Statement of Basis for the Air Operating Permit – Final

Phillips 66 Company
Ferndale Refinery
Ferndale, Washington

March 3, 2022
**PERMIT INFORMATION**  
Phillips 66 Company, Ferndale Refinery  
3901 Unick Road, Ferndale, WA 98248

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1 Introduction

1.1 Permit Changes in the first Modification (Administrative Amendment)

The name of the responsible corporate official has been changed. Mr. Carl Perkins, Refinery Manager, has replaced Ms. Jolie Rhinehart, previous Refinery Manager.

These changes were performed in accordance with WAC 173-401-720.

1.2 Permit Changes in the second Modification

Include references to 40 CFR §63.671 – Requirements for flare monitoring systems.

These changes were performed in accordance with WAC 173-401-730.
2 General Facility Description

The Northwest Clean Air Agency (NWCAA) is issuing a facility air operating permit to the Phillips 66 Company, Ferndale Refinery pursuant to Washington Administrative Code (WAC) 173-401 and NWCAA 322. The Ferndale Refinery is a designated major source for the air operating permit program because the facility has the potential to emit more than 100 tons of particulate matter (PM\textsubscript{10}), carbon monoxide (CO), nitrogen oxides (NO\textsubscript{X}), sulfur oxides (SO\textsubscript{X}) and volatile organic compounds (VOCs), more than 25 tons per year of a combination of hazardous air pollutants (HAP), and more than 10 tons per year of a various single HAPs. These air pollutants are defined as regulated air pollutants in Chapter 173-401 of the Washington Administrative Code (WAC).

The air operating permit is a compilation of all of the air pollution requirements the apply to the refinery. The purpose of this Statement of Basis is to set forth the legal and factual basis for the Air Operating Permit and to provide background information on the facility. The Statement of Basis is not a legally enforceable document.

2.1 Facility Description

The Ferndale Refinery is located at 3901 Unick Road in Ferndale, Whatcom County, Washington. The refinery is located on the coastline adjacent to the Strait of Georgia in a rural setting zoned for heavy industrial use. The area surrounding the refinery is designated in attainment with all National Ambient Air Quality Standards.

The Ferndale Refinery is a petroleum refinery that uses crude oil as a feedstock that is processed into a variety of petroleum products including gasoline, diesel, fuel oil, liquefied petroleum gas (LPG) and butane. The refinery receives crude oil via marine vessels, railcars, and by pipeline. The crude oil throughput capacity of the refinery is approximately 108,000 barrels per day.

The refining process at the Ferndale Refinery is described as follows. Crude oil enters the refining process at the Crude Distillation Unit where hydrocarbon is separated into light and heavy fractions based on their boiling point. These fractions or “cuts” are routed to other process units where they undergo catalytic cracking, catalytic reforming, isomerization, alkylation, or treatment. Treating systems are used to remove or reduce fuel impurities such as sulfur and benzene. Sulfur is recovered in the Sulfur Recovery Unit (SRU) as elemental sulfur. Some of the lighter hydrocarbons are flashed off as gasses during processing and used as fuel in the refinery’s fuel gas systems. The refinery has an oily wastewater system that routes hydrocarbon contaminated wastewater to the refinery’s wastewater treatment system prior to discharge into the Straits of Georgia. In final processing fuel components are blended into fished products and stored. Finished products are shipped to market via ship, barge, pipeline, railcar, or truck.
The Ferndale Refinery underwent major upgrades in 2003 and 2007. In 2003, the original Thermofor Catalytic Cracking Unit (TCCU) was replaced with a new Fluidized Catalytic Cracking Unit (FCCU) improving refining efficiencies and reliability. The project included adding hydrocarbon desulfurization capacity thereby allowing the refinery to produce low sulfur gasoline products as mandated by federal fuels standards. In 2007, the Crude Unit and FCCU Gas Plant were upgraded, and a second Sulfur Recovery Unit (SRU#2) was installed. In 2014, a railcar unloading facility was added. The Tier III Hydrotreater Unit is under construction and will allow the refinery to produce gasoline meeting Federal Tier III standards.
Figure 1-2 provides a general refinery process flow diagram for the Ferndale Refinery.

A more detailed description of petroleum refinery processes and the resulting air emissions may be found in Chapter 5 of EPA’s publication AP-42, Compilation of Air Pollutant Emission Factors. The principal sources of air emissions from the refinery include:

- Combustion units such as process heaters and boilers
- The Fluid Catalytic Cracking Unit (FCCU)
- Storage of hydrocarbon in tanks including crude oil, gasoline, and intermediates
- Fugitive emissions from leaking valves, pumps, and compressors
- The Sulfur Recovery Units (SRU #1 and #2)
- Oily wastewater conveyance and treatment at the effluent plant

### 2.2 General Facility History


The Ferndale Refinery was originally designed to process low sulfur Canadian crude oil delivered by pipeline from Alberta. The original throughput capacity was about 35,000
barrels of crude oil per day. The facility was expanded in 1967, 1972, 1990, and 2007 to its current crude oil processing capacity of approximately 108,000 barrels per day.

### 2.3 Enforcement History

Table 1-1 presents a list of formal enforcement actions taken against the Ferndale Refinery since 2008. Violations are resolved through a combination of penalty assessments and corrective action taken by the source. In most cases a summary of corrective action taken by the source is submitted to the NWCAA as a written response to the violation. Additional information about each violation can be obtained upon request to the NWCAA.

#### Table 1-1 Ferndale Refinery Notice of Violation History

<table>
<thead>
<tr>
<th>Date Issued</th>
<th>NOV#</th>
<th>Summary</th>
<th>Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/6/08</td>
<td>3712</td>
<td>Sulfur Recovery Units (SRU) #1 and #2 exceeded SO2 limits due to poor or inadequate maintenance.</td>
<td>$6,000</td>
</tr>
<tr>
<td>4/25/13</td>
<td>4020</td>
<td>Flaring with SO2 exceeding the 1,000 ppm limit resulting in 6,571 lb excess SO2. This occurred during a FCCU startup due to inadvertently leaving two-bypass valves open.</td>
<td>$15,000</td>
</tr>
<tr>
<td>6/30/14</td>
<td>4096</td>
<td>Sulfur Recovery Unit #2 exceeded SO2 limit due to operator delays in troubleshooting. The incident resulted in 434 lb of excess SO2.</td>
<td>$8,000</td>
</tr>
</tbody>
</table>

### 2.4 Periodic Reports

The refinery has various reporting requirements resulting from federal, state, and NWCAA regulations as well as Prevention of Significant Deterioration (PSD) permits and Orders of Approval to Construct (OACs). The refinery’s monthly report is of particular interest because it represents a compilation of monthly reporting elements required by numerous approval orders. The monthly report also includes any deviations that occurred during the month.

As required in AOP term 4.1, monthly, quarterly, semiannual, and annual reports are required to be submitted within 30 days of the close of the reported period, with specific exceptions. This 30-day deadline had been added as “directly enforceable” under the agency’s Title V gap-filling authority to ensure reporting consistency. Exceptions from the 30-day deadline are called out term 4.1 including, but not limited to, annual emission reports, fenceline benzene monitoring reports and the annual BWON total annual benzene (TAB) report. These exceptions have longer submission deadlines due in part to the more complex nature of the reports. The directly enforceable 30-day deadline was selected because in accordance with WAC 173-401-615(3) deviations are due within 30 days of the end of the month.

In general, periodic reports are considered those regularly submitted that provide information on the compliance status of the facility during the reporting period. They often include emission rates or operating parameters that have corresponding permit limits. One-time only notices, such as initial startup notices or initial MACT compliance status notices are not considered periodic reports for the purpose of AOP term 4.1 because they do not occur on a regular frequency.
2.5 Emissions Inventory

Each year the refinery is required to submit an emissions inventory for the entire facility. This report includes criteria air pollutants (carbon monoxide, nitrogen oxides, particulate matter, sulfur dioxide, and volatile organic compounds), toxic air pollutants (TAPs) and greenhouse gas (GHG) emissions. Inventory reports from the refinery are categorized into different source groups as well as for individual emission units. The NWCAA uses the emissions inventory data in a jurisdiction-wide emissions inventory report that includes a summary of annual emissions for large industrial facilities. A recent three-year history of air pollution emitted from the Phillips 66 Ferndale Refinery is provided in Table 1-2 below.

**Table 1-2 Annual Air Emissions from the Ferndale Refinery**

<table>
<thead>
<tr>
<th>Phillips 66 Ferndale Refinery</th>
<th>Tons per calendar year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria Air Pollutants</strong></td>
<td>2013</td>
</tr>
<tr>
<td>Fine particulate matter (PM$_{10}$)</td>
<td>65</td>
</tr>
<tr>
<td>Sulfur dioxide (SO$_2$)</td>
<td>46</td>
</tr>
<tr>
<td>Nitrogen oxides (NO$_x$)</td>
<td>784</td>
</tr>
<tr>
<td>Volatile organic compounds (VOC)</td>
<td>869</td>
</tr>
<tr>
<td>Carbon monoxide (CO)</td>
<td>220</td>
</tr>
</tbody>
</table>

2.6 Miscellaneous Refinery Non-Process Activities

There are several regulated activities that can emit air pollutants not generated by refining processes. These include asbestos removal, fire training, abrasive blasting, and cutback asphalt paving. Asbestos removal occurs during the demolition or modification of buildings and piping that are likely to contain asbestos-containing materials such as insulation and tiles. The refinery is subject to federal, state, and NWCAA asbestos requirements. Fire training employs open burning during the instruction of the refinery’s emergency response personnel. Open burning activities are subject to state and NWCAA requirements. Abrasive blasting occurs during maintenance and repair activities of tanks and equipment at the refinery to remove old and chipped paint and surface contaminants. This activity is subject to state and NWCAA regulations. Finally, cutback asphalt paving occurs from time to time at the refinery to repair road and other impermeable surfaces. The use of cutback asphalt is subject to NWCAA regulations.

2.7 Insignificant Emission Units

The refinery has emission units and activities determined to be insignificant under WAC 173-401-530, -532, and -533. In general, they are considered insignificant because they have low emission rates or generate only fugitive emissions. The Generally Applicable requirements in Section 4 of the air operating permit apply to these units, although the testing, monitoring, recordkeeping, and reporting requirements do not apply. As specified in WAC 173-401-530(2)(a), no emission unit or activity subject to a federally enforceable requirement, other than generally applicable requirements of the state implementation plan may qualify as insignificant.

The insignificant emission units and activities located at the Ferndale refinery are listed in Section 0 of this Statement of Basis.
3 Regulatory Programs

3.1 New Source Performance Standards (NSPS)

The federal New Source Performance Standards (NSPS) apply to the control of criteria air pollutants emitted from specific types of sources that have been constructed or modified after the applicability date for each rule. The NSPS rules are found in Title 40 Code of Federal Regulations (CFR) part 60. Criteria air pollutants are those associated with national ambient air quality standards including carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter, volatile organic compounds for ozone.

The Ferndale Refinery is subject to a number of NSPS subparts and the general provisions under Subpart A. Subpart A contains procedural and other requirements that apply generically to all other NSPS subparts, unless noted otherwise.

