Section 5.1 – Air Emissions Permits and Authorizations

WAC 463-60-536

Applications for Permits and Authorizations – Air emissions permits and authorizations.

(1) The application for site certification shall include a notice of construction application pursuant to the requirements of Chapter 463-78 WAC.

(2) The application shall include requests for authorization for any emissions otherwise regulated by local air agencies as identified in WAC 463-60-297 Pertinent federal, state and local requirements.

(04-23-003, recodified as § 463-60-536, filed 11/4/04, effective 11/11/04. Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, § 463-42-536, filed 10/11/04, effective 11/11/04.)

Section 5.1 Air Emissions Permits and Authorizations

5.1.1 Introduction

Tesoro-Savage Petroleum Terminal, LLC (Tesoro-Savage) proposes to construct a facility in Vancouver to receive crude oil by rail and transfer it to vessels. The Tesoro Savage Vancouver Energy Distribution Terminal (Facility) will emit air pollutants and therefore must obtain certain air quality permits before construction of the Facility can commence. Air permits are required for construction and operation of the emissions units associated with the stationary source. Emissions from mobile sources, including ships, trains, and vehicles, are regulated under other federal mobile source emission standards and are therefore not regulated or addressed under the stationary source air permitting process.

The Energy Facility Site Evaluation Council (EFSEC) is the lead state agency responsible for environmental permitting of facilities that have the capacity to receive more than an average of 50,000 barrels per day of crude or refined petroleum products that has been or will be transported over marine waters. EFSEC has responsibility for technical review of air quality concerns and for administering preconstruction permits.

Under Washington Administrative Code (WAC) 463-78-005, EFSEC has adopted by reference the general air quality regulations Ecology has established in Chapters 173-400, 173-401, 173-406, and 173-460.[8] It should also be noted that regulations established by the Southwest Clean Air Agency (SWCAA) do not directly apply to the Facility. However, SWCAA regulations are discussed in this application to demonstrate that even if the local regulations did apply, the Facility would be compliant.

5.1.1.1 Organization

This section constitutes a Notice of Construction (NOC) permit application. Although an air quality permit application typically begins with a project description, this permit application is a component of a broader Application for Site Certification. Section 2.3, Construction on Site, of this application provides a detailed project description.

Key components of this air quality permit application are as follows:

- Section 5.1.2 describes the components of the project that emit air pollutants and presents estimated emissions. Emissions are based on vendor information, emissions regulations, and the BACT analysis. A more detail discussion of BACT is included in Attachment 1.
- Section 5.1.3 identifies and discusses potentially applicable air quality regulations.
- Section 5.1.4 describes an air quality dispersion modeling analysis used to estimate concentrations of criteria pollutants and toxic air pollutants (TAPs) in the vicinity of the project (i.e., Class II areas). Section 5.1.4 also compares predicted ambient concentrations with regulatory criteria.
- References are provided in Section 1.5, Sources of Information, of this Application.

[8] Because EFSEC has adopted the Ecology regulations by reference, this section cites directly the Ecology regulations for the reader's convenience.

5.1.1.2 Summary of Findings

This permit application is summarized as follows:

- Emissions units at the Facility will employ Best Available Control Technology to ensure emissions of all regulated pollutants are less than major source thresholds.
- The Facility will comply with all federal and state emissions standards, including New Source Performance Standards and National Emissions Standards for Hazardous Air Pollutants.
- Predicted total concentrations of the criteria air pollutants emitted from the Facility are less than the National and Washington Ambient Air Quality Standards (NAAQS and WAAQS) established to protect human health and welfare. The maximum predicted concentrations attributable to the Facility are added to the existing background concentrations to ensure a conservative analysis.
- Estimated emissions or predicted concentrations of toxic air pollutants released from the Facility are below Ecology's Small Quantity Emissions Rates (SQER) or Ecology's Acceptable Source Impact Levels (ASIL) for all TAPs, demonstrating that the Facility emissions will be in compliance with Washington's toxic air pollutant regulations.

5.1.2 Project Emissions

5.1.2.1 Criteria Pollutant Emissions

Criteria pollutants, including oxides of nitrogen (NO_X), sulfur dioxide (SO_2), carbon monoxide (CO), volatile organic compounds (VOCs), and particulate matter (PM)[9], will be emitted by emissions units at the Facility. Facility emission units include natural gas-fired boilers, marine vapor combustion units (MVCUs), and emergency fire-water pumps, as well as fugitive VOC emissions from crude oil storage tanks and piping components. The following sections discuss the development of emission estimates for each of these emission units. Detailed supporting emission calculations are presented in the spreadsheets in Attachment 2.

5.1.2.1.1 Area 600 – Unloading Boilers

As described in greater detail in Part 2 of this application, the Facility will receive crude oil from railcars. The oil will be unloaded from the railcars and pumped to storage tanks. Steam provided by natural gas-fired boilers to be located in Area 600 will be piped to the railcar unloading area where it will be used on an as needed basis to heat up to 30 railcars at a time, reducing the viscosity of the crude oil sufficiently for the railcar unloading process to be completed within a reasonable time period.

Three boilers, each with a nameplate heat input capacity of 62 million British thermal units per hour (MMBtu/hr) will be located near the railcar unloading area (these boilers are referred to as the unloading boilers). Typically, no more than two of these boilers will operate at any given time, with the third boiler kept as a redundant unit. To allow for uninterrupted steam supply, the third boiler may start up and begin producing steam for a limited period of time before one of the operating boilers is shut down. For the purposes of evaluating compliance with short-term

[9] Virtually all of the particulate matter from the Facility emissions units will be $PM_{2.5}$. For simplicity, this application generally refers to PM but the applicability and compliance will be assessed assuming PM is all PM2.5.

(1-24 hour) ambient standards and ASILs, all three boilers were assumed operating for 24 continuous hours. For the purposes of evaluating compliance with annual ambient standards and ASILs, two boilers were assumed to combust a maximum of 755 million standard cubic feet of natural gas per year (MMscf/yr).

Unloading boiler emission rates were calculated assuming Cleaver Brooks 1500 CBEX Elite natural gas-fired boilers (manufacturer specification sheets are provided in Attachment 3), or equivalent, will be installed and operated. The unloading boilers could operate throughout the year (i.e., 8,760 hours per year), but at varying loads dictated by railcar arrival schedules, the viscosity of the crude oil contained in the railcars, and the maximum annual quantity of natural gas to be combusted (755 MMscf/yr). The estimated annual and hourly unloading boiler emission rates and assumptions are presented in Tables 5.1-1 and 5.1-2, respectively.

Table 5.1-1. Area 600 Boilers Maximum Annual Emission Rates[1]

Pollutant	Tons	Basis[2]
NO_X	4.15	Activity: 61.745 MMBtu/hr, 755 MMscf/yr (assuming 1,000 Btu/scf) Emission Factor: 0.011 lb/MMBtu – BACT
CO	13.6	Activity: 61.745 MMBtu/hr, 755 MMscf/yr (assuming 1,000 Btu/scf) Emission Factor: 0.036 lb/MMBtu – BACT
PM	2.83	Activity: 61.745 MMBtu/hr, 755 MMscf/yr (assuming 1,000 Btu/scf)8,760 hr/yr Emission Factor: 0.0075 lb/MMBtu – BACT
VOC	1.89	Activity: 61.745 MMBtu/hr, 755 MMscf/yr (assuming 1,000 Btu/scf) Emission Factor: 0.005 lb/MMBtu – BACT
SO_2	1.39	Activity: 61.745 MMBtu/hr, 755 MMscf/yr (assuming 1,000 Btu/scf) Emission Factor: 0.00367 lb/MMBtu – based on annual average gas sulfur content (1.31 gr/100 scf) as determined by testing, plus a 25% safety factor
GHG (CO_2e)	44,200	Activity: 61.745 MMBtu/hr, 755 MMscf/yr (assuming 1,000 Btu/scf) Emission Factor: 117 lb/MMBtu – composite of the CO_2, CH_4, and N_2O emission factors from 40 CFR Part 98 Tables C-1 and C-2, using the GWP factors from Table A-1

Notes:
1) Annual emission rates assuming continuous capacity operation of two boilers.
2) Assumptions in "Basis" column used to calculate the maximum annual emissions.

Table 5.1-2. Area 600 Boiler Hourly Emission Rates[1]

Pollutant	lb	Basis[2]
NO_X	0.68	Emission Factor: 0.011 lb/MMBtu – BACT
CO	2.22	Emission Factor: 0.036 lb/MMBtu – BACT
PM	0.463	Emission Factor: 0.0075 lb/MMBtu – BACT
VOC	0.309	Emission Factor: 0.005 lb/MMBtu – BACT
SO_2	0.448	Emission Factor: 0.00725 lb/MMBtu – based on maximum hourly average gas sulfur content (2.59 gr/100 scf) as determined by testing, plus a 25% safety factor

Notes:
1) Hourly average emission rates for a single boiler, based on a maximum firing rate of 62 MMBtu/hr.
2) Assumptions in "Basis" column used to estimate the maximum hourly average emissions.

5.1.2.1.2 Marine Vapor Combustion Unit

Crude oil will be transferred from the storage tanks to marine vessels located at the dock at a rate of up to 32,000 barrels per hour (bbl/hr). The daily and annual loading rates will be approximately 47 percent of the maximum hourly loading rate (360,000 bbl/day and 131,400,000 bbl/yr).

Vapors displaced from the tanks on the marine vessels will be collected and routed to a marine vapor combustion unit (MVCU). Emission rates were calculated based on a system consisting of eight Jordan Technologies CEB units. Emissions from the vapors displaced from the tanks were calculated with a net heating value derived using the estimated composition of vapors in the tanks.

Vessels will arrive at the Facility with on-board tanks filled with inert gas with oxygen levels below eight percent. The inert gas consists of cleaned exhaust from dedicated on-board inert gas generators (engines burning ultra-low sulfur distillate). Note that the inert gas is added to the tanks as the cargo is discharged – not at the Facility, which is a loading facility.

When the vessel tanks are filled with crude oil, the vapors from the cargo tanks, made up of hydrocarbon and inert gases, is displaced to the MVCU system, which will combust the hydrocarbons in the vapors. In order to ensure adequate destruction of hydrocarbons by the MVCU, the vapor stream must consist of at least approximately 20 percent hydrocarbon. Based on a theoretical profile of VOC fraction in the displaced vapors as loading progresses (see Attachment 2), the hydrocarbon concentration of the displaced vapors will be less than 20 percent for the first 85 percent of the loading operation, and natural gas will be added if needed to the displaced vapors at the MVCU as an “assist gas” to increase the heating value of the vapors, and ensure adequate destruction. During the final 15 percent of the crude oil loading operation, the hydrocarbon content of the vapors will be greater than 20 percent, and the assist gas will no longer be needed. For calculating emission rates, the hydrocarbon content of the vapors was assumed to average 32 percent over all loading operations.

The MVCU is expected to achieve a least 99.8 percent destruction of the hydrocarbons in the delivered vapors. The estimated maximum short-term and annual emission rates are summarized in Tables 5.1-3, 5.1-4, and 5.1-5. Table 5.1-3 presents the emissions from combusting displaced vapors in the MVCU, Table 5.1-4 presents the emissions from combusting the assist gas in the MVCU, and Table 5.1-5 presents the sum.

