the volume received into the pipeline to the volume delivered out of the system. Differences between receipts and deliveries are referred to as overages or shortages. A computer program compares the barrels received into the line against the barrels delivered out of the line. The computer calculates the pipeline inventory and a new line balance every 5 minutes. A barrel loss or gain for the last hour is displayed and compared with the previous hourly loss/gains to indicate a potential release. Line balance is designed to detect relatively small pipeline releases over a period of time. Causes of overages or shortages are discussed below.

A shortage can be caused by a line leak, increased pressure, temperature change, meter malfunction, fluid change, valve leakage and errors in calculating volumes. An overage can be caused by a reduction in operating pressure, temperature change, meter malfunction, fluid change and errors in calculating volumes. Both overages and shortages are analyzed with serious concern. The following steps are taken by the Operations Controller to determine the cause(s) for overages and shortages.

- Compare tank gauges versus meter readings.
- Prove meters.
- Analyze pressure and temperature changes.
- Rerun computer model and review historical data of system operating under similar conditions.
- Shut down intermediate delivery facilities to aid in the process of elimination.
- Confirm remotely transmitted information with field personnel at facilities.
- Check all valve alignments and relief systems.

Abnormal Pressure Changes

Another basic method of determining the integrity of the pipeline system is pressure surveillance. Hydraulic changes in a system give immediate indication of a variation in flow rates and can be used for checking the pipeline integrity. The rate of change (ROC) is a critical indicator for the controller. Changes in flow and pressure indications will depend on the operating conditions at each station at the time of the leak. The location of interfaces (intermix zone) between batches of product, whether or not the station control valve is throttling, and other transient conditions on the pipeline must be considered in analyzing for a leak condition. During steady state conditions, the computer monitors the ROC of station pressures and flow rates to detect a condition which would indicate a release. In general, the conditions listed below are indicators of a loss of pressure in the pipeline, assuming all units remain in operation.

Conditions at the "first station **upstream**" would include:

- Flow rate would increase.
- Discharge or pump pressures could be reduced.

Conditions at the "first station **downstream**" would include:

- Flow rate would decrease.
- Discharge pressures would be reduced due to the control valve closing to hold the suction at the control point.

Generally, the pressures and flow at stations upstream from a break will be affected less than those on the downstream side. The station immediately upstream would have a noticeable fluctuation on pressures. As this fluctuation is distributed to the remaining upstream station, it becomes progressively less detectable. All stations on the downstream side of the a break will show about the same changes in pressures due to the reduced flow.

A pressure change can be caused by a leak, a throughput rate change, changes in fluid viscosity and gravity, pump changes, changes in receiving and delivery locations, control valve functions and line blockage. When an abnormal pressure change occurs that cannot be justified due to current circumstances, the Operations Controller initiates an investigation to determine the cause and if corrective action is required. The following steps are used to analyze the situation.

- If the pressure change is an increase, the operations controller will determine if the fluid characteristics change, have any restrictions occurred downstream (pump shutdown), or have any control valve adjustments or malfunctions occurred downstream of the pressure increase. If the cause of the pressure increase cannot be corrected and the pressure continues to increase, the system will be reduced or shutdown.
- If the pressure change is a loss of pressure, the operations controller will determine if the volume is reflecting a shortage, have fluid characteristics changed, are there any restrictions in the system or have valve adjustments or malfunctions occurred upstream of the pressure loss. If the cause of the pressure loss cannot be determined the system will be shutdown.

Unscheduled Facility Shutdown Conditions

Any unanticipated shutdown of a facility creates a situation that requires immediate corrective action. Regardless of the nature of the shutdown, the operations controller will immediately initiate corrective action required to hydraulically balance the system in order to minimize line surges and prevent the shutdown of other facilities. As soon as pressures and flow rates have stabilized, the operations controller will analyze line operations for assurance that a continued safe operation is being achieved.

After the system has been adjusted and it has been determined that operations are normal under the current circumstance, actions will be initiated to resume pre-facility shutdown conditions.

OPL facilities on the Cross Cascade Pipeline will have a number of protective devices installed to accomplish safe pipeline operations. Some devices provide "lockout" protection which inhibit further operation of the affected facility or device until corrective action is taken by a local area operator following an onsite inspection and investigation of the cause of the lockout. Other devices initiate a "shutdown" of a facility or other devices requiring an investigation and analysis and corrective action taken before the affected facility or device can be brought back on line. In addition to these devices which can effect operation of the system other devices monitor and provide information regarding the operation of either a facility or another device.

General Causes of Facility Lockout: At a pumping station, a facility lockout begins a series of events which terminate with the main incoming electrical power breaker being tripped. In this event the operations control center in Renton receives both a mechanical and an electrical alarm.