The following is a listed NSPS regulations that may apply to the Ferndale Refinery. A more detailed description of each rule is provided in this section.

Subpart A – General Provisions

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

Subpart GGG - Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After January 4, 1983, and on or Before November 7, 2006. Subpart GGG references NSPS subpart VV


Subpart J – Standards of Performance for Petroleum Refineries.

Subpart Ja – Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007


Subpart Ka - Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984

Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

Subpart QQQ – Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater System

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

3.1.1 New Source Performance Standards (NSPS) - General Provisions

40 CFR 60 Subpart A – General Provisions

When a New Source Performance Standards (NSPS) standard applies to a facility, the general provisions of 40 CFR 60 Subpart A also apply. These general provisions are included
in Section 3 of the air operating permit. Subpart A requirements tend to be applicable only when triggered by a particular action, such as an initial startup notice and an initial notification when a facility becomes subject to a standard under 40 CFR 60.

40 CFR 60 Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

Subpart Db establishes nitrogen oxide emission standards and associated requirements for boilers that were constructed, modified, or reconstructed after June 19, 1984, with a heat input capacity greater than 100 MMBtu/hour. The #1 Boilers (22F-1C) and #4 Boiler (22F-1E) at the Ferndale Refinery are subject to Subpart Db. Both boilers are approved to combust refinery fuel gas. However, in actual practice the #4 Boiler is fired only on natural gas. #1 Boiler was originally approved to combust #2 distillate fuel as a backup fuel; however, dual-fuel burners were never installed and the approval order was revised to remove the ability to combust #2 distillate fuel.

To comply with Subpart Db, the #1 and #4 Boiler are equipped with continuous emissions monitoring systems (CEMS) for NOx. The boilers do not have duct burners and are not limited by a low annual capacity factor.

40 CFR 60 Subpart Db does not apply to the #2 and #3 Boilers because they were constructed prior to June 19, 1984 and have not been reconstructed or modified since that time. The FCCU CO Boiler is a steam generating unit that was constructed after June 19, 1984, however, it is not required to meet any of the emission standard of Subpart Db because it has a federally enforceable limit in OAC 733e restricting the amount of natural gas that can be used for auxiliary firing to less than 10% of its annual capacity.

3.1.2 Standards of Performance (NSPS) for Equipment Leaks


Subpart GGG applies to affected facilities in petroleum refineries constructed, reconstructed or modified after January 4, 1983, and on or before November 7, 2006. With some exceptions, such as compressors in hydrogen service, Subpart GGG requires a leak detection and repair (LDAR) program to reduce fugitive emissions from valves, pumps, and compressors in accordance with 40 CFR Part 60 Subpart VV – Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry.

It is noted that the definition of “process unit” in the rule has been stayed by the court until further notice and the stay continues to be in effect.

The process equipment components covered by Subpart GGG are listed in Work practice standards are in place to mitigate fugitive VOC and HAP emissions leaking from equipment components located throughout the refinery. Leaking equipment components include compressors, pumps, valves, flanges, sampling connections, pressure relief devices, and open-ended lines that are in gas or liquid service.

These leaks are required to be controlled through work practice standards that are commonly referred to as leak detection and repair (LDAR). There are three distinct LDAR programs at the Ferndale Refinery. Each program is based on one of two federal NSPS programs. Under the LDAR programs equipment components must be surveyed for leaks and the leaks repaired in a timely manner with some exceptions. The main difference between the three LDAR programs is the concentration level as measured by a monitoring
instrument, that defines a leak. Lower leak definitions represent a more stringent LDAR program.

40 CFR 60 Subpart VV – Leaks are defined as:

- 10,000 ppm for all valves and pumps in gas/light liquid service
- 10,000 ppm for all connectors
- 10,000 ppm for all components in heavy light liquid service

This LDAR program is required for the control of VOC emissions under NSPS 40 CFR 60 Subpart GGG for process units that were constructed, reconstructed, or modified between January 5, 1983, and November 7, 2006. Second, it is the LDAR program prescribed to control HAP emissions throughout the refinery under MACT 40 CFR 63 Subpart CC. Lastly, it is the LDAR program prescribed by Section 580 of the NWCAA Regulation to control VOC emissions from areas with a primary feedstock that is butane or lighter.

Modified 40 CFR 60 Subpart VV – Leaks are defined as:

- 1,000 ppm for all valves gas/light liquid service
- 2,000 ppm for all pumps in gas/light liquid service
- 10,000 ppm for all connectors
- 10,000 ppm for all components in heavy light liquid service

This LDAR program is required for the control of VOC and TAP emissions as BACT at specific process units as prescribed by OACs issued to the refinery during new source review.

40 CFR 60 Subpart VVa – Leaks are defined as:

- 500 ppm for all valves gas/light liquid service
- 2,000 ppm for all pumps in gas/light liquid service
- 10,000 ppm for all connectors
- 10,000 ppm for all components in heavy light liquid service

This LDAR program is required for the control of VOC emissions under NSPS 40 CFR 60 Subpart GGGa for process units that were constructed, reconstructed, or modified after November 7, 2006. In accordance with 63.640(p), it is also the LDAR program that may be used control HAP emissions under MACT 40 CFR 63 Subpart CC in lieu of 40 CFR 60 Subpart VV. In some cases, the LDAR program under Subpart GGGa/VVa has been relied upon as BACT for VOC and TAP emissions during new source review by the NWCAA.

All of these LDAR programs allow for a relaxation of the monitoring frequency for valves if their leak rates are found to be low during instrument monitoring surveys. In addition, all of the LDAR programs require control strategies for specific equipment. Compressors must use a dual seal system that employs a barrier fluid to capture and detect leaks. Pressure relief devices that do not vent to the atmosphere must vent to a close vent system and control device. Sampling connections must use a closed-purge, closed-loop, or must route to a closed-vent system and control device. Open-ended lines must double blocked using valves, blinds and caps. Pumps that employ dual seals and a barrier fluid are allowed an alternative monitoring strategy.
All LDAR programs have requirements to monitor pressure relief devices that release to the atmosphere within five days of release to ensure that the device has resealed. All pressure relief devices in HAP service at the Ferndale Refinery are scheduled to be routed to a closed vent system and control device. However, at this time there are some that still vent to the atmosphere and this five-day monitoring provision for pressure relief devices is included in the AOP.

In addition, for those units subject to the LDAR requirements under 580.8, the AOP also calls out one item because it is considered to be more stringent than similar LDAR requirements of 40 CFR 60 Subparts GGG and VV. That is the requirement under NWCAA 580.846 to inspect relief vents that have opened to the atmosphere within 24 hours of venting. The federal regulation allows up to five days for the relief valve to be checked to ensure that it has reseated. The requirement under NWCAA 580.846 comes from the SIP version of the rule and represents the only LDAR provision from 580.8 that is more stringent than the current version of 580.8.

To monitor for leaks, surveys are conducted using an instrument that is capable of meeting the requirements of 40 CFR 60 Appendix A Method 21 (EPA Method 21). When leaks are found they must be repaired within 15 days unless a delay of repair is utilized because the repair is technically infeasible or would cause greater emissions than the leak itself. If a delay of repair is utilized, the repair must be accomplished prior process unit startup following the next maintenance shutdown.

Table 2-9 identifies each LDAR program at the refinery and the process unit or area where it is employed. The table also identifies the regulatory driver, i.e., the underlying basis for requiring that LDAR program.

Process equipment subject to Subpart GGG are listed in Table 2-9.

**40 CFR 60 Subpart GGGa – Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006**

Subpart GGGa applies to affected facilities in petroleum refineries constructed, reconstructed, or modified after November 7, 2006. With some exceptions, Subpart GGGa requires a leak detection and repair (LDAR) program to reduce fugitive emissions from valves, pumps, and compressors in accordance with 40 CFR Part 60 Subpart VVa - Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry. Similar to Subpart GGG, the definition of “process unit” was stayed by the court until further notice.

Process equipment subject to Subpart GGGa are listed in Table 2-9.

**3.1.3 Standards of Performance (NSPS) for Petroleum Refineries**

**40 CFR 60 Subpart J – Standards of Performance for Petroleum Refineries**

Subpart J establishes sulfur dioxide and carbon monoxide emission limits and associated requirements for fluid catalytic cracking unit catalyst regenerators constructed or modified after June 11, 1973. Subpart J also establishes sulfur dioxide emission limits and requirements for fuel gas combustion devices constructed or modified after June 11, 1973, and Claus sulfur recovery plants constructed or modified after October 4, 1976 (except Claus plants of 20 long tons per day (LTD) or less). The fluid catalytic cracking unit and two sulfur recovery plants are subject to Subpart J because they were constructed after the June 11, 1973, Subpart J applicability date.
Most of the process heaters and boilers at the refinery are subject to Subpart J as fuel gas combustion devices. In addition, the truck rack vapor combustor is subject to Subpart J because it is considered a fuel gas combustion device, the fuel gas being gasoline vapors generated at the truck rack and combusted in the vapor combustor.

Most of the refinery heaters and boilers were constructed prior to the June 11, 1973, applicability date of Subpart J. However, these heaters and boiler are subject to Subpart J as an obligation of the Consent Decree. This obligation is memorialized in OAC 733e that established a federally enforceable requirement to comply with Subpart J. Table 2-1 identifies combustion devices that are subject to Subpart J due to their construction date and those that are subject to Subpart J under OAC 733e.

For fuel gas combustion devices, Subpart J allows the refinery to monitor the H₂S in the fuel gas instead of monitoring stack SO₂ emissions. The refinery has elected to use the H₂S monitoring option for all of its subject heaters and boilers. The H₂S limit specified in Subpart J is 230 mg/dscm (0.10 gr/dscf) on a 3-hour average. This is equivalent to 162 ppmv H₂S. Because CEMS for H₂S measure the concentration of H₂S by volume, the AOP lists the Subpart J H₂S limit as 162 ppmv, 3-hour average.

40 CFR 60 Subpart Ja – Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007

Subpart Ja establishes sulfur dioxide emission (SO₂) limits for fuel gas combustion devices and flares that are constructed, reconstructed, or modified after May 14, 2007. There are two combustion devices at the refinery, the Tier III Hydrotreater Charge Heater and Elevated Flare that are subject to Subpart Ja because they were constructed after May 14, 2007.

Similar to Subpart J for fuel gas combustion devices, Subpart Ja allows the refinery to monitor the H₂S in the fuel gas instead of monitoring stack SO₂ emissions. The refinery has elected to use the H₂S fuel gas monitoring option for the Tier III Hydrotreater Charge Heater. Subpart Ja imposes two H₂S limits for fuel gas; 162 ppmv on a 3-hour average, and 60 ppmv on a 365-day rolling average with continuous compliance monitored using an H₂S CEMS.

For the elevated flare, Subpart Ja requires that flared gas be limited to 162 ppmv H₂S on a 3-hour average. Process upset gas and fuel gas that is released to the flare as a result of relief valve leakage or other emergency malfunctions is exempt from this limit.