Table 5.1-3. Marine Vapor Combustion Unit Emissions due to Displaced Marine Vessel Vapors

Pollutant	Emission Factor (lb/MMBtu)	Emission Rates[1]		
		(lb/hr)	(lb/day)	(tpy)
NO_X[2]	0.023	3.32	79.6	6.81
CO[2]	0.010	1.44	34.6	2.96
PM[3]	0.0075	1.08	25.9	2.22
VOC[4]	--	4.21	101	8.64
SO_2[5]	--	3.02	72.5	6.20
GHG (CO_2e)[6]	135.6	19,548	469,156	40,100

Notes:

1) Emission rates are based on the following maximum crude oil loading rates: 32,000 bbl/hr, 360,000 bbl/day, and 131,400,000 bbl/yr (i.e., 360,000 bbl/day * 365 days/yr). Based on information provided by the MVCU manufacturer, the hydrocarbon content of the displaced vapors was assumed to average 32 percent by volume over all loading operations. Atypical vapor speciation profile provided by the MVCU was used with the average hydrocarbon content to calculate a composite hourly maximum heat input for the displaced vapor (144 MMBtu/hr), and a composite daily/annual average heat input (68 MMBtu/hr).
2) NO_X, and CO emission factors provided by Jordan Technologies were combined with the composite heat inputs. An email documenting these emission factors is provided in Attachment 3.
3) The MVCU manufacturer did not provide a specific PM emission factor, but indicated that PM emission rates for the MVCU should be calculated using the PM emission factor from EPA's AP-42 Section 1.4 (Natural Gas Combustion). An email documenting this recommendation is provided in Attachment 3.
4) Uncontrolled VOC emissions were calculated using Equation 2 from AP-42 Section 5.2, assuming a worst-case true vapor pressure of 11 psia, a molecular weight of 44.9 lb/lb-mol, and worst-case vessel arrival condition emission factor of 0.86 lb/10^3 gal (from Table 5.2-3, based on the assumption that the previous vessel cargo was volatile, and that the condition of the arriving tanks is "unclean"). The controlled emission rates presented in the table reflect a destruction efficiency of 99.8% applied to the uncontrolled emission rates.
5) SO_2 emissions were based on the assumption that the H_2S content of the vapors displaced from the marine vessel tanks during crude loading operations would not exceed 100 ppm, the Immediately Dangerous to Life or Health (IDLH) concentration established by the National Institute for Occupational Safety and Health (NIOSH). Because each mole of H_2S combusted yields one mole of SO_2, 100 ppm of H_2S will yield 100 ppm of SO_2. The ideal gas law was used to convert this maximum SO_2 concentration, combined with the hourly, daily, and annual maximum volumes of vapor displaced, to mass emission rates.
6) CO_2 emission factor provided by Jordan Technologies as a conservative estimate.

Table 5.1-4. Marine Vapor Combustion Unit Emissions due to Assist Gas

Pollutant	Emission Factor (lb/MMBtu)	Emission Rates[1]		
		(lb/hr)	(lb/day)	(tons/yr)
NO_X[2]	0.023	0.704	6.73	1.23
CO[2]	0.010	0.306	2.93	0.534
SO_2[3]	0.00725	0.222	2.12	0.387
PM[4]	0.0075	0.230	2.19	0.401
VOC[5]	--	0	0	0
GHG (CO_2e)[6]	117	3,580	34,240	6,250

Notes:

1) Emission rates are based on information from Jordan Technologies that assist gas will be added to the displaced vapors from vessel loading at a rate of 30,600 ft^3/hr whenever the hydrocarbon content is less than 20%. The hydrocarbon content of the displaced vapors was assumed to be less than 20% for the first 85% of each loading operation, and greater than 20% for the remainder. The assist gas will be pipeline natural gas; a gross or higher heating value of 1,000 Btu/ft^3 was assumed. The worst-case hourly assist gas usage rate was assumed to be the maximum assist gas usage rate, 30,600 ft^3/hr. Daily and annual composite usage rates were calculated assuming the maximum assist gas usage rate of 30,600 ft^3/hr 85% of the time, and no added assist gas 15% of the time (i.e., a daily usage rate of 292,600 ft^3/day, and 106,803,600 ft^3/year).
2) NO_X and CO emission factors provided by Jordan Technologies were combined with the usage rates and gross heating value described above.
3) SO_2 emissions were based on maximum hourly average gas sulfur content (2.59 gr/100 scf) as determined by testing, plus a 25% safety factor
4) Calculated using an emission factor provided by Jordan Technologies and the usage rates and gross heating value described above.
5) The assist gas will be pipeline natural gas, which is comprised almost entirely of CH_4, which is not a VOC. The small fraction of natural gas that is VOC will be 99.8% combusted by the MVCU; the resulting VOC emissions were assumed to be negligible.
6) The GHG emission factor in units of CO_2e is a composite of the CO_2, CH_4, and N_2O emission factors from 40 CFR Part 98 Tables C-1 and C-2, using the GWP factors from Table A-1.

Table 5.1-5. Marine Vapor Combustion Unit – Total Emissions

Pollutant	Emission Rates[1]		
	(lb/hr)	(lb/day)	(tons/yr)
NO_X	4.02	86.3	8.04
CO	1.75	37.5	3.49
SO_2	3.24	74.6	6.59
PM	1.31	28.1	2.62
VOC	4.21	101	8.64
GHG (CO_2e)	25,150	526,100	50,530

Notes:
Total emission rates are the sum of the displaced vapor emission rates in Table 5.1-5 and the assist gas emission rates in Table 5.1-6. Estimated CO_2 emissions from the inerting gas are included in Table 5.1-5.

5.1.2.1.3 Crude Oil Storage Tanks

There will be six crude oil storage tanks located in the storage area. Each tank will have a storage capacity of approximately 360,000 bbl, and have a working capacity of approximately 340,000 bbl.[10] Each tank will be approximately 48 feet tall (not counting the peak of the fixed roof), and be approximately 240 feet in diameter. Annual throughput for each of the tanks will be 868,700,000 gallons per year, for a total Facility throughput of 5,212,200,000 gallons per year. Each tank is expected to turn over approximately every six days, when the Facility is operating at full capacity. The tanks will feature an internal floating-roof design, with a pontoon-style internal deck. The edge of the deck will be equipped with a mechanical shoe primary seal, and a rim-mounted secondary seal to minimize the quantity of crude oil on the inside walls when the tank is drawn down. A figure showing a typical internal floating-roof sealing system similar to that proposed for the Project is provided in Attachment 3.

EPA's TANKS 4.0.9d program was used to calculate fugitive emissions from the crude oil storage tanks. EPA' TANKS 4.0.9d program uses working volume to establish a total throughput for estimating fugitive emissions. Speciation information was developed for a range of crude oils11, and provided to TANKS for the emission rate calculations that are detailed in Attachment 2. Tank emissions calculated by TANKS are summarized in Table 5.1-6, and the input data and results from TANKS are provided in Attachment 2.

Approximately once every 10 years, tanks will require inspection to ensure adequate operational condition. During this inspection process, a tank is completely drained and degassed. Degassing emission calculations were estimated by combining emissions from two calculations. To account for withdrawal losses while draining and refilling the portion of the tank above the level of the feet on the floating roof, emissions were estimated using EPA TANKS 4.0.9d for an internal floating roof tank (parameters specified in Attachment 2). For the losses associated with draining the tank below the feet that hold up the floating roof, working loss emissions were estimated using EPA TANKS 4.0.9d with a fixed roof with a height equal to the height of the legs (additional parameters specified in Attachment 2). Working and withdrawal loss emissions were then summed in order to determine the total VOC degassing emissions of approximately 1.6 tons.

Table 5.1-6. Total Crude Oil Storage Tank Emission Rates[3]

Pollutant	Hourly Average Emissions (lb/hr)	Annual Emissions (ton/yr)
VOC	5.38[1]	23.58[2]

Notes:
1) Hourly emission rate is the annual emission rate output from tanks divided by 8,760 hours per year.
2) Annual emission rate is a weighted composite of 80% Bakken crude oils and 20% other crude oils. Approximately every ten years, the annual emissions will be approximately 1.6 tons higher due to tank inspection and maintenance.
3) Emissions are a combined total from all six tanks.

[10] Although the tanks could hold approximately 360,000 bbl, in actual operation internal floating roof tanks are never completely full. The working capacity of the tanks is slightly lower than the total capacity to reflect the maximum volume that each tank will actually hold during operation.
[11] Six crude oils with Reid Vapor Pressures (RVPs) ranging from 0.98 to 8.41, as well as four Bakken crudes (413, 413-light, 423, and 430).

There will be six additional tanks at the Facility not intended to store crude oil. It is occasionally necessary to clean railcars that enter the Facility with dried crude oil from the loading process. This cleaning process uses a large quantity of soapy water to scrub dried crude oil from the shell of the railcar. There are six containment tanks located within the railcar unloading area that could be used to collect wash water from railcar cleaning. In addition to collecting wash water, these tanks could be used to store spilled material. The containment tanks are fixed roof tanks with an estimated height of 24 feet and a 12-foot diameter. It is expected that the throughput for these tanks will result in roughly one tank turnover per week. The liquid itself will be almost entirely soapy water, with only a very small portion of crude oil present in the mixture. Because of this relatively small throughput and small fraction of crude oil present in the mixture, emissions from these containment tanks are considered to be negligible.

5.1.2.1.4 Emergency Diesel Engines

Three emergency fire water pumps powered by diesel engines will be used in the event that water is needed to fight a fire within the Facility at the same time that electrical power is not available from the grid. Each of the fire pump engines will have a capacity of 225 hp or less.

While specific makes and models have not been selected for the emergency fire pump engines, emission rates were calculated using emission factors provided by manufacturers for engines that are representative of the units that will be installed. All three engines will be fueled with ultra-low sulfur diesel (ULSD). Planned operation of the units will be limited to a half hour per week for readiness testing, and one eight-hour test per year, as specified by the National Fire Protection Association's NFPA 25. Calculated emission rates from these engines are summarized in Table 5.1-7.

Table 5.1-7. Emergency Diesel Fire Water Pump Emission Rates

Pollutant	Emission Factor[1] (g/kW-hr)	Emission Rate[2]		
		(lb/hr)	(lb/day)	(ton/yr)
NO_X	0.335	0.124	0.124	0.00211
CO	1.60	0.592	0.592	0.0101
SO_2	--[3]	0.00254	0.00254	0.0000432
PM	0.17	0.0629	0.0629	0.00107
VOC	0.37	0.137	0.137	0.00233
GHG (CO_2e)	717.13[4]	265	265	4.51

Notes:
1) Provided by manufacturer/data.
2) Emissions are for a single diesel fire water pump engine, operated for a maximum of 1 hour per day and 34 hours per year.
3) Based on use of ULSD (15 ppm sulfur by weight).
4) Based on the CO_2, CH_4, and N_2O 40 emission factors for distillate fuel oil No. 2 from CFR Part 98 Subpart C, and a rated engine power output of 225 hp.

5.1.2.1.5 Fugitive Component Leaks

VOC emissions associated with minute vapor leakage from valve seals, pump seals, pressure relief valves, flanges, and similar equipment were calculated using anticipated component counts and EPA fugitive emissions factors. Fugitive emission factors were obtained from Protocol for Equipment Leak Estimates, EPA 453-R95-017, November 1995. Fugitive VOC emissions associated with leaks from gaseous and liquid streams are presented in Table 5.1-8. Calculation details are provided in Attachment 2.

Table 5.1-8. Short-term and Annual VOC Emissions from the Fugitive Equipment Leaks

Pollutant	Hourly Average Emissions[1] (lb/hr)	Annual Emissions[2] (ton/yr)
VOC	0.19	0.82

Notes:
1) Hourly emission is the worst-case crude emission rate divided by 8,760 hours per year.

5.1.2.1.6 Locomotive and Marine Vessel Emissions

Crude oil will be delivered to the Facility by rail for transport by marine vessel. Emissions from locomotives and vessels are not included in the Facility emissions inventory or dispersion modeling because they are mobile sources powered by off-road engines, and these sources of emissions are specifically exempted from pre-construction permitting.[12]

5.1.2.1.7 Facility-wide Emissions Summary

Table 5.1-9, 5.1-10, and 5.1-11 summarize the maximum estimated hourly, daily and annual criteria pollutant and GHG emissions from all Facility emissions units. Facility-wide potential annual GHG emissions are less than 100,000 tpy CO_2e.