- Emergency lockout button: Lockout buttons are installed at all facilities and can be activated by onsite personnel at anytime an unsafe situation exists.
- High-high sump level: Each facility is equipped with a reservoir (sump tank) to which various drain and thermal relief lines are connected. A sump pump is installed to pump fluid back into the product stream or into a tank at certain locations. Failure of the sump pump, or flow in excess of the sump pump capacity, or for what ever reason high liquid levels accumulate in the sump, will result in facility lockout.
- Fire eyes sensor: Pumping facilities will be equipped with devices which detect high ultraviolet radiation for a specified duration. Activation of this device causes a facility lockout.
- Gas concentration detectors: Gas detectors will be installed in pump and motor rooms. If the alarm point is reached, station lockout occurs.
- Valve incomplete sequence: When a manifold, divider or other valve has an incomplete sequence or malfunction a system failure could occur. In this case the pipeline will be

shutdown until the system can be analyzed and the valve physically checked for leakage.

- High loop pressure: When system controls indicate there is high loop pressure the facility will be isolated and actions to hydraulically balance the pipeline or shutdown the pipeline will be initiated. This condition requires an onsite evaluation and inspection to determine the cause of the high pressure and take corrective action. The facility will not be returned to normal operating status until notified by the onsite inspector or facility operator that the abnormal situation has been corrected.

General Causes of a Unit Lockout: Unit protective devices monitor items in the following mechanical categories and will initiate a unit lockout if the protective devices are activated.

- Motor over current and motor high winding temperature
- Incomplete motor starting sequence
- Unbalanced current
- High vibration
- Low lubricant level
- Fan blower operation malfunction

In the event of a unit lockout, corrective action is initiated. In some cases area operations personnel may be able to make repairs locally. Evaluation of effects of a prolonged outage are reported to the control center supervisor for determination of repair requirements and the overall effect on pipe line operations.

General Cause of Facility Shutdown: At pumping stations, a facility shutdown may be caused by low suction pressure due to a hydraulic imbalance in which the affected facility is attempting to deliver more volume than is being supplied from the upstream source. Reasons for this situation are described below.

- When volume restrictions occur upstream, an upstream station is shut down, an equipment malfunction occurs, or there is improper configuration of pumping equipment a hydraulic imbalance could occur.
- Changes in the downstream configuration which permit the affected facility to outpump upstream stations.
- Low suction can result in a facility shutdown and also results in alarms, displays and log station mechanical and station shutdown indications in the Renton control center.

General Causes of Unit Shutdown: At pumping stations, individual pump units may be shut down due to high discharge pressure and high control pressure. High pressure discharge is normally caused by the loss of pump unit(s) downstream of the facility with the pressure back surge, valve closure downstream of the station, or the pump unit at the facility with the control valve not responding to control for discharge pressure. When this situation occurs, the controller will adjust the hydraulic balance due to the loss of the pump unit or initiate line shutdown. The controller is also alerted when any malfunction or operating error that causes the pressure of a pipeline to rise to 110 percent of its maximum operating pressure.

If high control pressure is a result of pressure build-up between the downstream pump and upstream side of the facility control valve, the operator will adjust the pipeline hydraulic balance due to the loss of pump units or shut down the line. For other high pressure situations, the operator checks all station controls and evaluates the cause of the pressure build-up. In the event that the controller cannot diagnose and resolve the problem, the facility area chief will be called to do a facility check.

High pressure surge relief valves, when activated due to pressure build-up downstream of the valve(s), will open and relieve pressure to the Renton or Kittitas utility/transmix tank and the controller will receive a valve open alarm. If this situation occurs, the controller initiates a shutdown of the pipeline. To prevent an overflow condition from occurring in the Renton or Kittitas utility (transmix) tank, there will be a relief tank at Woodinville. To stop this flow, the motor-operated valve immediately upstream of the respective relief valve is closed as soon as possible after pipeline shutdown.

The Kittitas Terminal will have surge relief valves and, in the event that any of the delivery facilities high pressure surge valves are activated the Renton control center, will receive an open status of valve and the product will flow to the facility transmix tank. The transmix tank has been designed to accommodate flow volumes for sumps and/or high pressure relief. This situation is monitored very closely and if pressure is not fully relieved and the valve continues to remain open, the controller will shut down the appropriate pipeline segment.