Where, 60.101a defines process upset gas as “any gas generated by a process unit or by ancillary equipment as a result of startup, shutdown, upset or malfunction”.

Where, 60.101a defines fuel gas as “any gas which is generated at a petroleum refinery, and which is combusted. Fuel gas includes natural gas when the natural gas is combined and combusted in any proportion with a gas generated at a refinery. Fuel gas does not include gases generated by catalytic cracking unit catalyst regenerators, coke calciners (used to make premium grade coke) and fluid coking burners but does include gases from flexicoking unit gasifiers and other gasifiers. Fuel gas does not include vapors that are collected and combusted in a thermal oxidizer or flare installed to control emissions from wastewater treatment units other than those processing sour water, marine tank vessel loading operations or asphalt processing units (i.e., asphalt blowing stills)”.

Where, 60.2 defines “malfunction” as “any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to
operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.”

Subpart Ja also requires that the refinery developed and implement a flare management plan and conduct a root cause analyses and take corrective action when waste gas sent to the flare exceeds a flow rate of 500,000 standard cubic feet per day (scfd) above the baseline flow, or contains sulfur that upon combustion, will emit more than 500 pounds of SO\textsubscript{2} in a 24-hour period. In accordance with 60.103a(d)(3), if the SO\textsubscript{2} is emitted from flaring during a planned refinery startup or shutdown, the root cause analysis and corrective action analysis is not required but the discharge must be recorded and reported.

Table 2-1 identifies all of the emission units at the Ferndale Refinery that are subject to NSPS Subpart J and Subpart Ja and the regulatory driver for those requirements.

### Table 2-1 Combustion Devices Subject to Subpart J or Ja

<table>
<thead>
<tr>
<th>Subpart J Direct</th>
<th>Subpart J via OAC 733e</th>
<th>Subpart Ja Direct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Heater (1F-1)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Supplemental Crude Heater (1F-1A)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>FCCU Combustion Air Heater (4F-100)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Vacuum Flasher Heater (4F-2)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Alkylation Depropanizer Reboiler (17F-1)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cat Gas Desulfurizer Feed Heater (38F-101)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tier III Hydrotreater Charge Heater</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>#3 Reformer Heater (18-F21-F22-F23-F24)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>#3 Reformer Pretreat Heater (18F-1)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>#3 Reformer Regenerator Heater (18F-26)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Diesel Hydrotreater Heater (33F-1)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>#1 Boiler (22F-1C)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>#2 Boiler (22F-1A)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>#3 Boiler (22F-1B)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>#4 Boiler (22F-1E)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Elevated Flare (13V-11)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Truck Rack Vapor Combustor</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

### 3.1.4 Standards of Performance (NSPS) for Storage Vessels

There are three NSPS regulations applicable to storage vessels (tanks) at the refinery that store volatile organic liquids, Subpart K, Subpart Ka and Subpart Kb. These NSPS regulations are applicable to tanks above specific storage capacities and storing liquids between specific true vapor pressures. Pressure vessels are exempt from the regulations.

There are two tanks at the Ferndale Refinery subject to 40 CFR 60 Subpart K. Tanks 100X94 and 100X99 became subject to Subpart K when they were retrofit from fixed roof tanks to an IFR tank configuration during the applicability dates of the rule.


There is one tank at the Ferndale Refinery subject to 40 CFR 60 Subpart Ka. EFR, Crude Storage Tank 6000X1 is subject to Subpart Ka because it was constructed during the applicability dates of the rule.


There are a number of storage vessels at the Ferndale Refinery subject to Subpart Kb due to their date of construction or modification.

A summary of NSPS applicability for storage tanks constructed or modified after June 11, 1973, is provided in Table 2-2.

Table 2-2 Storage Tanks Subject to Subpart K, Ka, or Kb

<table>
<thead>
<tr>
<th>Tank</th>
<th>Type¹</th>
<th>Product</th>
<th>Subpart K</th>
<th>Subpart Ka</th>
<th>Subpart Kb</th>
<th>Trigger²</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000X1</td>
<td>EFR</td>
<td>Crude oil</td>
<td>X</td>
<td></td>
<td></td>
<td>Construction, 1978</td>
</tr>
<tr>
<td>900x1</td>
<td>EFR</td>
<td>Wastewater</td>
<td></td>
<td>X</td>
<td></td>
<td>Construction, 2002</td>
</tr>
<tr>
<td>900x2</td>
<td>EFR</td>
<td>Wastewater</td>
<td></td>
<td>X</td>
<td></td>
<td>Construction, 2002</td>
</tr>
<tr>
<td>900x3</td>
<td>EFR</td>
<td>Wastewater</td>
<td></td>
<td>X</td>
<td></td>
<td>Construction, 2002</td>
</tr>
<tr>
<td>400x1</td>
<td>IFR</td>
<td>Naphtha</td>
<td></td>
<td>X</td>
<td></td>
<td>Construction, 2000</td>
</tr>
<tr>
<td>300x40</td>
<td>IFR</td>
<td>Wastewater</td>
<td>X</td>
<td></td>
<td></td>
<td>Modification³ 1991</td>
</tr>
<tr>
<td>100x94</td>
<td>IFR</td>
<td>Recovered oil</td>
<td>X</td>
<td></td>
<td></td>
<td>Modification³, 1975</td>
</tr>
<tr>
<td>100x98</td>
<td>IFR</td>
<td>Recovered oil</td>
<td></td>
<td>X</td>
<td></td>
<td>Modification³, 1991</td>
</tr>
<tr>
<td>100x99</td>
<td>IFR</td>
<td>Recovered oil</td>
<td></td>
<td>X</td>
<td></td>
<td>Modification³, 1977</td>
</tr>
<tr>
<td>70x1</td>
<td>IFR</td>
<td>Ethanol</td>
<td></td>
<td>X</td>
<td></td>
<td>Construction, 2012</td>
</tr>
</tbody>
</table>

1. EFR = external floating roof, IFR = Internal floating roof.
2. Construction/modification date based on NSR (OAC) permitting date, except for Tank 6000X1 that was permitted in 1975 but constructed within the Subpart Ka applicability dates.
3. Modification involved converting from a fixed roof to an internal floating roof tank.

NSPS Subparts K, Ka, and Kb require specific equipment standards to control fugitive VOC emissions from tanks. It also includes inspection, testing, monitoring, recordkeeping, and reporting requirements to ensure compliance.
Because all of the storage tanks at the Ferndale Refinery subject to Subpart K, Ka, or Kb are considered MACT Group 1 tanks under 40 CFR 63 Subpart CC, the federal regulations only require the storage vessels to comply with 40 CFR 63 Subpart WW - National Emission Standards for Storage Vessels (Tanks) - Control Level 2, which is the compliance option selected by the refinery under §63.660 of Subpart CC. Tanks storing wastewater can be an exception. If a MACT Group 1 tank is storing wastewater that is considered a Group 1 wastewater stream under Subpart CC, the tank must comply with the requirements for storage tanks under 40 CFR 61 Subpart FF (BWON). The Ferndale Refinery has elected to meet Subpart FF requirements for tanks under §61.351 - Alternative Standards for Tanks, that requires:

- An IFR tank must meet the equipment specifications of Subpart Kb §60.112b(a)(1).
- An EFR tank must meet the equipment specifications of Subpart Kb §60.112b(a)(2).

In summary, tanks at the Ferndale Refinery that are subject to NSPS Subpart K, Ka, or Kb due to their construction or modification date are not required to comply with K, Ka, or Kb when they are considered a MACT Group 1 tank under Subpart CC, unless storing a Group 1 wastewater stream. If the tank is storing a Group 1 wastewater stream, it is also required to comply with the equipment standards of Subpart Kb. The following tanks at the refinery are MACT Group 1 tanks that store a Group 1 wastewater stream.

- EFR Tanks 900X1, 900X2, and 900X3
- IFR Tanks 300X40, 100X94, 100X98, and 100X99

Under NWCAA Regulation, all of the tanks at the refinery that store high volatile organic liquids (VOL) must comply with the equipment and maintenance provisions of 40 CFR 60 Subpart Kb as specified by the SIP approved version of NWCAA 580.3 - High Vapor Pressure Volatile Organic Compound Storage Tanks. High VOL means liquids with a true vapor pressure greater than 1.5 psia.

The following tanks require compliance with 40 CFR 60 Subpart Kb as a condition of OAC 314a;

- EFR Tanks 100X92 and 100X95 to be retrofit with rim mounted continuous secondary seals conforming to the design requirements of 40 CFR 60 Subpart K §60.112b(a)(2).
- IFR Tanks 300X40 and 100X98 to be retrofit with internal floating roofs conforming to the design requirements of 40 CFR 60 Subpart Kb §60.112b(a)(1).
- All four tanks meet the requirements of 40 CFR 60 Subpart Kb as follows; testing under §60.113b, recordkeeping and reporting under §60.115b, and vapor pressure monitoring of liquids under §60.116b.

The AOP includes the requirements of 40 CFR 60 Subpart Kb. However, the obligation to comply with Subpart Kb is not because the tank is subject to Subpart Kb directly. Instead, it is imposed through one or more of the following referring regulations or order; 40 CFR 61 Subpart FF (BWON), NWCAA 580 or OAC 314a.

OAC 1111 states that Tank 70x1 is subject to 40 CFR 60 Subpart Kb. This statement is found in a section of the OAC that is not enforceable. Instead, the requirement to comply with Subpart Kb is through direct applicability of Subpart Kb. Tank 70x1 is dedicated to storing ethanol that is used as a blending component in gasoline. Ethanol does not contain greater than 4% HAPs on an annual average and tank is considered a Group 2 storage vessel under Refinery MACT Subpart CC. As a Group 2 tank, the refinery is required to
comply with NSPS Subpart Kb for VOC control and is not provided the flexibility to comply with 40 CFR 63 Subpart WW instead of 40 CFR 60 Subpart Kb.

The AOP does not list the requirements of Subpart K or Ka because under the overlap provisions of Subpart CC, Group 1 tanks subject to Subpart K or Ka are only required to comply with the storage vessel provisions of 40 CFR 63 Subpart WW, the compliance option selected by the refinery. All of the tanks constructed or modified under the time periods of Subpart K and Ka are considered Group 1 tanks under Subpart CC.

3.1.5 Standards of Performance (NSPS) for Petroleum Refinery Wastewater Systems

40 CFR 60 Subpart QQQ – Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater Systems

Subpart QQQ applies to process wastewater collection, conveyance and treatment systems at petroleum refinery equipment that is constructed, modified, or reconstructed after May 4, 1987. Subpart QQQ requires a new source performance standards (NSPS) on drain systems, junction boxes, and sewer lines to control VOC emissions. The rule also requires NSPS on wastewater (effluent) treatment systems such as oil-water separators and closed vent systems and control devices used for VOC control.