Table 5.1-9. Hourly Emissions

Pollutant	Emission Rate (lb/hr)					
	Area 600 Boilers	MVCU	Component Leaks	Tanks	Firewater Pumps	Total
NO_X	2.04	4.02	--	--	0.372	6.43
CO	6.67	1.75	--	--	1.78	10.2
SO_2	1.34	3.24	--	--	0.00762	4.59
PM	1.39	1.31	--	--	0.189	2.89
VOC	0.926	4.21	0.188	5.38	0.411	11.1
GHG (CO_2e)	21,670	25,150	2.72	59.5	796	47,680

[12] See, e.g., WAC 173-400-030(79) ("Secondary emissions do not include any emissions which come directly from a mobile source such as emissions from the tailpipe of a motor vehicle, from a train, or from a vessel."); In re Cardinal FG Company, EPA Environmental Appeals Board PSD Appeal 04-04 (2005) (holding that Ecology correctly concluded that emissions from a captive on-site locomotive are not attributable to the stationary source); Letter from EPA to Ken Waid (Jan. 8, 1990) stating that "to and fro" vessel emissions are not attributable to a stationary source and that when determining PSD applicability you do not consider those emissions "which result from activities which do not directly serve the purposes of the terminal and are not under the control of the terminal owner or operator.")

Table 5.1-10. Daily Emissions

Pollutant	Emission Rate (lb/day)					
	Area 600 Boilers	MVCU	Component Leaks	Tanks	Firewater Pumps	Total
NO_X	48.9	86.3	--	--	0.372	136
CO	160	37.52	--	--	1.78	199
SO_2	32.2	74.6	--	--	0.00762	107
PM	33.3	28.1	--	--	0.189	61.7
VOC	22.2	101	4.50	129	0.411	257
GHG (CO_2e)	520,140	526,100	65.2	1,428	796	1,048,500

Table 5.1-11. Annual Emissions

Pollutant	Emission Rate (tons/yr)					
	Area 600 Boilers	MVCU	Component Leaks	Tanks	Firewater Pumps	Total
NO_X	5.95	8.04	--	--	0.00632	14.0
CO	19.5	3.49	--	--	0.0302	23.0
SO_2	1.99	6.59	--	--	0.000130	8.57
PM	4.06	2.62	--	--	0.00321	6.68
VOC	2.70	8.64	0.822	23.6	0.00689	35.7
GHG (CO_2e)	44,170	50,530	11.9	261	13.5	94,980

5.1.2.2 Toxic Air Pollutants

The Facility has the potential to emit non-criteria air pollutants that are regulated federally by the CAA Section 112 and others regulated in Washington by Ecology and EFSEC under Chapter 173-460 WAC. Some of these pollutants are deemed “hazardous air pollutants” (HAPs) under the CAA Section 112; others are defined as “toxic air pollutants” (TAPs) under Chapter 173-460 WAC.

Table 5.1-12 compares calculated facility-wide TAP emissions with Washington’s Small Quantity Emission Rates (SQERs). If facility-wide emissions of a given pollutant are greater than its SQER, dispersion modeling is required to determine compliance with ambient air quality criteria (Acceptable Source Impact Levels, or ASILs). As shown in Table 5.1-12, eight TAPs exceed the applicable SQERs; compliance with the applicable ASILs will be assessed in Section 5.1.4. Table 5.1-13 summarizes the calculated annual TAP emission rates.

Table 5.1-12 also identifies which of the TAPs is a federal HAP. The HAP emitted in greatest quantity from the Facility is hexane (1.75 tons per year). Aggregate HAP emissions are 2.04 tons per year.

The following sections discuss the estimation of TAP/HAP emissions from each emission unit. Detailed emission calculations are presented in Attachment 2.

Table 5.1-12. Facility-wide Toxic Air Pollutant Emissions

Compound	CAS	HAP?	WA TAP Averaging Period	Emission Rate	SQER	Model?
				lb/avg per	lb/avg per	
Acetaldehyde	75-07-0	Yes	Annual	4.23E-02	71	No
Acrolein	107-02-8	Yes	24-Hour	1.50E-04	0.00789	No
Arsenic	7440-38-2	Yes	Annual	3.20E-01	0.0581	Yes
Benzene	71-43-2	Yes	Annual	1.05E+02	6.62	Yes
Benzo(a)anthracene	56-55-3	No	Annual	2.97E-03	1.74	No
Benzo(a)pyrene	50-32-8	No	Annual	1.93E-03	0.174	No
Benzo(b)fluoranthene	205-99-2	No	Annual	2.88E-03	1.74	No
Benzo(k)fluoranthene	207-08-9	No	Annual	2.89E-03	1.74	No
Beryllium	7440-41-7	Yes	Annual	1.92E-02	0.08	No
1,3-Butadiene	106-99-0	Yes	Annual	2.16E-03	1.13	No
Cadmium	7440-43-9	Yes	Annual	1.76E+00	0.0457	Yes
Carbon monoxide	630-08-0	No	1-Hour	1.02E+01	50.4	No
Chromium, (hexavalent)	18540-29-9	No	Annual	8.96E-02	0.00128	Yes
Chrysene	218-01-9	No	Annual	2.90E-03	17.4	No
Cobalt	7440-48-4	Yes	24-Hour	7.60E-04	0.013	No
Copper	7440-50-8	No	1-Hour	3.36E-04	0.219	No
Cyclohexane	110-82-7	No	24-Hour	5.10E-01	789	No
Dibenzo(a,h)anthracene	53-70-3	No	Annual	1.95E-03	0.16	No
Diesel Engine Particulate	DEP	No	Annual	6.41E+00	0.639	Yes
7,12-Dimethylbenz(a)anthracene	57-97-6	No	Annual	2.56E-02	0.00271	Yes
Ethylbenzene	100-41-4	Yes	Annual	4.53E+01	76.8	No
Fluorene	86-73-7	No	24-Hour	4.73E-05	1.71	No
Formaldehyde	50-00-0	Yes	Annual	1.81E+01	32	No
Hexane	110-54-3	Yes	24-Hour	1.80E+01	92	No
Hydrogen Sulfide	7783-06-4	No	24-Hour	9.45E-03	0.263	No
Indeno(1,2,3-cd)pyrene	193-39-5	No	Annual	2.90E-03	1.74	No
Isopropyl benzene	98-82-8	Yes	24-Hour	1.58E-02	52.6	No
Manganese	7439-96-5	Yes	24-Hour	3.44E-03	0.00526	No
Mercury	7439-97-6	Yes	24-Hour	2.35E-03	0.0118	No
3-Methylchloranthrene	56-49-5	No	Annual	2.88E-03	0.0305	No
Naphthalene	91-20-3	Yes	Annual	9.80E-01	5.64	No
Nitrogen dioxide	10102-44-0	No	1-Hour	6.43E+00	1.03	Yes
Propylene	115-07-1	No	24-Hour	4.18E-04	394	No
Selenium	7782-49-2	Yes	24-Hour	2.17E-04	2.63	No
Sulfur dioxide	7446-09-5	No	1-Hour	4.59E+00	1.45	Yes
Toluene	108-88-3	Yes	24-Hour	4.27E-01	657	No
Vanadium	7440-62-2	No	24-Hour	2.08E-02	0.0263	No
Xylene (-m)	108-38-3	Yes	24-Hour	4.19E-01	29	No
Xylene (-o)	95-47-6	Yes	24-Hour	1.10E-01	29	No
Xylene (-p)	106-42-3	Yes	24-Hour	1.22E-01	29	No

Table 5.1-13. Facility-wide Annual Toxic Air Pollutant Emissions

Compound	CAS	Emission Rate
		lb/yr
Acetaldehyde	75-07-0	4.23E-02
Acrolein	107-02-8	5.10E-03
Arsenic	7440-38-2	3.20E-01
Benzene	71-43-2	1.05E+02
Benzo(a)anthracene	56-55-3	2.97E-03
Benzo(a)pyrene	50-32-8	1.93E-03
Benzo(b)fluoranthene	205-99-2	2.88E-03
Benzo(k)fluoranthene	207-08-9	2.89E-03
Beryllium	7440-41-7	1.92E-02
1,3-Butadiene	106-99-0	2.16E-03
Cadmium	7440-43-9	1.76E+00
Carbon monoxide	630-08-0	3.42E+04
Chromium, (hexavalent)	18540-29-9	8.96E-02
Chrysene	218-01-9	2.90E-03
Cobalt	7440-48-4	1.34E-01
Copper	7440-50-8	1.36E+00
Cyclohexane	110-82-7	1.86E+02
Dibenzo(a,h)anthracene	53-70-3	1.95E-03
Diesel Engine Particulate	DEP	6.41E+00
7,12-Dimethylbenz(a)anthracene	57-97-6	2.56E-02
Ethylbenzene	100-41-4	4.53E+01
Fluorene	86-73-7	1.61E-03
Formaldehyde	50-00-0	1.81E+01
Hexane	110-54-3	3.51E+03
Hydrogen Sulfide	7783-06-4	3.45E+00
Indeno(1,2,3-cd)pyrene	193-39-5	2.90E-03
Isopropyl benzene	98-82-8	5.76E+00
Manganese	7439-96-5	6.08E-01
Mercury	7439-97-6	4.16E-01
3-Methylchloranthrene	56-49-5	2.88E-03
Naphthalene	91-20-3	9.80E-01
Nitrogen dioxide	10102-44-0	2.44E+04
Propylene	115-07-1	1.42E-02
Selenium	7782-49-2	3.84E-02
Sulfur dioxide	7446-09-5	1.59E+04
Toluene	108-88-3	1.50E+02
Vanadium	7440-62-2	3.68E+00
Xylene (-m)	108-38-3	1.53E+02
Xylene (-o)	95-47-6	4.00E+01
Xylene (-p)	106-42-3	4.47E+01

5.1.2.2.1 Natural Gas-Fired Boilers

Emissions of TAPs from the natural gas-fired Area 600 boilers were calculated using emission factors from EPA's AP-42 Section 1.4 (Natural Gas Combustion). TAP emission rates for compounds that are also criteria pollutants (i.e., CO, NO_2, SO_2) were calculated using the same emission factors used to calculate criteria pollutant emission rates. Table 5.1-14 presents short-term TAP emissions from three Area 600 boilers operating at full load and annual TAP emissions from two Area 600 boilers operating at full load.