Unauthorized Operation of Valves

While block valves are an absolute necessity in pipeline operation, the opening or closing of a block valve at a time when operations dictate that it be in the opposite mode could create situations that can rapidly develop into emergencies. To prevent emergencies from occurring from a valve closure which would block the upstream flow in a pipeline, the upstream pump stations are shut down immediately to prevent over pressuring. This action is followed by stopping all pumps at the originating station and then continuing downstream from the origin until all pumps are stopped. If a valve opens inappropriately, causing product to flow to be diverted into another tank or destination, the upstream pump stations are also shut down.

If conditions indicate that a loss of product may have occurred the pipeline will remain down and appropriate employees deployed to investigate. The pipeline will be blocked in segments to minimize any potential for a release. If a loss of product from the pipeline is not apparent from field or control center evaluations, a static pressure test by segment is required. After concluding this test and a decision is made to restart the pipeline, the line balance calculations will be monitored at more frequent intervals.

Communications

A loss of communications, which reduces the capability of the operations controller to remotely control and monitor the operations of the system, creates a situation that requires caution and certain corrective actions on the part of the controller to assure a safe operation.

When the loss of communications has been determined to be non-transient, the operations controller notifies the appropriate telephone company personnel and requests that immediate corrective action be taken. The controller will also assess the operations of the system and determine which facilities will require a local area facility operator assistance. During time periods that the data circuit is out-of-service, communications will be maintained by using long distance telephone, the SS-4 system, radio, or mobile facilities.

Immediate Response Locations

OPL maintains a list by milepost marker, pipeline segment, and physical description, where pipeline facilities are located in sensitive areas that would require priority response. This list includes all stream crossing and communities on the pipeline route. A similar list will be prepared and maintained for the Cross Cascade Pipeline.

<u>Kittitas Terminal Operating Conditions</u>

The Kittitas Terminal will be equipped with both terminal lockout and shutdown devices and/or procedures that will result in a lockout or shutdown.

Terminal and delivery facility lockout will be activated when any one of the following conditions occur.

- Local initiation of the terminal lockout button from the local control panel or emergency lockout button from any pole position in the terminal yard. When the lockout or emergency lockout button is activated, the entire terminal complex will be locked out. Alarms at both the local control panel and the Renton operations control panel will be activated.

- High-high sump tank level. The terminal and delivery shutdown occurs when the sump high-high level monitor is activated. Alarms at both the local and Renton control centers are activated.
- Relief line flow will lockout the terminal and delivery shutdown occurs. Alarms are triggered at the local and Renton operations control panel.
- Devices will be installed to detect when ultraviolet radiation exceeds the maximum allowable for a specified time, indicating possible fire conditions. Alarms are activated at both the local and Renton operations control panels.
- Foam sprinkler systems will be installed that, when activated, also trigger alarm systems in both the local and Renton control panels. In addition, OPL will coordinate with the local fire departments (Kittitas and Ellensburg) to determine the appropriate alarm and notification systems for their needs.
- All storage tanks will be equipped with both a high-level monitor that activates delivery facility lockout and shutdown. The monitor/annunciator also activates alarms at the local and Renton control panels.

Tank Liquid Level Alarms

The Kittitas Terminal tank fluid level will be monitored for a high level which will cause a mechanical alarm at the Renton operations control center. The cause of the high level alarm will be determined immediately and corrective action taken. An additional high-level indicator device will initiate a lockout of the facility. It is anticipated that the flow to the Kittitas Terminal could be stopped within 5 minutes of receiving the alarm.

At terminals operated by other companies (Northwest Terminalling in Pasco), an alarm point will provide the capability for the operations controller to receive an indication of a high liquid level from the receiving terminal's facilities. During deliveries to the terminal, a tank alarm would be activated if liquid levels reach abnormally high levels, and the Renton Operations Controller will immediately initiate an emergency call to Northwest Terminalling and initiate a shutdown to stop the flow of product into the terminal. Examples of the time required to entirely stop the flow between Renton and the terminal in Portland, Oregon (the farthest from the control center) is 5 minutes. Although OPL does not operate the Northwest Terminalling facility, OPL will coordinate with the facility operators to set the high level monitors at levels to allow time for OPL to activate shutdown and prevent over-fill conditions. It is anticipated that the control of flow could be completed within 5 minutes of the over-fill alarm being received in Renton from the facility in Pasco.

Supervisory Control and Data Acquisition (SCADA)

Detection and estimation of release volumes is achieved through the use of Supervisory Control and Data Acquisition (SCADA) software, field hardware, and the experience of the Renton Control Center Operations Controllers. The combination of hardware and software tools provides the operations controllers with significant detection capabilities. A block diagram of the SCADA system is shown on Figure 2.9-1.

FIGURE 2.9-1 - SCADA SYSTEM BLOCK DIAGRAM

The proposed pipeline and facilities will be equipped with similar or more technologically advanced systems than are currently being used on the existing OPL mainline in western Washington. The existing SCADA system is described below.