There is considerable regulatory overlap between NSPS 40 CFR 60 Subpart QQQ, BWON 40 CFR 61 Subpart FF and Refinery MACT 40 CFR 63 Subpart CC. Where Subpart CC overlaps with Subpart QQQ, Subpart CC takes precedence as provided in 63.640(o). This occurs when the equipment in effluent service is either managed as having, or actually services a Group 1 wastewater stream defined in 63.461

*Group 1 wastewater stream* means a wastewater stream at a petroleum refinery with a total annual benzene loading of 10 megagrams per year or greater as calculated according to the procedures in 40 CFR 61.342 of subpart FF of part 61 that has a flow rate of 0.02 liters per minute or greater, a benzene concentration of 10 parts per million by weight or greater, and is not exempt from control requirements under the provisions of 40 CFR part 61, Subpart FF.

The equipment at Ferndale Refinery subject to the requirements of Subpart QQQ without a clear overlap provision are located at the Alkylation, DHT, and the Tier III Hydrotreater process units. The subject equipment includes individual drain systems, junction boxes, and sewers lines. The VOC control requirements of Subpart QQQ are included in Section 6 of the AOP. Whereas Section 5 of the AOP includes a reference to the Section 6 terms for the Alkylation, DHT, and the Tier III Hydrotreater units.

3.1.6 Standard of Performance (NSPS) for Stationary Reciprocating Internal Combustion Engines (RICE)

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

40 CFR 60 Subpart IIII was promulgated in June 2006 applying NSPS standards to stationary compression ignition (CI), reciprocating internal combustion engines (RICE). The rule was amended in June 2011. The rule applies only to CI engines constructed on or after July 11, 2005.
The following CI engines are located at the Ferndale Refinery. All are diesel-fired and in dedicated emergency service. There are no stationary, spark ignition engines at the refinery subject to the corresponding NSPS; 40 CFR 60 Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.

### Table 2-3 Engines subject to 40 CFR 60 Subpart III

<table>
<thead>
<tr>
<th>Make and Model</th>
<th>Year</th>
<th>Brake Horse Power (hp)</th>
<th>Emergency Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detroit Model 62402RA</td>
<td>1953</td>
<td>264 hp</td>
<td>firewater pump</td>
</tr>
<tr>
<td>Detroit Model 62402RA</td>
<td>1953</td>
<td>264 hp</td>
<td>firewater pump</td>
</tr>
<tr>
<td>Detroit Model 62402RA</td>
<td>1953</td>
<td>264 hp</td>
<td>firewater pump</td>
</tr>
<tr>
<td>Kohler Model 20R0274</td>
<td>1986</td>
<td>61 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Detroit Model 62402RA</td>
<td>1953</td>
<td>264 hp</td>
<td>firewater pump</td>
</tr>
<tr>
<td>Detroit Model 62402RA</td>
<td>1953</td>
<td>264 hp</td>
<td>firewater pump</td>
</tr>
<tr>
<td>Kohler Model 20R0274</td>
<td>1986</td>
<td>61 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Cummins Model QSB5-63 NR3</td>
<td>2009</td>
<td>132 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Kubota Model C2203-EBG</td>
<td>2008</td>
<td>33 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Caterpillar Model C9</td>
<td>2007</td>
<td>398 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Caterpillar Model 3456</td>
<td>Nov. 2002</td>
<td>800 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Cummins Model K11A19G2)</td>
<td>1991</td>
<td>750 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Cummins Model VT-1710-F</td>
<td>1953</td>
<td>685 hp</td>
<td>firewater pump</td>
</tr>
<tr>
<td>Caterpillar Model 3412</td>
<td>2004</td>
<td>739 hp</td>
<td>firewater pump</td>
</tr>
</tbody>
</table>

There are three CI engines that were constructed on or after July 11, 2005, subject to Subpart III. All are in dedicated emergency service and regulated in the ≤ 500 hp size category. None of these emergency generator engines are contractually obligated to be available for more than 15 hours per calendar year for emergency demand response as specified in 60.4211(f), for assisting in voltage/frequency deviations or for non-emergency situations to supply power as part of a financial arrangement with another entity.

To remain in the emergency use category under Subpart III, 60.4211(f)(2) limits the number of hours per calendar year in non-emergency service to 100 hours as long as it is used for recommended maintenance checks and readiness testing. There is no limit to the number of hours an engine can run while in emergency service.

The three CI engines subject to Subpart III are required to be maintained in a manner that ensures they meet Tier 3 emission standards for nonroad engines. This includes conducting proper maintenance and not to tampering with emission related settings on the engine that could compromise the emission standard. Subpart III also prescribes the type of diesel fuel that can be used in the engine. The engines subject to Subpart III the requirements of this subpart are listed in Section 5 of the AOP.
3.2 National Emission Standards for Hazardous Air Pollutants (NESHAP)

The National Emission Standards for Hazardous Air Pollutants (NESHAP), which cover the emission of hazardous air pollutants, are found in Title 40 CFR Parts 61 and 63. These rules apply to existing sources regardless of the construction/modification dates. The NESHAP are established to reduce emissions of hazardous air pollutants. The NESHAP include a Subpart A with procedural and other requirements that apply generically to all of the NESHAP subparts.

The following NESHAP regulations apply to emission units at the Ferndale Refinery:

**40 CFR 61 Subpart A – General Provisions**


**40 CFR 63 Subpart A – General Provisions**


**40 CFR 63 Subpart PPPPP – National Emission Standards for Hazardous Air Pollutants for Engine Test Cells/Stands**

3.2.1 40 CFR 61 Subpart A – General Provisions

When a Part 61 NESHAP standard applies to a facility, the general provisions of 40 CFR 61 Subpart A also apply. These general provisions are included in Section 3 of the air operating permit. Subpart A requirements tend to be applicable only when triggered by a particular action, such an initial startup notice and an initial notification when a facility becomes subject to a standard under 40 CFR 61.

3.2.2 40 CFR 61 Subpart FF – National Emission Standard for Benzene Waste Operations (BWON)

40 CFR 61 Subpart FF, commonly referred to as benzene waste operations NESHAP (BWON), applies to benzene waste operations at petroleum refineries with more than 10 Mg per year of benzene in their waste streams. Along with general overall program standards, Subpart FF includes specific equipment standards including those for tanks, surface impoundments, containers, individual drain systems, oil-water separators, treatment processes, and closed-vent systems and control devices. The Refinery MACT I wastewater provisions include the same applicability criteria for Subpart CC Group 1 wastewater stream as those in Subpart FF. In effect, all of the equipment subject to Subpart FF are also subject to Subpart CC. The list of wastewater streams subject to Subpart FF is substantial and varies from year to year. The refinery takes periodic samples and keeps records detailing the status of the various benzene containing waste streams at the facility, and whether they
are controlled or uncontrolled. By no later than April 7th each year the refinery reports their total annual benzene (TAB). The report is based on each calendar year of BWON operations.

3.2.3 40 CFR 63 Subpart A – General Provisions

When a Part 63 NESHAP standard applies to a facility, the general provisions of 40 CFR 63 Subpart A also apply. These general provisions are included in Section 3 of the air operating permit. Subpart A requirements tend to be applicable only when triggered by a particular action, such an initial startup notice and an initial notification when a facility becomes subject to a standard under 40 CFR 63.

3.2.4 40 CFR 63 Subpart CC – National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries (aka Refinery MACT I)

Subpart CC was originally published on August 18, 1995. Under the rule refineries must control hazardous air pollutants from storage tanks, equipment leaks, process vents, cooling towers due to heat exchanger leaks, product loading terminals, and oily wastewater collection and treatment systems. Subpart CC was recently amended on December 1, 2015, and July 13, 2016, under the refinery sector rule (RSR) initiative to:

- Add a fenceline benzene monitoring program.
- Remove the requirement for startup, shutdown, and malfunction plans.
- Add new monitoring provisions for flares.
- Revised the definition of Group 1 miscellaneous process vents.
- Add requirements for Group 1 miscellaneous process vents and a category of maintenance process vents that release to the atmosphere.
- Revise the definition of Group 1 storage vessels.
- Add new compliance options for Group 1 storage vessels including the option to use 40 CFR 63 Subpart WW.

All of the Subpart CC requirements are included in the air operating permit with the following exceptions.

- During the 2017 maintenance turnaround at the Ferndale Refinery, all process vent in HAP service that had vented to the atmosphere were reconfigured to vent into the refinery flare gas header where they are recovered or controlled at the flare. Therefore, the new provision for monitoring process vents that release to the atmosphere are not included in the AOP.
- The new definitions of Group 1 miscellaneous process vents and Group 1 storage vessel did not add any equipment to the list of process vents and storage vessels that were already in the AOP.

3.2.5 40 CFR 63 Subpart UUU – National Emission Standards for Hazardous Air Pollutants for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery

Subpart UUU, originally published on April 11, 2002, and amended thereafter requires controls and work practice standards for hazardous air pollutants from catalytic cracking units (FCCU), sulfur recovery units (SRU) and catalytic reformers (#3 Reformer). Subpart UUU was recently amended on December 1, 2015, and July 13, 2016 under the refinery sector rule (RSR) initiative to:
• Remove the requirement for startup, shutdown, and malfunction plans.
• Provided alternatives to the emission standards at sulfur recovery units and catalytic cracking units during startup, and shutdown.

The requirements of Subpart UUU are included in the air operating permit.

3.2.6 40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

40 CFR 63 Subpart ZZZZ was promulgated on June 15, 2004, applying NESHAP standards to stationary reciprocating internal combustion engines (RICE) with a size rating of greater than 500 brake horsepower. The rule was amended on January 18, 2008, subjecting RICE with a size rating of equal to or less than 500 brake horsepower to the rule.

The following engines located at the Ferndale Refinery are subject to Subpart ZZZZ. All are diesel-fired, compression ignition (CI) engines in dedicated emergency service. There are no stationary, spark ignition engines at the refinery subject to the rule.

### Table 2-4 Engines subject to 40 CFR 60 Subpart ZZZZ

<table>
<thead>
<tr>
<th>Make and Model</th>
<th>Year</th>
<th>Brake Horse Power (hp)</th>
<th>Emergency Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency, CI Engines ≤ 500 hp, constructed before June 12, 2006 (subject to 40 CFR 63 Subpart ZZZZ as “existing”)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detroit Model 62402RA</td>
<td>1953</td>
<td>264 hp</td>
<td>firewater pump</td>
</tr>
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<td>1953</td>
<td>264 hp</td>
<td>firewater pump</td>
</tr>
<tr>
<td>Kohler Model 20R0274</td>
<td>1986</td>
<td>61 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Emergency, CI Engines ≤ 500 hp, constructed on or after June 12, 2006 (subject to Subpart 40 CFR 63 Subpart ZZZZ as “new”)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cummins Model QSB5-63 NR3</td>
<td>2009</td>
<td>132 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Kubota Model C2203-EBG</td>
<td>2008</td>
<td>33 hp</td>
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<tr>
<td>Caterpillar Model C9</td>
<td>2007</td>
<td>398 hp</td>
<td>electrical generator</td>
</tr>
<tr>
<td>Emergency, CI Engines &gt; 500 hp, constructed before December 19, 2002. (subject to 40 CFR 63 Subpart ZZZZ as “existing” with no requirements)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caterpillar Model 3456</td>
<td>Nov. 2002</td>
<td>800 hp</td>
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</tr>
<tr>
<td>Cummins Model VT-1710-F</td>
<td>1953</td>
<td>685 hp</td>
<td>firewater pump</td>
</tr>
<tr>
<td>Emergency, CI Engine &gt; 500 hp, constructed on or after December 19, 2002 (subject to 40 CFR 63 Subpart ZZZZ as “new” with no requirements)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caterpillar Model 3412</td>
<td>2004</td>
<td>739 hp</td>
<td>firewater pump</td>
</tr>
</tbody>
</table>

None of the emergency generator engines at the Ferndale Refinery are contractually obligated to be available for more than 15 hours per calendar year for emergency demand response as specified in 63.6640(f)(2)(ii), for assisting in voltage/frequency deviations as specified in 63.6640(f)(2)(iii), or for non-emergency situations to supply power as part of a financial arrangement with another entity as specified in 63.6640(f)(4)(ii).
To remain in the emergency use category under Subpart ZZZZ, 63.6640(f)(2) limits the number of hours per calendar year in non-emergency service to 100 hour as long as it is used for recommended maintenance checks and readiness testing. There is no limit to the number of hours an engine can run while in emergency service.