Table 5.1-14. Area 600 Boiler TAP Emissions

Compound	CAS #	Emission Factor ($lb/10^6$ scf)	Emission Rate[1]		
			(lb/hr)	(lb/day)	(lb/yr)
Arsenic	7440-38-2	0.0002	3.70E-05	8.89E-04	2.16E-01
Benzene	71-43-2	0.0021	3.89E-04	9.34E-03	2.27E+00
Benzo(a)anthracene	56-55-3	0.0000018	3.33E-07	8.00E-06	1.95E-03
Benzo(a)pyrene	50-32-8	0.0000012	2.22E-07	5.33E-06	1.30E-03
Benzo(b)fluoranthene	205-99-2	0.0000018	3.33E-07	8.00E-06	1.95E-03
Benzo(k)fluoranthene	207-08-9	0.0000018	3.33E-07	8.00E-06	1.95E-03
Beryllium	7440-41-7	0.000012	2.22E-06	5.33E-05	1.30E-02
Cadmium	7440-43-9	0.0011	2.04E-04	4.89E-03	1.19E+00
Carbon monoxide	630-08-0	0.036	6.67E+00	1.60E+02	3.89E+04
Chromium, (hexavalent)[2]	18540-29-9	0.000056	1.04E-05	2.49E-04	6.06E-02
Chrysene	218-01-9	0.0000018	3.33E-07	8.00E-06	1.95E-03
Cobalt	7440-48-4	0.000084	1.56E-05	3.73E-04	9.09E-02
Copper	7440-50-8	0.00085	1.57E-04	3.78E-03	9.20E-01
Dibenzo(a,h)anthracene	53-70-3	0.0000012	2.22E-07	5.33E-06	1.30E-03
7,12-Dimethylbenz(a)anthracene	57-97-6	0.000016	2.96E-06	7.11E-05	1.73E-02
Formaldehyde	50-00-0	0.01125	2.08E-03	5.00E-02	1.22E+01
Hexane	110-54-3	1.8	3.33E-01	8.00E+00	1.95E+03
Indeno(1,2,3-cd)pyrene	193-39-5	0.0000018	3.33E-07	8.00E-06	1.95E-03
Manganese	7439-96-5	0.00038	7.04E-05	1.69E-03	4.11E-01
Mercury	7439-97-6	0.00026	4.82E-05	1.16E-03	2.81E-01
3-Methylchloranthrene	56-49-5	0.0000018	3.33E-07	8.00E-06	1.95E-03
Naphthalene	91-20-3	0.00061	1.13E-04	2.71E-03	6.60E-01
Nitrogen dioxide	10102-44-0	0.011	2.04E+00	4.89E+01	1.19E+04
Selenium	7782-49-2	0.000024	4.45E-06	1.07E-04	2.60E-02
Sulfur dioxide	7446-09-5	0.00725	1.34E+00	3.22E+01	3.97E+03
Toluene	108-88-3	0.0034	6.30E-04	1.51E-02	3.68E+00
Vanadium	7440-62-2	0.0023	4.26E-04	1.02E-02	2.49E+00

Notes:

1) Short term emissions from three in-service boilers combined, annual emissions from two in-service boilers combined, each with a maximum heat input rate of 62 MMBtu/hr
2) Note: AP-42 provides a chromium emission factor for natural gas fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). EPA's 2002 National-Scale Air Toxics Assessment (NATA) released June 2009 includes a chromium speciation profile for gas-fired process heaters, which indicates 4 percent of total chromium is chromium VI and 96 percent is chromium III. ENVIRON assumed 4 percent of total chromium emissions were emitted as chromium VI.

5.1.2.2.2 Marine Vapor Combustion Unit

Emissions of TAPs from the marine vapor combustion unit (MVCU) were calculated using emission factors from EPA's AP-42 Section 1.4 (Natural Gas Combustion) for both the vapor displaced from the marine vessels and the assist gas. TAP emissions for compounds that are also criteria pollutants (i.e., CO, NO_2, SO_2) were calculated using the same emission factors or assumptions and methodology used to calculate criteria pollutant emission rates. Table 5.1-15 presents aggregate TAP emissions from the proposed marine vapor combustion unit.

Table 5.1-15. Marine Vapor Combustion Unit TAP Emissions

Compound	CAS #	Emission Factor ($lb/10^6$ scf)	Emission Rate[1]		
			(lb/hr)	(lb/day)	(lb/yr)
Arsenic	7440-38-2	0.0002	4.21E-05	9.21E-04	1.69E-01
Benzene	71-43-2	0.0021	4.42E-04	9.67E-03	1.77E+00
Benzo(a)anthracene	56-55-3	0.0000018	3.78E-07	8.29E-06	1.52E-03
Benzo(a)pyrene	50-32-8	0.0000012	2.52E-07	5.53E-06	1.01E-03
Benzo(b)fluoranthene	205-99-2	0.0000018	3.78E-07	8.29E-06	1.52E-03
Benzo(k)fluoranthene	207-08-9	0.0000018	3.78E-07	8.29E-06	1.52E-03
Beryllium	7440-41-7	0.000012	2.52E-06	5.53E-05	1.01E-02
Cadmium	7440-43-9	0.0011	2.31E-04	5.07E-03	9.29E-01
Carbon monoxide	630-08-0	--[2]	1.75E+00	3.75E+01	6.99E+03
Chromium, (hexavalent)[3]	18540-29-9	0.000056	1.18E-05	2.58E-04	4.73E-02
Chrysene	218-01-9	0.0000018	3.78E-07	8.29E-06	1.52E-03
Cobalt	7440-48-4	0.000084	1.77E-05	3.87E-04	7.09E-02
Copper	7440-50-8	0.00085	1.79E-04	3.91E-03	7.18E-01
Dibenzo(a,h)anthracene	53-70-3	0.0000012	2.52E-07	5.53E-06	1.01E-03
7,12-Dimethylbenz(a)anthracene	57-97-6	0.000016	3.36E-06	7.37E-05	1.35E-02
Formaldehyde	50-00-0	0.01125	2.37E-03	5.18E-02	9.50E+00
Hexane	110-54-3	1.8	3.78E-01	8.29E+00	1.52E+03
Indeno(1,2,3-cd)pyrene	193-39-5	0.0000018	3.78E-07	8.29E-06	1.52E-03
Manganese	7439-96-5	0.00038	7.99E-05	1.75E-03	3.21E-01
Mercury	7439-97-6	0.00026	5.47E-05	1.20E-03	2.20E-01
3-Methylchloranthrene	56-49-5	0.0000018	3.78E-07	8.29E-06	1.52E-03
Naphthalene	91-20-3	0.00061	1.28E-04	2.81E-03	5.15E-01
Nitrogen dioxide	10102-44-0	--[2]	4.02E+00	8.63E+01	1.61E+04
Selenium	7782-49-2	0.000024	5.05E-06	1.11E-04	2.03E-02
Sulfur dioxide	7446-09-5	--[2]	3.24E+00	7.46E+01	1.32E+04
Toluene	108-88-3	0.0034	7.15E-04	1.57E-02	2.87E+00
Vanadium	7440-62-2	0.0023	4.84E-04	1.06E-02	1.94E+00

Notes:

1) Displaced vapor volumes calculated for maximum hourly, daily, and annual averaging periods were combined with the natural gas-fired emission factors to calculate TAP emission rates; considering that, even for the worst-case hourly average scenario, which is when vessel loading is almost complete, the displaced vapor will not be 100% percent saturated by hydrocarbons. The maximum hourly assist gas flow rate (30,600 ft^3/hr) was used to calculate emission rates for TAPs that have a SQER with a 1-hour average basis. For TAPs that have a SQER with a 24-hour or annual average basis, 85% of the maximum assist gas flow rate was used.
2) The maximum hourly emission rate calculated for the criteria pollutant analysis was used. See Tables 5.1-3, 5.1-4, and 5.1-5.
3) AP-42 provides a chromium emission factor for natural gas fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). EPA's 2002 National-Scale Air Toxics Assessment (NATA) released June 2009 includes a chromium speciation profile for gas-fired process heaters,

which indicates 4 percent of total chromium is chromium VI and 96% is chromium III. ENVIRON assumed 4% of total chromium emissions were emitted as chromium VI.

5.1.2.2.3 Crude Oil Storage Tanks

Emissions of TAPs from the crude oil storage tanks were calculated using the same methodology as the criteria pollutants. The TANKS program calculated emission rates for each of the TAPs included in the provided speciation information. Table 5.1-16 presents the estimated aggregate TAP emissions from the crude oil storage tanks.

Table 5.1-16. Crude Oil Storage Tank TAP Emissions

Components	CAS #	Emission Rate		
		(lb/hr)	(lb/day)	(lb/yr)
Benzene	71-43-2	1.10E-02	2.64E-01	9.63E+01
Cyclohexane	110-82-7	2.03E-02	4.86E-01	1.77E+02
Cyclopentane	287-92-3	1.13E-02	2.70E-01	9.86E+01
Ethylbenzene	100-41-4	4.89E-03	1.17E-01	4.29E+01
Hexane	110-54-3	6.84E-02	1.64E+00	5.99E+02
Hydrogen Sulfide	7783-06-4	3.66E-04	8.78E-03	3.21E+00
Isooctane	540-84-1	6.15E-04	1.48E-02	5.39E+00
Isopentane	78-78-4	1.14E-01	2.74E+00	9.99E+02
Isopropyl benzene	98-82-8	6.21E-04	1.49E-02	5.44E+00
Pentane	109-66-0	1.52E-01	3.65E+00	1.33E+03
Toluene	108-88-3	1.56E-02	3.75E-01	1.37E+02
1,2,4-Trimethylbenzene	95-63-6	2.04E-03	4.89E-02	1.79E+01
Xylene (-m)	108-38-3	1.65E-02	3.96E-01	1.45E+02
Xylene (-o)	95-47-6	4.35E-03	1.04E-01	3.81E+01
Xylene (-p)	106-42-3	4.85E-03	1.17E-01	4.25E+01

Notes:

1) Annual emission rate is a weighted composite of 80% worst-case Bakken crude result from TANKS program, and 20% worst-case other crude result from TANKS program.

5.1.2.2.4 Emergency Diesel Engines

Emissions of TAPs from the emergency fire water pump engines were calculated based on EPA AP-42 emission factors for small internal combustion diesel engines (Section 3.3). Annual emissions were based on 34 hours of operation for maintenance and testing purposes only. TAP emissions for compounds that are also criteria pollutants were calculated using the same emission factors or assumptions and methodology used to calculate criteria pollutant emission rates. Table 5.1-17 presents the estimated aggregate TAP emissions from the emergency fire water pump engines.

Table 5.1-17. Emergency Fire Water Pump Engine TAP Emissions

CAS #	Compound	Emission Factor ($lb/10^6$ Btu)	Emission Rate[1]		
			(lb/hr)	(lb/day)	(lb/yr)
83-32-9	Acenaphthene	1.42E-06	2.30E-06	2.30E-06	7.83E-05
208-96-8	Acenaphthylene	5.06E-06	8.20E-06	8.20E-06	2.79E-04
75-07-0	Acetaldehyde	7.67E-04	1.24E-03	1.24E-03	4.23E-02
107-02-8	Acrolein	9.25E-05	1.50E-04	1.50E-04	5.10E-03
120-12-7	Anthracene	1.87E-06	3.03E-06	3.03E-06	1.03E-04
71-43-2	Benzene	9.33E-04	1.51E-03	1.51E-03	5.14E-02
56-55-3	Benzo(a)anthracene	1.68E-06	2.72E-06	2.72E-06	9.26E-05
50-32-8	Benzo(a)pyrene	1.88E-07	3.05E-07	3.05E-07	1.04E-05
205-99-2	Benzo(b)fluoranthene	9.91E-08	1.61E-07	1.61E-07	5.46E-06
191-24-2	Benzo(g,h,i)perylene	4.89E-07	7.93E-07	7.93E-07	2.70E-05
207-08-9	Benzo(k)fluoranthene	1.55E-07	2.51E-07	2.51E-07	8.54E-06
106-99-0	1,3-Butadiene	3.91E-05	6.34E-05	6.34E-05	2.16E-03
630-08-0	Carbon monoxide	--[2]	1.78E+00	1.78E+00	6.04E+01
218-01-9	Chrysene	3.53E-07	5.72E-07	5.72E-07	1.95E-05
53-70-3	Dibenz(a,h)anthracene	5.83E-07	9.45E-07	9.45E-07	3.21E-05
none	Diesel Engine Particulate	--[2]	1.89E-01	1.89E-01	6.41E+00
206-44-0	Fluoranthene	7.61E-06	1.23E-05	1.23E-05	4.20E-04
86-73-7	Fluorene	2.92E-05	4.73E-05	4.73E-05	1.61E-03
50-00-0	Formaldehyde	1.18E-03	1.91E-03	1.91E-03	6.51E-02
193-39-5	Indeno(1,2,3-cd)pyrene	3.75E-07	6.08E-07	6.08E-07	2.07E-05
91-20-3	Naphthalene	8.48E-05	1.37E-04	1.37E-04	4.67E-03
10102-44-0	Nitrogen dioxide	--[2]	3.72E-01	3.72E-01	1.26E+01
85-01-8	Phenanthrene	2.94E-05	4.77E-05	4.77E-05	1.62E-03
115-07-1	Propylene	2.58E-04	4.18E-04	4.18E-04	1.42E-02
129-00-0	Pyrene	4.78E-06	7.75E-06	7.75E-06	2.64E-04
7446-09-5	Sulfur dioxide	--[2]	7.62E-03	7.62E-03	2.59E-01
108-88-3	Toluene	4.09E-04	6.63E-04	6.63E-04	2.25E-02
108-38-3	Xylenes (m-xylene)[3]	2.85E-04	4.62E-04	4.62E-04	1.57E-02

Notes:
1) Emission rates for a single engine. Hourly emission rates are based on maximum operation, daily emission rates are based on one hour of operation per day, and annual emission rates are based on 34 hours of operation per year.
2) The emission rates calculated for the criteria pollutant analysis were used. See Table 5.1-9.