The Vector SCADA software runs on Digital Equipment Corporation VAX 400 model 300 computers and is designed to detect and post any failure of software or hardware. The SCADA system contains several software elements, which both activate alarms in the operations center in the event of an abnormal condition, as well as automatically document the event for immediate, on-line review and archiving to magnetic tape. Deviation limit alarms notify the control center operators in the event a system analog value deviates outside of preset, absolute, or percentage of change limits. Deviation limits are calculated on a per scan basis that occurs every 4 to 5 seconds.

The SCADA system provides the capability of evaluating trends in the system at discrete, analog, calculated point, or accumulators. A single trend, which may include up to 4 separate, distinct points, can range from intervals of 30 minutes up to 48 hours. The operation controllers may also trend historical, on-line data, which is up to 21 days old. This data is also archived on magnetic tape and may be retrieved for display and evaluation.

A fundamental leak detection capability of SCADA that alerts operation controllers of possible problems is the over/short subsystem. The surveillance functions include over/short volume calculations based upon:

- Net volumes from metered injection and receiving points
- Net volumes calculated from tank level readings
- Net line segment inventory changes

The net over/short is calculated and based upon net volumes. The calculation takes into consideration the volumetric changes within the pipeline segment inventory that are metered into and out of the pipeline segment. These segments include pipeline between pump stations and the Kittitas Terminal. Frequency of calculations will be made at a minimum of every 2 minutes, with statistics compiled for short term (2 minutes), hourly, and 24 hour values.

Facilities that are constructed utilizing enclosed motor/pump housing, such as pump stations, will maintain a "product detection device," which when activated, transmits a discrete alarm to the Renton Control Center. In the event a hydrocarbon presence is detected, a warning alarm is sounded locally and subsequently transmitted to the Control center. Should this detection remain activated, the facility will be automatically shutdown and lockout will occur. Should this product detection device fail, the facility will also be automatically shutdown and lockout will occur.

Hourly log sheets will be maintained by the operation controllers, which allow a review of activity, not only of past, but of anticipated events. The operation controllers will manually log volumes received into and out of the system, as well as over/short calculations. Review of these values is based upon current line conditions, and previous activities and product placement is made as a comparison to the automatic on-line system.

All hardware devices will be visually inspected via field operations personnel, and a record of testing maintained for operation integrity at intervals not to exceed 7.5 months, but at least twice annually.

The sensitivity of model compensated volume balance leak detection is influenced by a number of factors including the instrumentation, communications, and computer systems associated with the pipeline; the physical conditions present at the site of the event, and the manner in which the event develops. The instrumentation, communications, and computer system technology that will be employed for the new pipeline is designed to detect leaks of less than one percent (1%) of average pipeline flowrate. It is important to recognize that an integral component of the leak detection system is Olympic's operational monitoring program. This program includes over-flights of the route approximately every two weeks, periodic inspection of facilities by field personnel, and landowner education. These activities are designed to identify product losses which are below the threshold that is detectable through the technology.

Safety Devices

The OPL operating system also has safety devices installed to protect pipeline facilities and prevent injury to persons, property, and the environment. Generally, these alarms will require or result in shutdown of some portion of the pipeline system. In the event of a station lockout, field employees will be sent to investigate and correct the condition. The shutdown portion of the system will not be restarted until the designated field employee notifies the Renton Control Center Operations Controller that an abnormal condition does not exist and the system may resume operation.

2.9.5.2 Visual Monitoring

In addition to continuous monitoring of operating conditions via the Renton Control Center, visual inspections of the pipeline right-of-way will be performed on a frequent and consistent basis. Aerial visual inspection of the entire length of the pipeline is performed at a minimum of 26 times per year (Federal DOT minimum required). OPL policy is to schedule an aerial inspection once a week. Pipeline segments are also visually inspected via maintenance personnel during the normal course of work, and routine observations will be made by surface vehicles as they drive along rights-of-way. Abnormal conditions will be noted and responded to immediately. If abnormal conditions are noted by the Renton Control Center, field personnel are directed to the affected area(s) to visually assess the situation.

2.9.5.3 Reports From Outside Sources

Conditions which may indicate that a release has occurred, may be reported by noncompany personnel. In this case, the conditions will be responded to by facility personnel closest to the reported release. Signs will be posted on the perimeter fences of facilities (pump stations and block valves) with a 24-hour telephone number to call in the event of an emergency. The OPL 24-hour telephone number is also printed on right-of-way signs at highway and water crossings, on milepost markers, and along the right-of-way.

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