There are four engine categories based on their age and size that determine compliance obligations for emergency IC engines under Subpart ZZZZ.

1. Existing engines ≤ 500 HP constructed before June 12, 2006.

   63.6590(a)(1) states;

   (i) For stationary RICE with a site rating of more than 500 brake horsepower (HP) located at a major source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before December 19, 2002.

   The four engines at the refinery under this category are listed in Section 5 of the AOP along with requirements of Subpart ZZZZ. The requirements include replacing the engine lube oil and intake air filter on a periodic basis to ensure the engines are kept in good operating condition.

2. New engines ≤ 500 HP constructed on or after June 12, 2006.

   63.6590 states;

   (c) Stationary RICE subject to Regulations under 40 CFR Part 60. An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part.

   (6) A new or reconstructed emergency or limited use stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions;

   All of these CI engines at the refinery are subject to NSPS 40 CFR 60 Subpart IIII. Because 40 CFR 63 Subpart ZZZZ relies on the provisions of Subpart IIII for compliance, the NSPS requirements are included in the AOP for these particular engines.

3. Existing engines > 500 HP constructed before December 19, 2002.

   63.6590(b) states;

   (b) Stationary RICE subject to limited requirements.

   (3) The following stationary RICE do not have to meet the requirements of this subpart and of subpart A of this part, including initial notification requirements:

   (iii) Existing emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions that does not operate or is not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in §63.6640(f)(2)(ii) and (iii).

   All of these CI engines at the refinery meet the (iii) criteria and have no requirements under Subpart ZZZZ. These engines are not listed in Section 5 of the AOP.

4. New engines > 500 HP constructed on or after December 19, 2002.
63.6590(b) states;

(b) Stationary RICE subject to limited requirements.

(1) An affected source which meets either of the criteria in paragraphs (b)(1)(i) through (ii) of this section does not have to meet the requirements of this subpart and of subpart A of this part except for the initial notification requirements of §63.6645(f).

(i) The stationary RICE is a new or reconstructed emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions that does not operate or is not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in §63.6640(f)(2)(ii) and (iii).

(ii) The stationary RICE is a new or reconstructed limited use stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions.

The refinery has one IC engines in this category that requires only initial notification under Subpart ZZZZ. The initial notification for the Caterpillar Model 3412 generator engine was received by the agency on January 14, 2005, stating that the engines was installed on December 29, 2004. This one-time only requirement has been completed and there are no ongoing requirements under Subpart ZZZZ. This engine is not listed in Section 5 of the AOP.

3.2.7 40 CFR 63 Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

40 CFR 63 Subpart DDDDD applies to industrial, commercial, or institutional boilers and process heaters that are located at a major source of hazardous air pollutants (HAPs), commonly referred to as the Major Source Boiler MACT (Boiler MACT). The Initial Notification under 40 CFR 63.7545(b) was due May 31, 2013.

On May 23, 2013, the NWCAA received initial notification from the refinery listing their existing process heaters and boilers subject to Subpart DDDDD. They are considered “existing” units because they were constructed prior to the June 4, 2010, applicability date for “new” units under the rule.

On October 23, 2015, the NWCAA issued OAC 1223 approving the Tier III Hydrotreater Unit. The Tier III Hydrotreater is under construction. The Tier III Hydrotreater includes a new Tier III Hydrotreater Charge Heater. Because this process heater is being constructed after the June 4, 2010, applicability date, it is considered a “new” heater under Subpart DDDDD.

All of the process heaters and boilers at the refinery subject to Subpart DDDDD are fired exclusively on natural gas and/or refinery fuel gas and fall under the “units designed to burn gas 1 fuels” subcategory. Subpart DDDDD does not require any pollutant-specific emission limits for process heaters and boilers designed to burn gas 1 fuels. Instead, it requires work-practice standards involving an initial energy assessment for existing units and periodic tune-ups for both new and existing units.

All of the subject heaters and boilers at the refinery are equipped with continuous oxygen trim systems. Under Subpart DDDDD, heaters and boilers designed to burn gas 1 fuels and equipped with oxygen trim must be tuned-up at least once every five years. There are no differences between the tune-up requirements for new verse existing heaters or boilers. However, the existing heaters and boilers are required to undergo an initial energy assessment, whereas new heaters and boilers do not have this initial requirement. On March 24, 2016, the NWCAA received a notice of compliance status report from Phillips 66 stating that the initial energy assessments that were required by January 31, 2016, had
been completed for all existing heaters and boilers at the Ferndale Refinery. Because the one-time only energy assessments were completed, they are not listed in the AOP.

The CO Boiler at the FCCU qualifies as a boiler under Subpart DDDDD, however, it is also subject to 40 CFR 63 Subpart UUU and therefore not subject to Subpart DDDDD pursuant to the overlap provision in 40 CFR 63.7491(h). The FCCU also includes a Combustion Air Heater that directly fires into the fluid catalytic cracker prior to the regen section. In general, this Combustion Air Heater is not used except during startups and in some cases during troubleshooting. The FCCU Combustion Air Heater is not considered a process heater under Subpart DDDDD because it is direct fired, whereas the rule defines process heaters as those that are not direct fired. In 2016, Boiler MACT reports submitted by the refinery included the FCCU Combustion Air Heater inferring that it is subject to Subpart DDDDD. However, the FCCU Combustion Air Heater is not subject to Subpart DDDDD and the AOP has been written accordingly.

Table 2-6 lists the process heaters and boilers that are subject to Major Source Boiler MACT, 40 CFR 63 Subpart DDDDD located at the Phillips 66 Ferndale Refinery

Table 2-5 Process Heaters and Boilers subject to Subpart DDDDD

<table>
<thead>
<tr>
<th>Process Unit</th>
<th>Process Heaters</th>
<th>Refinery ID #</th>
<th>New or Existing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude</td>
<td>Crude Heater</td>
<td>1F-1</td>
<td>Existing</td>
</tr>
<tr>
<td>Crude</td>
<td>Supplemental Crude Heater</td>
<td>1F-1A</td>
<td>Existing</td>
</tr>
<tr>
<td>FCC</td>
<td>Vacuum Flasher Heater</td>
<td>4F-2</td>
<td>Existing</td>
</tr>
<tr>
<td>Alky</td>
<td>Alkylation Depropanizer Reboiler</td>
<td>17F-1</td>
<td>Existing</td>
</tr>
<tr>
<td>Reformer</td>
<td>#3 Reformer Heaters</td>
<td>18-F21, F22, F23 &amp; F24</td>
<td>Existing</td>
</tr>
<tr>
<td>Reformer</td>
<td>#3 Reformer Pretreater Heater</td>
<td>18F-1</td>
<td>Existing</td>
</tr>
<tr>
<td>Reformer</td>
<td>#3 Reformer Regenerator Heater</td>
<td>18F-26</td>
<td>Existing</td>
</tr>
<tr>
<td>DHT</td>
<td>Diesel Hydrotreater Heater</td>
<td>33F-1</td>
<td>Existing</td>
</tr>
<tr>
<td>CGD/S-Zorb</td>
<td>Cat Gas Desulfurizer Feed Heater (S-Zorb Heater)</td>
<td>38F-101</td>
<td>Existing</td>
</tr>
<tr>
<td>Tier III</td>
<td>Tier III Hydrotreater Charge Heater</td>
<td>41F-1</td>
<td>New</td>
</tr>
<tr>
<td>Hydrotreater</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boilers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>#1 Boiler</td>
<td>22F-1C</td>
<td>Existing</td>
</tr>
<tr>
<td>Utilities</td>
<td>#2 Boiler</td>
<td>22F-1A</td>
<td>Existing</td>
</tr>
<tr>
<td>Utilities</td>
<td>#3 Boiler</td>
<td>22F-1B</td>
<td>Existing</td>
</tr>
<tr>
<td>Utilities</td>
<td>#4 Boiler</td>
<td>22F-1E</td>
<td>Existing</td>
</tr>
</tbody>
</table>
### 3.2.8 Part 63 Subpart PPPPP – National Emission Standards for Hazardous Air Pollutants for Engine Test Cells/Stands

40 CFR 63 Subpart PPPPP applies to the emissions of hazardous air pollutants (HAPs) at engine test cells/stands located at major sources of HAP emissions. The refinery maintains three octane test engines in the lab for fuel testing, which qualifies as an engine test cell/stand. All three octane test engines were installed prior to May 14, 2002, and are considered existing engine test cells/stands under the rule. Pursuant to 40 CFR 63.9290(b), existing engine test cells/stands are subject to the rule but do not have to meet any of the requirements of Subpart PPPPP and 40 CFR 63 Subpart A.

The three octane test engines listed below are also listed in Section 1 of the air operating permit. However, they are not in Section 5 of the AOP because there are no specific requirements under Subpart PPPPP for these engines.

- Waukesha Model MON (949817), manufactured in 1954
- Waukesha Model Swing (354050), manufactured in 1980
- Waukesha Model RON (R-F5039), manufactured in 1981

### 3.3 Prevention of Significant Deterioration

The Prevention of Significant Deterioration (PSD) program is a federal new source review program that applies to construction of major new sources and major modifications that occur in areas that are in attainment with the National Ambient Air Quality Standards (NAAQS). The PSD program stems from 40 CFR parts 50, 51, and 52. The area surrounding the refinery is in attainment with all of the NAAQS. The PSD permitting process ensures that air quality is maintained in attainment areas. The PSD permit establishes best available control technology (BACT) for the new and modified emission units. The U.S. EPA has partially delegated the PSD rules to the Washington State Department of Ecology (WDOE) which writes PSD permits covering emissions of criteria pollutants for which a facility or a project is major.

The Phillips 66 refinery has received two PSD permits. As described below in the “Process Area Description” Section of the Statement of Basis, the WDOE issued PSD permit #PSD-00-02 on April 4, 2001, for the Upgrade/Clean Fuels project associated with a large-scale upgrade of the refinery and installation of equipment needed to make low sulfur gasoline. As of the date of this permit issuance, PSD-00-02 has been amended eight times. The Upgrade/Clean Fuels project triggered PSD for nitrogen oxides, carbon monoxide, and particulate matter 10 microns in diameter or less (PM$_{10}$). Other pollutants are addressed in NWCAA OAC 733 and its subsequent revisions.