5.1.2.2.5 Fugitive Component Leaks

TAP emissions associated with normal equipment leakage at the Facility have been estimated using EPA fugitive emission factors for valve seals, pump seals, pressure relief valves, flanges, and similar equipment.[13] Emission estimates are based on equipment counts, which are, in turn,

[13] Protocol for Equipment Leak Estimates, U.S. EPA 453-R95-017, November 1995

based on preliminary piping and instrumentation diagrams developed for the project. Estimated TAP emissions from component leakage are presented in Table 5.1-18.

Table 5.1-18. Fugitive Component Leak TAP Emissions

Pollutant	CAS #	Emission Rate		
		(lb/hr)	(lb/day)	(lb/year)
Benzene	71-43-2	5.7E-04	1.37E-02	4.99
Cyclohexane	110-82-7	1.0E-03	2.41E-02	8.81
Cyclopentane	287-92-3	5.1E-04	1.23E-02	4.50
Ethylbenzene	100-41-4	2.7E-04	6.51E-03	2.37
Hexane (-n)	110-54-3	3.1E-03	7.40E-02	26.99
Hydrogen Sulfide	7783-06-4	2.8E-05	6.62E-04	0.24
Isooctane	540-84-1	3.7E-05	8.87E-04	0.32
Isopentane	78-78-4	6.5E-03	1.56E-01	56.84
Isopropyl benzene	98-82-8	3.7E-05	8.95E-04	0.33
Pentane	109-66-0	6.6E-03	1.57E-01	57.41
Toluene	108-88-3	8.4E-04	2.02E-02	7.37
1,2,4-Trimethylbenzene	95-63-6	1.2E-04	2.94E-03	1.07
Xylene (-m)	108-38-3	9.2E-04	2.20E-02	8.04
Xylene (-o)	95-47-6	2.2E-04	5.29E-03	1.93
Xylene (-p)	106-42-3	2.5E-04	5.88E-03	2.15

Notes:
See Attachment 2 for detailed emissions calculations.

5.1.3 Applicable Regulations

This section discusses federal, state, and local air quality regulations and guidelines that potentially apply to the Facility.

5.1.3.1 Emission Standards

5.1.3.1.1 New Source Performance Standards

EPA has established performance standards for a number of air pollution source categories in 40 Code of Federal Regulation (CFR) Part 60. These New Source Performance Standards (NSPS) represent a minimum level of control that is required on a new source. This section identifies those NSPS that apply to Facility emissions units.

Subpart A, General Provisions

Subpart A identifies monitoring, record-keeping, and notification requirements that apply generally to all NSPS subparts. Subpart A specifies that any performance (emissions) tests required by an NSPS must be conducted within 60 days of achieving maximum production rate at which the source will be operated, but not later than 180 days after initial startup.

Consistent with NSPS requirements, Tesoro-Savage will notify EFSEC of commencement of construction of purpose-built facilities, the initial start-up date, the actual start-up date, and performance tests. Tesoro-Savage will also maintain records of start-ups and shutdowns, malfunctions of control equipment and periods of excess emissions if they occur.

Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

The provisions of Subpart Dc apply to steam-generating units with a maximum design heat input capacity less than 100 MMBtu/hr and greater than 10 MMBtu/hr. The boilers associated with this project all fall within this capacity range. The particulate matter (PM) and SO_2 emission standards defined in Subpart Dc do not apply to units that are solely fueled by natural gas. Therefore, only the record keeping and reporting requirements of this Subpart are applicable. The provisions of this Subpart require that Tesoro-Savage maintain a record of the volume of natural gas burned in each boiler during each calendar month.

Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels The provisions of Subpart Kb apply to the crude oil storage tanks associated with the Facility. Subpart Kb regulates VOC emissions and establishes controls based on the vapor pressure of the stored liquid.

Because Facility will receive, store, and load a range of crude oils, some of which may have true vapor pressures within the applicable ranges addressed by Subpart Kb, it is assumed that Subpart Kb will apply to the Facility tanks. Subpart Kb identifies three control options. The Facility will incorporate the option identified in §60.112b(a)(1): A fixed roof in combination with an internal floating roof that floats on the liquid surface. A series of regulations for seals and closure devices related to roof contact must be followed.

Subpart IIII--Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

The provisions of Subpart IIII apply to the emergency diesel fire water pump engines associated with the Facility. Subpart IIII regulates "NMHC+NOx" and PM and requires that the engine manufacturer certify that the engine will meet the standards in the rule; emission testing by the Facility is not required. Subpart IIII limits hours of non-emergency operation, mandates the use of ULSD and states that the owner or operator must keep records of the time of operation of the engine and the reason the engine was in operation during that time. Initial notification of installation is not required for emergency engines subject to Subpart IIII.

5.1.3.1.2 National Emissions Standards for Hazardous Air Pollutants

Under the provisions of Section 112 of the 1990 Clean Air Act Amendments, EPA was required to regulate emissions of a total of 189 HAPs from stationary sources.[14] EPA does this by specific industry categories to tailor the controls to the major sources of emissions and the HAPs of concern from that industry. The rules promulgated under Section 112 generally specify the Maximum Achievable Control Technology (MACT) that must be applied for a given industry category. Consequently, these rules are often called MACT standards.

MACT standards can require facility owners/operators to meet emission limits, install emission control technologies, monitor emissions and/or operating parameters, and use specified work

[14] EPA has since removed three HAPs from the list: caprolactum, ethylene glycol monobutyl ether, and methyl ethyl ketone (MEK).

practices. In addition, the standards typically include recordkeeping and reporting provisions. MACT standards are codified in 40 CFR Parts 61 and 63.

There are two types of HAP sources, "major" sources of HAP emissions and "area" sources of HAP emissions. Major sources are facilities that have a potential to emit more than 10 tons of a single HAP, or 25 tons of all HAPs combined. Area sources are facilities that are not a major source.

As reported in Section 5.1.2.2, facility-wide HAP emissions are less than 10 tons of a single HAP and less than 25 tons of aggregate HAPs. Therefore, the Facility will be an area source of HAP emissions. MACT standards that potentially apply to the proposed project are addressed below.

Parts 61 and 63, Subpart A, General Provisions
Subpart A establishes general requirements for reporting, testing, monitoring, and record-keeping for any major source facility. The Facility must send notifications to EFSEC and EPA of anticipated and actual start-up dates as defined in §63.9 and submit reports summarizing operations, emissions, and compliance with regulations and limits as specified in the standard.

Part 61, Subpart M – National Emission Standards for Asbestos
Subpart M of 40 CFR 61 establishes requirements related to asbestos in the event of demolition or remodeling. The Facility will comply with these requirements.

Part 63, Subpart Y – National Emission Standards for Hazardous Air Pollutants for Marine Tank Vessel Loading Operations
The emission standard provisions of Subpart Y apply to existing and new marine terminals that are major sources of HAPs or are associated with a major source of HAPs (such as a refinery). As noted above, the Facility is not in itself a major source of HAPs and is not associated with a major source of HAPs. However, area sources such as the Facility are subject to the emission estimation (40 CFR §63.565(l)) and recordkeeping (40 CFR §63.567(j)(4)) requirements, and must meet the Coast Guard's submerged fill standards (40 CFR §153.282). Because the Facility's crude oil throughput will be less than 200 million barrels per year, it will not be subject to the RACT emission standards, per 40 CFR §63.560(b)(2).

Part 63, Subpart DDDDD -- National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters The provisions of Subpart DDDDD apply to boilers and process heaters at major sources of HAPs. Because the Facility is not a major source of HAPs, Subpart DDDDD does not apply to the Facility boilers.

Part 63, Subpart JJJJJ -- National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources
The Facility will be classified as an area source of HAPs and will operate boilers. However, gas-fired boilers are not subject to Subpart JJJJJJ. The Facility boilers will combust exclusively natural gas, so Subpart JJJJJ is not applicable.

Part 63, Subpart ZZZZ -- National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

The provisions of Subpart ZZZZ apply to stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. A new stationary RICE located at an area source (such as the emergency firewater pump engines) must meet the requirements of Subpart ZZZZ by meeting the requirements of NSPS Subpart IIII for compression ignition engines. No further requirements apply for such engines under Subpart ZZZZ.

5.1.3.1.3 State Emission Limits

General standards for maximum emissions from industrial air pollution sources in Washington are outlined in WAC 173-400-040. This section limits visible emissions to 20 percent opacity except for 3 minutes per hour; controls nuisance dust particulate matter fallout, fugitive dust, and odors; and limits SO_2 emissions to no more than 1,000 ppm (hourly average, 7 percent O_2, dry basis). WAC 173-400-050 identifies emission standards for combustion and incinerator units, and limits process emissions to 0.1 grains per dry standard cubic foot at 7 percent O_2.

Washington also requires Best Available Control Technology (BACT) for new and modified emissions units. A BACT analysis identifies pollutant-specific alternatives for emission control, and the pros and cons of each alternative. The determination of which control scenario best protects ambient air quality is made on a case-by-case basis and considers the technical, economic, energy and environmental costs. Chapter 173-460 WAC requires that BACT also be employed to control emissions of TAPs (i.e., T-BACT). Generally, the same technologies or operations that reduce criteria pollutants also reduce TAPs.

5.1.3.2 Consistency with SWCAA Regulations

In addition to the general State emissions standards addressed in the preceding section, SWCAA has other regulations that would apply if the Facility were not subject to EFSEC's jurisdiction. Although these regulations are not directly applicable, this section evaluates SWCAA's regulations to demonstrate that the Facility will be designed and operated consistent with those local requirements.

5.1.3.2.1 SWCAA General Regulations

The SWCAA regulations generally mirror Ecology's emission limits for new sources, limiting exhaust plume opacity to 20 percent opacity except for 3 minutes of any hour, particulate matter emissions to 0.1 grains per dry standard cubic foot, and SO_2 emissions to 1,000 ppm. The Facility will comply with all local general emissions requirements because BACT imposes more stringent requirements.

5.1.3.2.2 SWCAA VOC Standards

SWCAA has established emission standards and control requirements for sources that emit VOCs. The Facility, as a source of VOC emissions, would be subject to the provisions of SWCAA 490 if it were under the jurisdiction of SWCAA.

SWCAA 490-040(2), covering petroleum liquid storage tanks requires that all fixed-roof tanks storing volatile organic petroleum liquids with a true vapor pressure as stored greater than 78 mm of Hg (1.5 psi) at actual monthly average storage temperatures, and having a capacity greater than one hundred fifty thousand liters (40,000 gallons), shall comply with one of the following:

- (i) Meet the equipment specifications and maintenance requirements of the federal standards of performance for new stationary sources - Storage Vessels for Petroleum Liquids (40 CFR 60, subpart K); or

- (ii) Be retrofitted with a floating roof or internal floating cover using a metallic seal or a nonmetallic resilient seal at least meeting the equipment specifications of the federal standards referred to in SWCAA 490-040 (2)(a)(i) or its equivalent; or

- (iii) Be fitted with a floating roof or internal floating cover meeting the manufacturer's specifications in effect when installed.