The second permit issued by the WDOE to the Phillips 66 refinery is PSD-05-01 issued November 14, 2005, for the Crude/Fluidized Catalytic Cracking/Sulfur Recovery Unit project. The project was designed to increase feed rates at the Crude Unit and at the FCCU, increase the primary amine system capacity to remove more sulfur from fuel gas, and add a second sulfur recovery unit (SRU #2) to provide backup capacity and additional sulfur removal capacity.

The project triggered PSD review for nitrogen oxides, carbon monoxide, total particulate matter, PM$_{10}$, and VOCs.

### 3.4 Consent Decree

On December 5, 2005, a complaint and a Consent Decree were filed by the United States Justice Department, on the behalf of the Environmental Protection Agency and five co-
plaintiffs, including the Northwest Clean Air Agency, against the Phillips 66 (ConocoPhillips at that time). The United States alleged that the company violated statutory and regulatory provisions at twelve refineries in the United States, including the Ferndale refinery. The Phillips 66 denied that it had violated the statutory, regulatory, and SIP provisions and the state and/or local rules and regulations incorporating and implementing federal requirements and maintained that it had been and remains in compliance with all applicable statutes, regulations and permits and was not liable for civil penalties and injunctive relief. The process culminated in a Consent Decree settlement where Phillips 66 agreed to take numerous actions to reduce air pollutants at the Ferndale refinery. The Consent Decree will eventually terminate (or “sunset”) when the company completes the obligations in the Consent Decree. Many of these obligations have been converted into federally enforceable requirements that are written into NWCAA regulatory orders, NWCAA OACs and WDOE PSD permits to provide permanence and these requirements are included in the Air Operating Permit (AOP). Other requirements in the Consent Decree are considered an enhancement of existing requirements and will terminate with the Consent Decree. These requirements are not Title V applicable requirements and have not been included in the AOP.

3.5 Compliance Assurance Monitoring (CAM)

The 40 CFR Part 64 CAM rule requires owners and operators to monitor the operation and maintenance of their control equipment so that they can evaluate the performance of their control devices and report whether or not their facilities meet established emission standards. If owners and operators of these facilities find that their control equipment is not working properly, the CAM rule requires them to take action to correct any malfunctions and to report such instances to the appropriate enforcement agency (i.e., State and local environmental agencies). If there are relatively frequent excursions of the monitoring parameters, the rule requires that the facility implement a quality improvement program (QIP) to reduce excursions. Additionally, the CAM rule provides enforcement tools that help agencies address appropriate monitoring of pollution control systems.

The CAM rule applies to each Pollutant Specific Emissions Unit (PSEU) when it is located at major source required to obtain an air operating permit. Each PSEU must meet all of the following criteria:

- be subject to an emission limitation or standard,
- use a control device to achieve compliance,
- have an uncontrolled potential to emit equal to or greater than the major source threshold, e.g., 100 tons PM_{10}, NOx, SO_{2}.

The term PSEU means an emissions unit considered separately with respect to each regulated air pollutant. Also the term “control device” means equipment, other than inherent process equipment, that is used to destroy or remove air pollutants prior to discharge to the atmosphere. Low NOx burners are considered inherent process equipment because they cannot be activity adjusted during use. Whereas flue gas recirculation is considered an active control system that can used or bypassed during operation. The term “control device” does not include passive methods such as lids or seals, or inherent process equipment provided for safety or material recovery.

If the PSEU has a controlled potential to emit equal to or greater than the major source threshold, it is considered a “large PSEU” and monitoring parameters must be records at least once every 15 minutes. If its controlled potential to emit is less than the major source
threshold, it is considered an “other PSEU” and monitoring parameters must be recorded at least once per day.

The following emission limitations or standards are exempted from the CAM rule:

- post – 11/15/90 NSPS or NESHAP standards, since those standards have been and will be designed with monitoring that provides a reasonable assurance of compliance;
- stratospheric ozone protection requirements under Title VI of the act;
- acid rain program requirements;
- emission limitations or standards or other requirements that apply solely under an approved emissions trading program;
- emissions cap that meets requirements of 70.4(b)(12) or 71.6(a)(13);
- emission limitations or standards for which a part 70 or 71 permit specifies a continuous compliance determination method, as defined in 40 CFR 64.1;
- certain municipally-owned utility units, as defined in 40 CFR 72.2.

The emission unit is not exempted from the CAM rule if nonexempt emission limitations or standards (e.g., a state rule or older NSPS emission limits) apply to the emissions unit.

The CAM rule (40 CFR 64) requires permits to specify, at minimum:

- The approved monitoring approach, including the indicators (or the means to measure the indicators) to be monitored, and performance requirements established to satisfy 40 CFR 64.3 (b) or (d), as applicable;
- The means by which the owner or operator will define exceedances or excursions;
- The duty to conduct monitoring;
- If appropriate, minimum data availability and averaging period requirements; and
- milestones for testing, installation, or final verification.
The following PSEU are subject to CAM at the Phillips 66 Ferndale Refinery.

**Table 2-6 Emission Units and Pollutants Subject to CAM**

<table>
<thead>
<tr>
<th>Pollutant-Specific Emission Unit</th>
<th>Description</th>
<th>Control Device</th>
<th>Pollutant</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCCU/CO Boiler</td>
<td>FCCU Regenerator/Combustion</td>
<td>Flue Gas Scrubber (FGS)</td>
<td>PM₁₀</td>
</tr>
<tr>
<td></td>
<td>Air Heater/CO Boiler</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Gases exiting the FGS are saturated with water vapor making continuous direct measurement of particulate matter difficult and unreliable. The CAM plan serves as an alternative that continuously measures operating parameters of the FGS that affect scrubber efficiency. These parameters are correlated with data taken during periodic PM/PM₁₀ source tests. The CAM plan, also referred to as the alternative monitoring plan (AMP), continuously monitors the liquid-to-flue gas ratio of the FGS and the weight percent of solids in the scrubber liquid to ensure the FGS is operating properly to control emissions. The CAM Plan was incorporated into OAC 733e to memorialize the EPA approved AMP as a Consent Decree obligation.

The FCCU/COB FGS stack has a controlled PTE < 100 tpy and is considered an "other PSEU" requiring that monitoring parameters be recorded no less than daily under the CAM rule. However, the CAM plan as incorporated into OAC 733e requires hourly parameter monitoring.

<table>
<thead>
<tr>
<th>Pollutant-Specific Emission Unit</th>
<th>Description</th>
<th>Control Device</th>
<th>Pollutant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck Loading Rack</td>
<td>Gasoline/Diesel Truck Load Rack</td>
<td>Thermal Oxidizer</td>
<td>VOC</td>
</tr>
</tbody>
</table>

For CAM, the temperature in the thermal oxidizer is monitored continuously during loading to ensure that a minimum temperature of 450°F is maintained.

The Truck Loading Rack thermal oxidizer stack has a controlled PTE < 100 tpy and is considered an "other PSEU" requiring that monitoring parameters be recorded no less than daily under the CAM rule. However, the CAM plan as incorporated into the AOP requires continuous monitoring of the thermal oxidizer temperature to determine compliance.

The following emission units are not subject to CAM. The combustion devices have grain loading standards for particulate matter under state and NWCAA regulation. However, CAM does not apply because they do not have active particulate emission control devices that are being used to meet the standards.
### Table 2-7 Emission Units and Pollutants not subject to CAM

<table>
<thead>
<tr>
<th>PSEU Designation</th>
<th>Unit Description &amp; Control Device</th>
<th>Pollutant &amp; Reasons for Non Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Distillation</td>
<td>• 1F-1A Crude Heater</td>
<td>These units do not have control devices.</td>
</tr>
<tr>
<td>Process Area</td>
<td>• 1F-1 Crude Heater</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• HDF Stripper Offgas Process Vent</td>
<td>post – 11/15/90 regulatory standard</td>
</tr>
<tr>
<td>Catalytic Cracking</td>
<td>• FCCU Regenerator/Combustion Air Heater/CO Boiler</td>
<td>Metal HAP – Post 11/15/90 regulatory standard</td>
</tr>
<tr>
<td>Process Area</td>
<td></td>
<td>NOₓ – Unit equipped with CEM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CO – Unit equipped with CEM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SO₂ – Unit equipped with CEM</td>
</tr>
<tr>
<td></td>
<td>• 4F-2 Vacuum Flasher Heater</td>
<td>SO₂ – No control device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOₓ – CEM</td>
</tr>
<tr>
<td></td>
<td>• Process Vent 25FV-007</td>
<td>post – 11/15/90 regulatory standard</td>
</tr>
<tr>
<td>Alkylation Process</td>
<td>• Process Vent 17HC-1717</td>
<td>post – 11/15/90 regulatory standard</td>
</tr>
<tr>
<td>Area</td>
<td>• 17F-1 Alky Depropanizer Reboiler Heater</td>
<td>These units do not have control devices.</td>
</tr>
<tr>
<td></td>
<td>• 38F-101 Cat Gas Desulfurizer Feed Heater (S-Zorb Heater)</td>
<td></td>
</tr>
<tr>
<td>Tier III Hydrotreater</td>
<td>• Tier III Hydrotreater Charge Heater</td>
<td>This unit does not have a control device.</td>
</tr>
<tr>
<td>Process Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reformer/Diesel</td>
<td>• 18F-1 #3 Reformer Pretreater Heater</td>
<td>These units do not have control devices.</td>
</tr>
<tr>
<td>Hydrotreater Process</td>
<td>• 18F-26 #3 Reformer Catalyst Regeneration Heater</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>• 33-F-1 Diesel Hydrotreater (DHT) Heater</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 18F-21, -22 #3 Reformer Heater, Passes 1 and 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 18F-23, -24 #3 Reformer Heater, Passes 3 and 4</td>
<td></td>
</tr>
<tr>
<td>PSEU Designation</td>
<td>Unit Description &amp; Control Device</td>
<td>Pollutant &amp; Reasons for Non Applicability</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>• Miscellaneous Process Vents</td>
<td>post – 11/15/90 regulatory standard</td>
</tr>
<tr>
<td></td>
<td>• #3 Reformer Regeneration Vents</td>
<td>post – 11/15/90 regulatory standard</td>
</tr>
<tr>
<td>Sulfur Plant/Treaters</td>
<td>• Sulfur Recovery Unit #1</td>
<td>SO₂ – CEM</td>
</tr>
<tr>
<td>Process Area</td>
<td></td>
<td>NOx - no control device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CO – no control device</td>
</tr>
<tr>
<td></td>
<td>• Sulfur Recovery Unit #2</td>
<td>SO₂ – CEM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOx - no control device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CO – no control device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HAP – post-11/15/90 regulatory standard</td>
</tr>
<tr>
<td>Utilities Process Area</td>
<td>• 22F-1C #1 Boiler with Flue Gas Recirculation</td>
<td>NOx - CEM</td>
</tr>
<tr>
<td></td>
<td>• 22F-1A #2 Boiler</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 22F-1B #3 Boiler</td>
<td>These units do not have control devices.</td>
</tr>
<tr>
<td></td>
<td>• 22F-1E #4 Boiler</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cooling Tower #1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cooling Tower #2</td>
<td></td>
</tr>
<tr>
<td>Wastewater Treatment</td>
<td>• 12S-204 Induced Air Flotation Unit (IAF)</td>
<td>These units are subject to MACT Subpart CC and NESHAP Subpart FF. Subpart CC,</td>
</tr>
<tr>
<td>Plant</td>
<td>• 12S-2 API Separator</td>
<td>finalized in 1995 and amended in 2009 and 2010, references Subpart FF for</td>
</tr>
<tr>
<td></td>
<td>• Individual Drain Systems</td>
<td>wastewater requirements including monitoring. Since the Subpart FF reference</td>
</tr>
<tr>
<td></td>
<td>• Closed vent systems and control devices</td>
<td>and wastewater monitoring requirements were not amended in the initial Subpart</td>
</tr>
<tr>
<td></td>
<td>• Vacuum trucks</td>
<td>CC promulgation or the 2009/1010 amendments, the facility is considered to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>be exempted from CAM due to a post-11/15/90 regulatory standard.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual drain systems subject to only NSPS QQQ are minimal at the facility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and presumed to have exempt amounts of pre-control emissions.</td>
</tr>
<tr>
<td>Storage and Handling</td>
<td>• Tank Farm</td>
<td>These units do not have control devices.</td>
</tr>
<tr>
<td></td>
<td>• Butane/Pentane Spheres</td>
<td></td>
</tr>
<tr>
<td>PSEU Designation</td>
<td>Unit Description &amp; Control Device</td>
<td>Pollutant &amp; Reasons for Non Applicability</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------</td>
<td>------------------------------------------</td>
</tr>
</tbody>
</table>
| Flares           | • Flare Gas Recovery  
• Elevated Flare (13V-11) | These units do not have control devices. |
3.6 Washington Administrative Code