490-040 also requires that all seals be maintained in good operating condition and that seal fabric shall contain no visible holes, tears, or openings.

The Facility storage tanks will employ a fixed roof and internal floating cover and would therefore comply with 490-040 if under the jurisdiction of SWCAA. The Facility is not subject to the provisions of SWCAA 490-201 because that rule addresses petroleum storage in external floating roof tanks only.

5.1.3.2.3 SWCAA Maintenance Plan Requirements

Portions of the Portland-Vancouver metropolitan area (including the Facility site) have exceeded ozone and carbon monoxide ambient air quality standards in the past. Although the area currently meets ambient air quality standards, industrial sources in the area are still governed by "maintenance" plans intended to ensure air quality in the area does not deteriorate to the point where ozone and CO ambient standards are exceeded again. SWCAA administers those plans in the Washington portion of the maintenance area with certain elements of the maintenance plan integrated into the SWCAA regulations. Each SWCAA requirement is presented after a bullet below, and followed by an explanation of how the Facility complies with that requirement.

- SWCAA 400-111, Requirements for New Sources in a Maintenance Plan Area: SWCAA 400-111 implements portions of the State Implementation Plan (SIP) for the Vancouver CO and ozone maintenance areas.[15] Both maintenance areas cover the same geographic area, extending over the urban and industrial regions of Vancouver. SWCAA 400-111 requires that no approval to construct a new source shall be granted unless:

  a) Emissions from all units will comply with applicable emissions standards including NSPS and MACT standards.

  b) Emissions from the new source will be minimized to comply with emissions levels and other requirements within the maintenance plan.

  c) BACT will be employed for all pollutants emitted from units associated with the new source.

[15] Vancouver, WA ozone and carbon monoxide maintenance plans are available for download from http://www.swcleanair.org/maintenanceplans.html

d) Emissions from the new source will not cause any violation of an ambient air quality standard

e) The source will employ control equipment and take measures to control emissions of TAPs to comply with WAC 173-460.

Although the EFSEC approval process supersedes SWCAA regulations, the Facility would comply with this regulation were it subject to SWCAA jurisdiction.

- SWCAA 400-111(2) indicates that a source located within the maintenance area may have to apply Lowest Achievable Emission Rate (LAER) emission limits if any ambient air quality standard is violated within the CO or O_3 maintenance areas.

According to SWCAA (2007)[16], the region has been in compliance with CO NAAQS since 1992 and future exceedance is not anticipated. Also, according to SWCAA (2006)[17], the region is in compliance with the ozone standards and future exceedance is not expected in the immediate future. Facility-wide emissions of ozone precursors and carbon monoxide are low and do not threaten compliance with the CO and ozone ambient standards. Consequently, this regulation would not apply to the Facility even if it were subject to SWCAA regulations.

- SWCAA 400-111(5) states that if a new source located within the maintenance area is designated as "major"[18] then emission offsets are required. Offsets are reductions in pollutant emissions equivalent to or greater than the proposed increases, provided by other stationary sources emitting the same pollutant.

Because the Facility is not a major source of carbon monoxide or ozone precursors, offsets would not be required even if the Facility were subject to SWCAA regulations.

- SWCAA 400-113(3) requires that allowable emissions from a proposed new source do not result in a significant increase in ambient concentrations within a maintenance area. This provision therefore requires that a source demonstrate that the project emissions will not result in exceedance of significant impact levels (1 $\mu g/m^3$ NO_2 annual average, 0.5 mg/m^3 CO 8-hour average, or 2 mg/m^3 CO 1-hour average) within the Vancouver maintenance area. If a SIL is exceeded then emission offsets must be obtained. Offsets must be sufficient enough to lower the modeled ambient concentration below the indicated impact level.

This regulation is intended to ensure that sources outside the maintenance area do not adversely affect compliance within the maintenance area. As noted above, the Facility is within the

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[16] SWCAA (2007): Vancouver Air Quality Maintenance Area Second 10-year Carbon Monoxide Maintenance Plan, Supplement to the Washington State SIP, SWCAA, March 1, 2007.
[17] SWCAA (2006): Vancouver Portion of the Portland-Vancouver AQMA Ozone Maintenance Plan, Supplement to the Washington State SIP, SWCAA, November 2, 2006.
[18] A "major" stationary source is defined in SWCAA 400-030 (62)(a) as a source located in a maintenance plan or non-attainment area that emits or has the potential to emit 100 tons per year or more of any criteria pollutant (lower thresholds apply for PM and CO in non-attainment areas).

maintenance areas but its emissions are below the major source thresholds that trigger LAER and offsets.

5.1.3.3 Preconstruction Permitting

5.1.3.3.1 Notice of Construction and Application for Approval

WAC 173-400-110 requires a NOC application for the construction of new air contaminant sources in Washington. SWCAA maintains a similar regulation (SWCAA 400-109) for new or modified sources in its jurisdiction. The NOC application provides a description of the facility and an inventory of pollutant emissions and controls. The reviewing agency, EFSEC, considers whether BACT has been employed and evaluates ambient concentrations resulting from these emissions to ensure compliance with ambient air quality standards. Pollutant emissions not governed by the PSD permit process are addressed in an Order of Approval that results from the NOC application. In the case of the Facility, all pollutants are addressed in the NOC application.

5.1.3.3.2 Prevention of Significant Deterioration (PSD)

The PSD regulations were established by EPA to ensure that new or expanded major stationary sources that emit Clean Air Act-regulated pollutants above a significance rate do not cause air quality in areas that currently meet the standards (i.e., attainment areas) to deteriorate significantly. The Facility is not subject to PSD regulations because it will not emit any Clean Air Act-regulated pollutants above the applicable PSD significance rate (See Table 5.1-11).

5.1.4 Local Air Quality Impact Assessment

This section describes the local Air Quality Impact Assessment (AQIA) that has been conducted for the Facility. Computer-based dispersion modeling techniques were applied to simulate dispersion of toxic and criteria pollutant releases from Facility emissions units to estimate pollutant concentrations in the neighboring area. The results of the modeling analyses are used to assess compliance with NAAQS, WAAQS, and Ecology's ASILs for TAPs.

The dispersion modeling techniques employed in the analysis follow the EPA regulatory guidelines (40 CFR Part 51, Appendix W). These guidelines include recommendations for model selection, data preparation, and model application, but allow flexibility on a case-by-case basis.

Section 5.1.4.1 summarizes stack parameters used for the simulation. Section 5.1.4.2 describes the data used to characterize existing ambient air quality and discusses the meteorological data used in the dispersion modeling. Dispersion model selection and application are described in Section 5.1.4.3, followed by a summary of the model results in Section 5.1.4.4.

5.1.4.1 Stack Parameters, Building Dimensions, and Good Engineering Practice

In addition to emission rates, the modeling analysis requires estimates of the stack heights, building dimensions, and other parameters that characterize exhaust flows and/or atmospheric release characteristics from a facility. These release characteristics have an important influence on initial dispersion of emissions. The stack parameters used in the dispersion modeling simulation of Facility operations are presented in Table 5.1-19.

The effect of building wakes (i.e., downwash) on stack plumes was evaluated in accordance with EPA guidance. Direction-specific building data were generated for stacks below good engineering practice (GEP) stack height, using the most recent version of the EPA Building

Parameter Input Program – Prime (BPIP-Prime). The AERMOD model considers direction-specific downwash using both the Huber Snyder and Schulman-Scire algorithms, as represented in the BPIP-Prime program. Figure 5.1-1 shows the major structures that were used in the BPIP-Prime analysis.

Table 5.1-19. Stack Parameters

Source	Stack Base Elevation Above Sea Level (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
Area 600 Boiler1	9	19.8	504	10.7	1.07
Area 600 Boiler2	9	19.8	504	10.7	1.07
Area 600 Boiler3	9	19.8	504	10.7	1.07
VCU1	10	7.36	1,478	39.6	1.12
VCU2	10	7.36	1,478	39.6	1.12
VCU3	10	7.36	1,478	39.6	1.12
VCU4	10	7.36	1,478	39.6	1.12
VCU5	10	7.36	1,478	39.6	1.12
VCU6	10	7.36	1,478	39.6	1.12
VCU7	10	7.36	1,478	39.6	1.12
VCU8	10	7.36	1,478	39.6	1.12
Emergency Firewater Pump 1	10	3.35	787	73.6	0.10
Emergency Firewater Pump 2	11	3.10	787	73.6	0.10
Emergency Firewater Pump 3	9	3.10	787	73.6	0.10

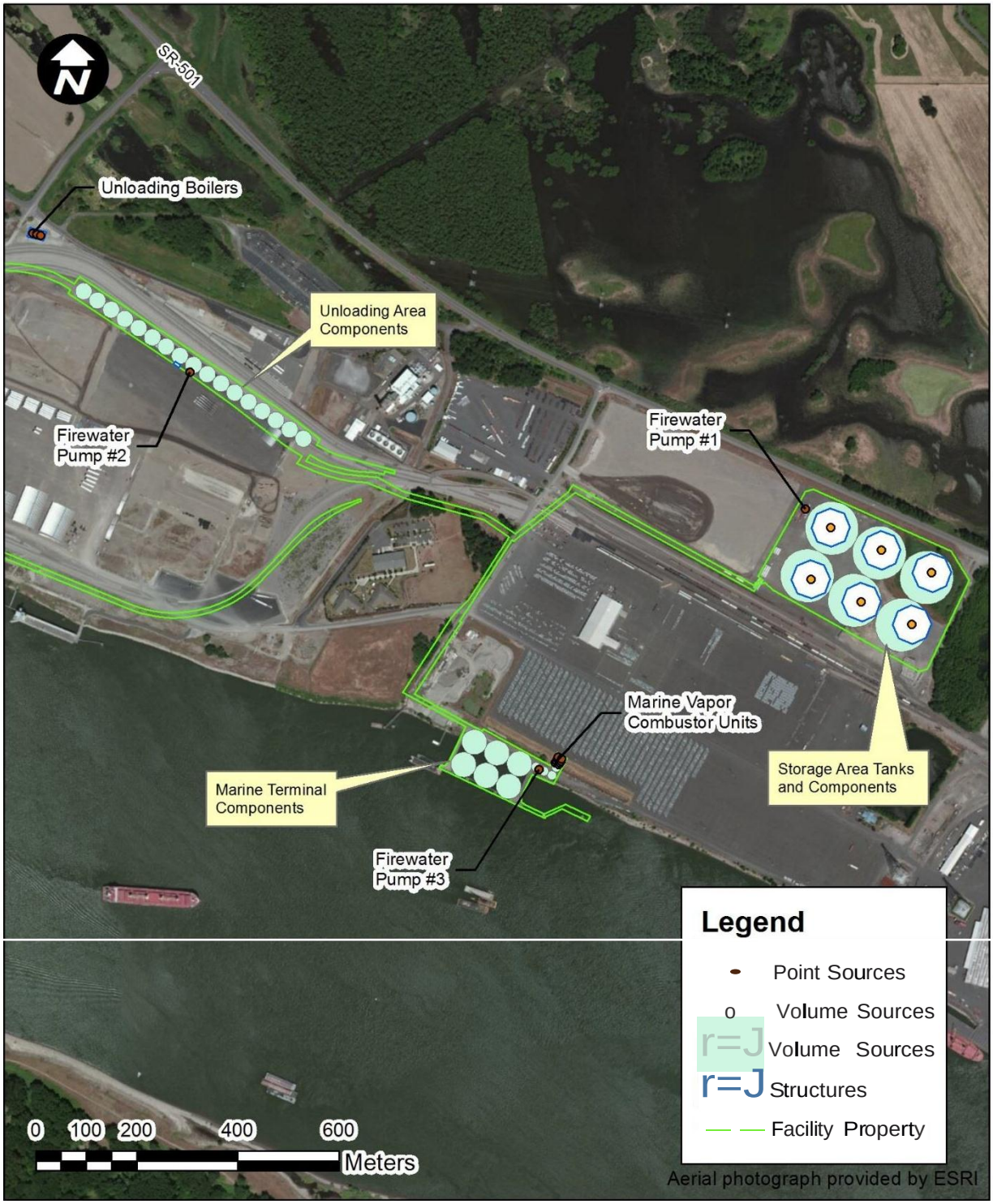

Figure 5.1-1. Site Plan with Emission Units and Property Boundary

5.1.4.2 Local Meteorology and Air Quality

5.1.4.2.1 Local Meteorology

A meteorological database for the dispersion modeling was constructed using the best available surface and upper air data. A survey of available meteorological data was conducted for use in the simulations. For surface meteorological data, the closest and most representative National Weather Service (NWS) station was Pearson Field, located in Vancouver. The most appropriate upper air data was from McNary field airport, in Salem Oregon. A five year meteorological database was created using the most recent available years of data: 2008 through 2012. Pearson Field was judged to be the best available source of meteorological data for air quality dispersion modeling. The meteorological station at Pearson Field is the station closest to the proposed project site that is part of the National Weather Service (NWS) Automatic Surface Observing System (ASOS), and provides 1-minute wind speed and wind direction data that are used to resolve calm and variable wind conditions, as recommended by the EPA.