Various portions of the Washington Administrative Code (WAC) pertaining to air pollution programs are included in the AOP.

Section 2 of the AOP contains various portions of the WAC that are considered standard terms and conditions. These include WAC 173-460 requiring review of toxic air pollutant impacts during NSR permitting, WAC 173-401 establishing basic requirement of the air operating permit program, and WAC 173-441 and 173-442 regulating greenhouse gas emissions.

Section 4 of the AOP contains generally applicable requirements of the WAC, such as limits on visible emissions, particulate matter, and sulfur dioxide from all stacks.

Section 5 of the AOP contains specifically applicable requirements from the WAC for petroleum refineries including particulate and opacity limits for catalytic cracking units (WAC 173-400-070) and VOC limits and work practice standards for gasoline loading terminals (WAC 173-491).

The AOP does not include Chapter 173-485 WAC – Petroleum Refinery Greenhouse Gas Emission Requirements. This is because the Ferndale Refinery chose to comply with the one-time only requirement to meet an energy intensity index (EII) that is within the 50% quartile or better for similar sized refineries using national 2006 EII data for comparison. This one-time only requirement was met on September 26, 2014 when the NWCAA received the refinery’s initial and final GHG annual report required under WAC 173-485-090. This report demonstrated that the calendar year 2013 greenhouse gas emissions were 769,015 tons and that at this rate the refinery was within the 50% or better EII quartile of similar refineries in the United States. In accordance with WAC 173-485-050 and 173-485-090(1), the Ferndale Refinery has no further reporting or compliance obligations under Chapter 173-485 WAC and it is therefore not listed in the AOP.

3.7 Northwest Clean Air Agency Regulation

The NWCAA Regulation contains requirements that are generally applicable to a wide group of air pollution sources. These generally applicable requirements are found in Section 4 of the AOP. These include requirements such as the 1,000 ppm sulfur dioxide limit for combustion sources from NWCAA Section 462 and the 20% opacity limit for stacks found in NWCAA Section 451.

The NWCAA regulation also contains numerous emission unit specific requirements. These are found in Section 5 of the AOP. As an example, NWCAA Section 580 applies to petroleum refineries and has specific requirements storage vessels, equipment component leaks, process unit turnarounds, vacuum systems, and gasoline truck loading racks.

The NWCAA new source review regulations reflect state and federal NSR regulations. The federal system to implement the Clean Air Act (in particular programs related to the NAAQS) may be administered by the federal government or it may be delegated (in part) to states, such as Washington, that seek regulation through State Implementation Plans (SIPs). Certain state and local (NWCAA) regulations are part of the Washington State Implementation Plan and are therefore enforceable by both the EPA and the NWCAA. These SIP approved rules are in the operating permit. There is often a lag between the current state/local regulation and the version of that state/local regulation approved in the SIP. In this case the AOP will list the current, non-SIP approved regulation identified as “state only” and the SIP-approved, federally enforceable version of the regulation in the air operating permit.

The NWCAA has the ability to enforce, but not issue PSD permits. The NWCAA has authority to enforce local, state, and most federal regulations and to fully enforce the air operating permit.
3.8 Refinery Gas Systems

Waste gases produced during refinery processing are delivered via fuel gas systems for combustion in heaters and boilers throughout the refinery. If the refinery is short on refinery generated fuel gas, the fuel gas system is supplemented with purchased natural gas.

Refinery fuel gas contains sulfur, primarily in the form of hydrogen sulfide (H₂S), which is converted to sulfur dioxide (SO₂) when combusted. New and modified combustion units have restrictions on the concentration of H₂S in the fuel gas through BACT limits contained in OACs or from federal NSPS regulations.

There are three sources of refinery fuel gas systems at the Ferndale Refinery; the main refinery fuel gas system, the reformer fuel gas system and the FCCU absorber offgas (overhead gas). The main refinery fuel gas system is comprised of light gasses generated at a wide variety of process units within the refinery. This fuel gas is combusted in heaters and boilers throughout the refinery that do not have a separate supply of fuel gas. In general, the main refinery fuel gas system cannot supply all of the fuel needs to the heaters and boilers that it supports and the main refinery fuel gas system is supplemented with purchased natural gas and excess gas from the reformer fuel gas and FCCU absorber offgas systems.

The main refinery fuel gas system is limited to 162 ppm H₂S, 3-hour average through NSPS and OAC requirements. The new Tier III Hydrotreater Charge Heater will combust main refinery fuel gas and will also be limited to 50 ppm H₂S, 24-hour average as required as BACT under OAC 1223 (10/23/15).

The reformer fuel gas system is supplied by gas generated at the #3 Reformer and supplies fuel gas to the heaters in the #3 Reformer Unit and DHT Unit. Depending on operating conditions, there may be an excess amount of fuel gas generated at the #3 Reformer with the excess used to supplement the main refinery fuel gas system. There may also be times when the heaters at the #3 Reformer and DHT Units use for more fuel gas than is generated at the #3 Reformer. In this case the reformer fuel gas system is supplemented with gas from the main refinery fuel gas system.

The reformer fuel gas is limited to 162 ppm H₂S, 3-hour average through NSPS and OAC requirements. The H₂S concentration of the fuel gas is also limited to 50 ppm, 24-hour average under BACT conditions established under OAC 733e and OAC 780a for gas combusted in the DHT Heater.

The third fuel gas system in the refinery is the FCCU absorber offgas (overhead gas). This gas is generated at the FCCU and combusted in the CO Boiler for supplemental firing of that boiler. The CO Boiler can also combust gas from the main refinery fuel gas system for additional supplemental firing. The FCCU absorber offgas is limited to 162 ppm H₂S, 3-hour average under NSPS when combusted in the CO Boiler.

The #4 Boiler and S-Zorb Heater are approved to combust refinery fuel gas, however often combust only natural gas. During periods when only natural gas is combusted in a heater or boiler, the H₂S limit in the natural gas do not apply.

All three fuel gas systems at the refinery (main, reformer and FCCU absorber) are scrubbed with amine to reduce the H₂S content of the gas prior to combustion to below applicable H₂S limits. In addition, the H₂S concentration in each fuel gas is continuously monitored to ensure compliance in accordance with the monitoring provisions of NSPS Subpart J or Ja. These NSPS regulations state the standard in mg/liter instead of concentration. However, the AOP states the limits in terms of ppm concentration because ppm of the measured parameter from the continuous H₂S monitors.

The conversion from the NSPS H₂S limit of 230 mg/dscm to the AOP stated value of 162 ppm is done using standard conditions of 20°C and 760 mm Hg as follows.
Equation 2-1

\[
\frac{230 \text{ mg } H_2S}{dscm \text{ air}} \times \frac{1 \text{ g } H_2S}{1,000 \text{ mg } H_2S} \times \frac{1 \text{ mol } H_2S}{34.082 \text{ g } H_2S} \times \frac{24.056 \text{ L } H_2S}{\text{mol } H_2S \text{ (ideal gas law)}} \times \frac{1 \text{ dscm } H_2S}{1,000 \text{ L } H_2S} = \frac{162 \text{ dscm } H_2S}{1,000,000 \text{ dscm air}}
\]

In addition to H₂S limits in refinery fuel gas, process heaters and boilers at the refinery are subject to a SO₂ limit of 1000 ppm, 1-hour average in the exhaust stack per WAC 173-400-040 and NWCAA Section 462. In general, H₂S represents the vast majority of sulfur species in the refinery fuel gas and knowledge of the H₂S concentration in the fuel gas provides a good approximation of stack SO₂ values. To ensure compliance with the 1000 ppm standard the refinery conducts periodic sampling of the fuel gas to identify all sulfur species, continuously monitors the gas specific gravity of the fuel gas and continuously monitors the total reduced sulfur (TRS) in the flare header. When the refinery fuel gas includes hydrogen, the carbon to hydrogen ratio must be accounted for in calculating SO₂ emissions. The specific gravity of the fuel gas helps to determine the carbon to hydrogen ratio when making this calculation.

3.9 Continuous Emission Monitoring Systems (CEMS)

Continuous emission monitoring systems (CEMS) are in place throughout the refinery to monitor compliance with air pollution limits and standards. CEMS are installed and operated in accordance with applicable federal requirements of 40 CFR 60 Appendices B and F, and NWCAA Regulation Section 367 and Appendix A - Ambient Monitoring, Emission Testing, and Continuous Emission and Opacity Monitoring. CEMS are quality assurance tested as required under 40 CFR 60 Appendix F and NWCAA 367 and Appendix A. This includes conducting quarterly cylinder gas audits (CGA) and annual relative accuracy test audits (RATA). The duration and nature of CEM downtimes is reported to the NWCAA in monthly reports. The monthly reports also include CGA and RATA results. Under NWCAA Regulation Section 340 measured emission exceedances are reported to the NWCAA within when discovered and explained in more detailed monthly Part II excess reports. When a CEMS is sampling from a stack, the oxygen concentration so that the pollutant concentration can be corrected to the appropriate percent oxygen value stated in the limit or standard.