Figure 5.1-2 displays a wind rose constructed from the five years of hourly meteorological data. The average wind velocity for the five year period is 2.32 meters per second (m/s) and periods of calm winds occur 5.72 percent of the time.

Additional meteorological variables and geophysical parameters are required by the dispersion modeling analysis to estimate the surface energy fluxes and construct boundary layer profiles. Surface characteristics including the surface roughness length, albedo, and Bowen ratio were assigned on a sector-by-sector basis using land use within one kilometer of Pearson Field. The USGS 1992 National Land Cover (NLCD92) land use data set used in the analysis has a 30 m mesh size and over 30 land use categories.[19]

The NLCD92 data were processed using the utilities that accompany the AERMOD modeling system. Land use was characterized in eight upwind sectors surrounding the site. Within each sector a weighted average surface roughness length, albedo, and Bowen ratio was calculated from the characteristics recommended for each land use by the AERSURFACE program. Arithmetic averages were used for the albedo and Bowen ratio, while a geometric or logarithmic average was used for surface roughness length.

The EPA meteorological program AERMET was used to combine the Pearson Field observations with twice daily upper air soundings from Salem and derive the necessary variables for AERMOD. The upper air data are used to estimate the temperature lapse rate aloft and subsequently by AERMET to predict the development of the mixed layer height. The Bulk-Richardson option was used to estimate dispersion variables and surface energy fluxes during nocturnal periods, while solar radiation and wind speed are used by AERMET to estimate these same variables during the day. The sigma-theta data from the Pearson Field site are passed through by AERMET to AERMOD for the lateral dispersion algorithms.

[19] The USGS NLCD92 data set is described and can be accessed at http://landcover.usgs.gov/natllandcover.php.

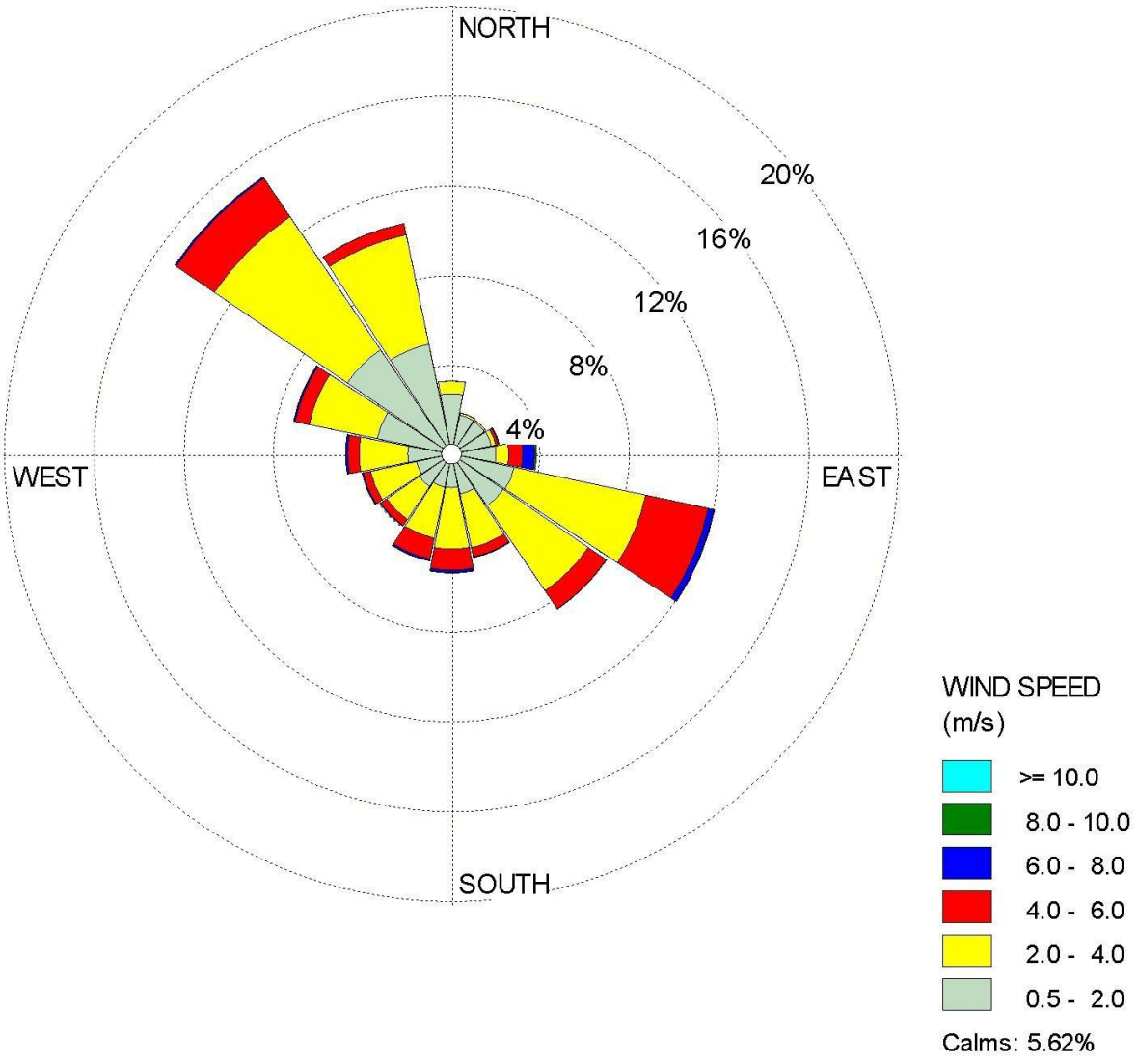

Figure 5.1-2. Pearson Field Airport Windrose from 2008-2012

5.1.4.2.2 Background Air Quality

Ecology and EPA designate regions as being "attainment" or "nonattainment" areas for particular air pollutants based on monitoring information collected over a period of years. Attainment status is therefore a measure of whether air quality in an area complies with the health-based ambient air quality standards. The Facility is located in a region considered to be in attainment for all criteria pollutants, but it remains subject to maintenance plans that ensure continued compliance with ozone and carbon monoxide ambient standards.

Existing air quality at the Facility site can be inferred from several sources of information. First, conditions can be estimated from measurements collected by Ecology and the Oregon Department of Environmental Quality air quality monitoring networks. Current and archived air quality data are accessible from the EPA AirData website.[20] The 2012 AirData database files for several monitoring sites near to the project site were accessed to characterize background air quality. The values reported at these sites represent the conservatively highest background air quality values in the region because monitoring sites are often specifically selected to identify the highest regional pollutant concentrations. Air quality values for each pollutant were estimated using measurements from the following monitors:

CO: SE Lafayette, Portland, Oregon, EPA AQS Site No. 41-051-0080 (about 10 miles SE of the project site), 2012 maximum and second highest maximum values.

NO_2: SE Lafayette, Portland, Oregon 2011 Annual mean, 2012 1-hour maximum and 98th percentile daily maximums.[21]

Ozone: Sauvie Island, Oregon, EPA AQS Site No. 41-009-0004 (about 8 miles north-northwest of the project site), 2011 8-hour maximum and fourth highest 8-hour maximum values.

$PM_{2.5}$: Fourth Plain Boulevard East, Vancouver, Washington, EPA AQS Site No. 53-011-0013 (about 10 miles east of the project site), 2012 24-hour maximum and 98th percentile concentrations, annual average estimated using annual average of 1-hour values.

PM_{10}: N. Roselawn Emerson Playfield, Portland, Oregon, EPA AQS Site No. 41-051-0246 (about 7 miles southeast of the project site), 2012 24-hour average maximum value and 98th percentile 24-hour average value, annual average estimated using annual average of 24-hour values.

SO_2: SE Lafayette, Portland, Oregon, EPA AQS Site No. 41-051-0080, 2012 maximum and 99th-percentile 1-, 3-, and 24-hour values. Annual average estimated using annual average of 1-hour values.

Background concentrations can also be estimated using a tool provided by Ecology. Ecology provides the 2009-2011 "design values" for background air quality throughout the state using the

[20] U.S. EPA AirData website archive of monitoring data. http://www.epa.gov/airquality/airdata/

[21] Reported in Oregon Dept. of Environ. Quality (2012): 2011 Oregon Air Quality Data Summaries, DEQ 11-AQ-021

output from the AIRPACT-3 regional air quality model, with adjustments from assimilated monitor data. The tool is a product of the Northwest International Air Quality Environmental Science and Technology Consortium and is used to support air permitting and regulation in the State.[22] Use of this database may provide a more accurate estimate of the actual background air quality at the project site than the conservative measurements from the monitoring network. Design values were collected in July 2013 using the tool for project site coordinates (46.643 Lat., -122.705 Long.).

The background air quality values estimated from these sources of information are listed in Table 5.1-20.

Table 5.1-20. Existing Air Quality

Pollutant	Averaging Period	State Monitoring Network Maximum Value	State Monitoring Network Regulatory Value[1]	Design Value[2]
CO	1-hour	3.8 ppm	3.1 ppm (2nd high)	2.065 ppm
	8-hour	2.3 ppm	2.2 ppm (2nd high)	1.276 ppm
NO_2	1-hour	59 ppb	36 ppb (98th %-ile.)	37 ppb
	Annual	9 ppb	9 ppb	7 ppb
O_3	1-hour	0.068 ppm	0.064 ppm (4th high)	NA[3]
	8-hour	0.057 ppm	0.053 ppm (4th high)	0.056 ppb
$PM_{2.5}$	24-hour	31.2 μg/m^3	20.5 μg/m^3 (98th %-ile)	20 μg/m^3
	Annual	7.0 μg/m^3	NA[3]	5.8 μg/m^3
PM_{10}	24-hour	36 μg/m^3	34 μg/m^3 (98th %-ile)	31 μg/m^3
SO_2	1-hour	9.8 ppb	4.9 ppb (99th %-ile)	9.5 ppb
	3-hour	7.0 ppb	2.7 ppb (99th %-ile)	7.1 ppb
	24-hour	2.5 ppb	1.7 ppb (99th %-ile)	3.6 ppb
	Annual	1.5 ppb	NA[3]	3 ppb

Notes:
[1] Values that are applicable for comparison to the NAAQS.
[2] Facility site Design Value obtained from NW-Airquest/ Dept. of Ecology
[3] NA: Not available

5.1.4.3 Dispersion Model Selection and Application

The most recent version (14134) of AERMOD was used for the air quality modeling. AERMOD is the preferred EPA guideline model for near-field simulation of industrial stack releases. AERMOD was used to model concentrations of pollutants having short-term (e.g., one to 24 hour) ambient standards with the appropriate averaging time selected. Modeling of pollutants with annual standards (i.e., $PM_{2.5}$, SO_2 and NO_2) was conducted using AERMOD with the PERIOD option.

[22] NW-Airquest "design values" tool website: http://lar.wsu.edu/nw-airquest/index.html

An analysis of the land use adjacent to the Facility site was conducted in accordance with Section 7.2.3 of the Guideline on Air Quality Models (EPA, 2005 and Auer, 1978). The land use analysis within 3 kilometers of the site was determined to be predominantly rural, such that rural dispersion coefficients were selected for all Facility simulations. All AERMOD regulatory default settings were selected.

Concentrations attributable to Facility emissions units are calculated at simulated locations referred to as model receptors. The receptor grids used in the modeling analyses are as follows:

- 25-meter spacing along the property line and extending from the property line out to 3 km beyond the property line;
- 50-meter spacing from 3 km to 4 km from the property line;
- 200-meter spacing from 4 km to 5 km from the property line; and
- 500-meter spacing from 5 km to 10 km from the property line.

Actual Universal Transverse Mercator (UTM) NAD27 coordinates and digital terrain data provided by the USGS were used in all receptor grids.

Figure 5.1-3 shows the receptor grids used in the modeling overlaid on a topographic map.

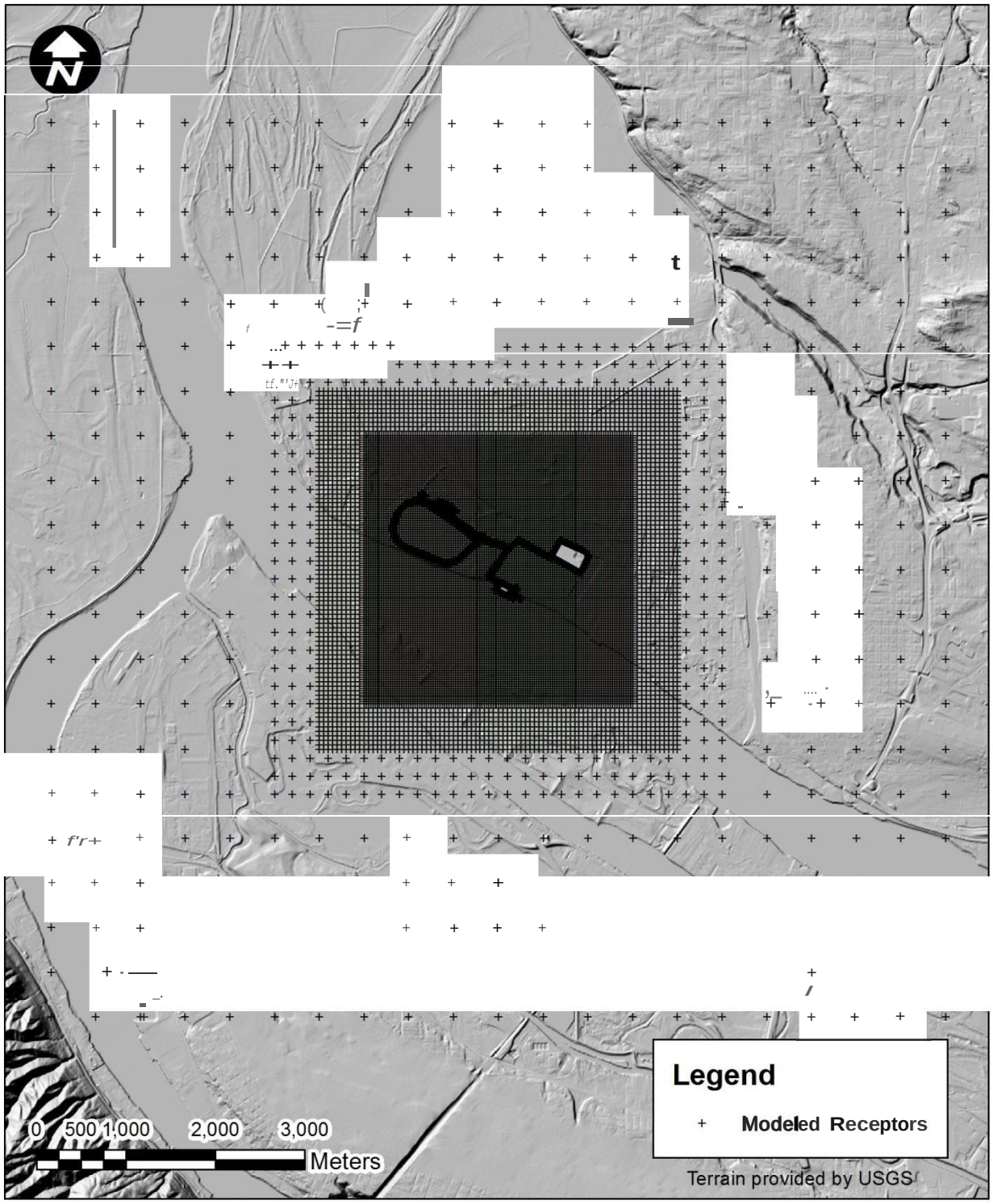

Figure 5.1-3. Modeling Receptor Grids

5.1.4.4 Dispersion Model Results

5.1.4.4.1 Criteria Pollutants

The criteria pollutant concentrations predicted using AERMOD to evaluate Facility operations are presented in Table 5.1-21. All maximum modeled concentrations occurred within one km of the Facility. In order to assess the significance of the predicted values, the maximum predicted criteria pollutant concentrations attributable to the Facility are compared with the EPA Significant Impact Levels (SILs); concentrations below the SILs are considered to be insignificant, and these pollutants do not require cumulative modeling with other sources to demonstrate compliance with ambient air quality standards.

Table 5.1-21. Project-Only Modeling Results

Pollutant	Averaging Period	Design Concentration[1] (µg/m^3)	UTM Easting[2] (m)	UTM Northing[2] (m)	SIL[3] (µg/m^3)
CO	1-hour	90.6	520704	5055515	2,000
	8-hour	76.8	520704	5055515	500
NO_2	1-hour	22.1	520704	5055515	7.5
	Annual	0.588	520701	5055505	1
PM_{10}	24-hour	13.2	520698	5055496	5
$PM_{2.5}$	24-hour	10.5	520701	5055505	1.2
	Annual	0.393	520701	5055505	0.3
SO_2	1-hour	18.2	520704	5055515	7.8
	3-hour	17.2	520704	5055515	25
	24-hour	12.8	520704	5055515	5
	Annual	0.207	520701	5055505	1

Notes:

[1] Maximum concentration (highest 1st high) except for 1-hour NO_2, 24-hour $PM_{2.5}$, annual $PM_{2.5}$, and 1-hour SO_2, which are the highest of the 5-year averages of the maximum modeled concentrations predicted each year at each receptor.

[2] UTM Zone 10

[3] From WAC 173-400-113(4)(a)

Predicted CO, 3-hour average SO_2, and annual NO_2, $PM_{2.5}$, and SO_2 concentrations attributable to Facility emissions units are less than the SILs. A concentration less than the SIL indicates that emissions of that pollutant attributable to the Facility does not have the potential to significantly affect ambient air concentrations.

Short-term concentrations of NO_2, $PM_{2.5}$, PM_{10}, and SO_2 exceed their respective SILs; it is common to evaluate cumulative concentrations by adding existing "background" concentrations to the predicted concentrations attributable to the Facility. The background concentrations summarized in Section 5.1.4.2.2, provide a conservative assessment of background air quality. Table 5.1-22 identifies cumulative concentrations based on the sum of these conservative background concentrations and the modeled design concentrations attributable to the Facility. The analysis indicates that when predicted design concentrations are added to the background concentrations, the resulting total concentrations comply with National and Washington ambient air quality standards (NAAQS/WAAQS).

Table 5.1-22. Comparison of Cumulative Concentrations with Ambient Air Quality Standards

Pollutant	Averaging Period	Modeled Design Concentration[1]	Background Concentration	Total Concentration[2]	NAAQS/ WAAQS
		($\mu g/m^3$)			
CO	1-hour	87.5	2,364	2,452	40,000
	8-hour	69.4	1,461	1,530	10,000
NO_2	1-hour	19.6	70	89.6	188
	Annual	0.588	13	13.6	100
PM_{10}	24-hour	10.1	31	41.1	150
$PM_{2.5}$	24-hour	6.59	20	26.6	35
	Annual	0.393	6	6.39	12
SO_2	1-hour	16.9	25	41.9	196
	3-hour	17.1	19	36.1	1,300
	24-hour	10.4	9	19.4	365
	Annual	0.207	8	8.21	52

Notes:

[1] The forms of the design concentrations are as follows:

CO, 1- & 8-hour average & SO2, 3- & 24-hour average – highest 2nd high concentration over the five modeled years of meteorological data

NO_2, 1-hour average – 98th percentile of the annual distribution of daily maximum 1-hour average concentrations averaged at each receptor over the five modeled years of meteorological data

NO_2 & SO_2, annual average – maximum annual average concentration

PM_{10}, 24-hour average – highest 6th high concentration over the five modeled years of meteorological data

$PM_{2.5}$, 24-hour average – 98th percentile of the annual distribution of 24-hour average concentrations averaged at each receptor over the five modeled years of meteorological data

$PM_{2.5}$, annual average – maximum annual average concentration averaged over the five modeled years of meteorological data

SO_2, 1-hour average – 99th percentile of the annual distribution of daily maximum 1-hour average concentrations averaged at each receptor over the five modeled years of meteorological data

[2] Total Concentration = Modeled Design Concentration + Background Concentration

5.1.4.4.2 Toxic Air Pollutants

WAC 173-460 regulates emissions of almost 400 substances as toxic air pollutants (TAPs). When anticipated emissions of a given TAP exceed a prescribed "Small Quantity Emission Rate for that TAP, EFSEC requires permit applications to include dispersion modeling of TAP emissions and to include a comparison of calculated concentrations attributable to the project with the ASILs. If calculated concentrations are less than the ASILs, a permit can be granted without further analysis. Otherwise, the Applicant must revise the project or submit a health risk assessment demonstrating that toxic emissions from the project are sufficiently low to protect human health. Concentrations below the ASILs indicate insignificant potential for adverse health effects from these chemicals.

Table 5.1-12 identifies facility-wide TAP emissions and was used to determine whether facility-wide emissions of each TAP exceed its SQER. A dispersion modeling analysis for those TAPs emitted at rates exceeding the SQERs was conducted in the same manner as for the criteria pollutants.

Maximum predicted TAP concentrations attributable to the Facility emission units are compared with Ecology ASILs in Table 5.1-23. Predicted concentrations are less than the Ecology ASILs for all TAPs.

Table 5.1-23. Maximum Predicted TAP Concentrations

CAS #	Compound	Averaging Period	Maximum Predicted Concentration ($\mu g/m^3$)	ASIL ($\mu g/m^3$)
10102-44-0	Nitrogen dioxide	1-hour	22.6	470
7446-09-5	Sulfur dioxide	1-hour	18.6	660
57-97-6	7,12-Dimethylbenz(a)anthracene	Annual	8.41E-07	1.41E-05
7440-38-2	Arsenic	Annual	1.05E-05	3.03E-04
71-43-2	Benzene	Annual	2.16E-02	3.45E-02
7440-43-9	Cadmium	Annual	5.78E-05	2.38E-04
18540-29-9	Chromium, (hexavalent)	Annual	2.94E-06	6.67E-06
N/A	Diesel Engine Particulate	Annual	1.45E-03	3.33E-03