### Table 2-8 Continuous Emission Monitoring Systems (CEMS)

<table>
<thead>
<tr>
<th>Location</th>
<th>Pollutant Monitored</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fuel Gas Systems</strong></td>
<td></td>
</tr>
<tr>
<td>Main Refinery Fuel Gas System</td>
<td>H₂S</td>
</tr>
<tr>
<td>Reformer Fuel Gas System</td>
<td>H₂S</td>
</tr>
<tr>
<td>FCC Absorber Offgas Fuel Gas</td>
<td>H₂S</td>
</tr>
<tr>
<td><strong>FCCU</strong></td>
<td></td>
</tr>
<tr>
<td>FCCU/CO Boiler Flue Gas Scrubber (FGS) Stack</td>
<td>SO₂, NOx, CO</td>
</tr>
<tr>
<td><strong>Heater and Boilers</strong></td>
<td></td>
</tr>
<tr>
<td>#1 Boiler</td>
<td>NOx</td>
</tr>
<tr>
<td>#4 Boiler</td>
<td>NOx, CO</td>
</tr>
<tr>
<td>Vacuum Flasher Heater</td>
<td>NOx</td>
</tr>
<tr>
<td><strong>Sulfur Recovery Unit</strong></td>
<td></td>
</tr>
<tr>
<td>SRU #1 Incinerator</td>
<td>SO₂</td>
</tr>
</tbody>
</table>
3.10 Equipment Component Leaks (LDAR)

Work practice standards are in place to mitigate fugitive VOC and HAP emissions leaking from equipment components located throughout the refinery. Leaking equipment components include compressors, pumps, valves, flanges, sampling connections, pressure relief devices, and open-ended lines that are in gas or liquid service.

These leaks are required to be controlled through work practice standards that are commonly referred to as leak detection and repair (LDAR). There are three distinct LDAR programs at the Ferndale Refinery. Each program is based on one of two federal NSPS programs. Under the LDAR programs equipment components must be surveyed for leaks and the leaks repaired in a timely manner with some exceptions. The main difference between the three LDAR programs is the concentration level as measured by a monitoring instrument, that define a leak. Lower leak definitions represent a more stringent LDAR program.

40 CFR 60 Subpart VV – Leaks are defined as:

- 10,000 ppm for all valves and pumps in gas/light liquid service
- 10,000 ppm for all connectors
- 10,000 ppm for all components in heavy light liquid service

This LDAR program is required for the control of VOC emissions under NSPS 40 CFR 60 Subpart GGG for process units that were constructed, reconstructed or modified between January 5, 1983, and November 7, 2006. Second, it is the LDAR program prescribed to control HAP emissions throughout the refinery under 40 CFR 63 Subpart CC. Lastly, it is the LDAR program prescribed by Section 580 of the NWCAA Regulation to control VOC emissions from areas with a primary feedstock that is butane or lighter.

Modified 40 CFR 60 Subpart VV – Leaks are defined as:

- 1,000 ppm for all valves gas/light liquid service
- 2,000 ppm for all pumps in gas/light liquid service
- 10,000 ppm for all connectors
- 10,000 ppm for all components in heavy light liquid service

This LDAR program is required for the control of VOC and HAP emissions as BACT at specific process units as prescribed by OACs issued to the refinery during new source review.

40 CFR 60 Subpart VVa – Leaks are defined as:

- 500 ppm for all valves gas/light liquid service
- 2,000 ppm for all pumps in gas/light liquid service
- 10,000 ppm for all connectors
- 10,000 ppm for all components in heavy light liquid service

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<table>
<thead>
<tr>
<th>SRU #2 Incinerator</th>
<th>SO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flare System</strong></td>
<td></td>
</tr>
<tr>
<td>Elevated Flare Header</td>
<td>H₂S and TRS</td>
</tr>
</tbody>
</table>
This LDAR program is required for the control of VOC emissions under NSPS 40 CFR 60 Subpart GGGa for process units that were constructed, reconstructed or modified after November 7, 2006. In accordance with 63.640(p), it is also the LDAR program that may be used to control HAP emissions under 40 CFR 63 Subpart CC in lieu of 40 CFR 60 Subpart VV.

All of these LDAR programs allow for a relaxation of the monitoring frequency for valves if their leak rates are found to be low during instrument monitoring surveys. In addition, all of the LDAR programs require control strategies for specific equipment. Compressors must use a dual seal system that employs a barrier fluid to capture and detect leaks. Pressure relief devices that do not vent to the atmosphere must vent to a close vent system and control device. Sampling connections must use a closed-purge, closed-loop, or must route to a closed-vent system and control device. Open-ended lines must double blocked using valves, blinds, and caps. Pumps that employ dual seals and a barrier fluid are allowed an alternative monitoring strategy.

All LDAR programs have requirements to monitor pressure relief devices that release to the atmosphere within five days of release to ensure that the device has resealed. All pressure relief devices in HAP service at the Ferndale Refinery are scheduled to be routed to a closed vent system and control device. However, at this time there are some that still vent to the atmosphere and this five-day monitoring provision for pressure relief devices is included in the AOP.

In addition, for those units subject to the LDAR requirements under 580.8, the AOP also calls out one item because it is considered to be more stringent than similar LDAR requirements of 40 CFR 60 Subparts GGG and VV. That is the requirement under NWCAA 580.846 to inspect relief vents that have opened to the atmosphere within 24 hours of venting. The federal regulation allows up to five days for the relief valve to be checked to ensure that it has reseated. The requirement under NWCAA 580.846 comes from the SIP version of the rule and represents the only LDAR provision from 580.8 that is more stringent than the current version of 580.8.

To monitor for leaks, surveys are conducted using an instrument that is capable of meeting the requirements of 40 CFR 60 Appendix A Method 21 (EPA Method 21). When leaks are found they must be repaired within 15 days unless a delay of repair is utilized because the repair is technically infeasible or would cause greater emissions than the leak itself. If a delay of repair is utilized, the repair must be accomplished prior process unit startup following the next maintenance shutdown.
Table 2-9 identifies each LDAR program at the refinery and the process unit or area where it is employed. The table also identifies the regulatory driver, i.e., the underlying basis for requiring that LDAR program.

### Table 2-9 LDAR Program Regulatory Drivers

<table>
<thead>
<tr>
<th>LDAR Program</th>
<th>Subpart VV (NSPS or MACT)</th>
<th>Modified Subpart VV (BACT)</th>
<th>Subpart VVa (NSPS or MACT)</th>
<th>Pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Crude Oil Process Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude Unit (Crude)</td>
<td>CC</td>
<td>GGGa</td>
<td></td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td><strong>Catalytic Cracking Process Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid Catalytic Cracking Unit (FCC)</td>
<td>GGG &amp; CC</td>
<td></td>
<td>OAC 733e &amp; OAC 1047a(^1)</td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td><strong>Alkylation Process Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alkylation Unit (Alky Gas and HF)</td>
<td>580, GGG &amp; CC</td>
<td></td>
<td>OAC 733e &amp; OAC 795a</td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td>CGD/S-Zorb Unit (S-Zorb)</td>
<td>GGG &amp; CC</td>
<td></td>
<td>OAC 733e</td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td>Butane Isomerization Unit (Butamer)</td>
<td>580, GGG, CC &amp; OAC 564a</td>
<td></td>
<td></td>
<td>VOC, HAP &amp; PERC</td>
</tr>
<tr>
<td><strong>Tier III Hydrotreater Processing Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tier III Hydrotreater Unit</td>
<td>CC</td>
<td>GGGa</td>
<td></td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td><strong>Reformer/Diesel Hydrotreater Process Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#3 Reformer Unit (Reformer)</td>
<td>CC</td>
<td></td>
<td></td>
<td>HAP</td>
</tr>
<tr>
<td>Diesel Hydrotreater Unit (DHT)</td>
<td>GGG, CC &amp; OAC 886</td>
<td></td>
<td></td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td><strong>Sulfur Plant/Treaters Process Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur Recovery Unit (SRU/Treaters)</td>
<td>CC</td>
<td></td>
<td></td>
<td>HAP</td>
</tr>
<tr>
<td>Merox Unit (Merox)</td>
<td>GGG &amp; CC</td>
<td></td>
<td>OAC 727a</td>
<td>VOC &amp; HAP</td>
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<tr>
<td><strong>Utilities Area</strong></td>
<td></td>
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<td>Boiler Plant (Boilers)</td>
<td>CC</td>
<td></td>
<td></td>
<td>HAP</td>
</tr>
<tr>
<td><strong>Flare System</strong></td>
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</tr>
<tr>
<td>Flare Gas Recovery Unit (FGRU)</td>
<td>CC</td>
<td>GGGa, OAC 1029</td>
<td></td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td><strong>Storage &amp; Transfer Areas</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck Loading Rack (LRAC)</td>
<td>580 &amp; CC</td>
<td></td>
<td></td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td>LPG Railcar Loading Unit (LPGU)</td>
<td>580(^2)</td>
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<td>VOC</td>
</tr>
<tr>
<td>Railcar Unloading Facility (RUL)</td>
<td>CC</td>
<td></td>
<td>OAC 1152</td>
<td>VOC &amp; HAP</td>
</tr>
<tr>
<td>Marine Terminal (Dock)</td>
<td>CC</td>
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<td></td>
<td>HAP</td>
</tr>
<tr>
<td><strong>Effluent Conveyance and Treatment</strong></td>
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</tr>
<tr>
<td>Effluent Treatment Plant (WWTR)</td>
<td>CC</td>
<td></td>
<td></td>
<td>HAP</td>
</tr>
<tr>
<td><strong>Storage Vessels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tank Farm (Offplot)</td>
<td>CC</td>
<td></td>
<td></td>
<td>HAP</td>
</tr>
</tbody>
</table>

1. OAC 1047a modifies Subpart VV with a 500 ppm leak definition for valves instead of a 1,000 ppm leak definition for valves prescribed under OAC 727a, OAC 733e & OAC 795a.

2. The 580 LDAR requirements for the LPG Railcar Loading Unit are from the current version of the NWCAA Regulation, not the SIP version because there are no federal LDAR requirements at this unit that would trigger the overlap provisions under NWCAA 580.26.

"580" means NWCAA Section 580.8 Petroleum Refinery Equipment Leaks. Note; the SIP version of 580.8 includes 580.846 requiring PRD be monitored within 24 hours of releasing to the atmosphere that is more stringent than Subpart VV.
"GGG" means NSPS 40 CFR 60 Subpart GGG - Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced After January 4, 1983, and on or Before November 7, 2006

"GGGa" means NSPS 40 CFR 60 Subpart GGGa - Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006

"CC" means Refinery MACT I 40 CFR 63 Subpart CC - National Emission Standards for Hazardous Air Pollutants From Petroleum Refineries

To reduce overlaps between NWCAA 580 and similar requirements under federal regulations the NWCAA adopted NWCAA 580.26, which exempts process units subject to similar federal VOC or HAP standards from section 580.8. Given this overlap provision, the Alkylation and Butane Isomerization Units are exempt from section 580.8 under the current NWCAA Regulation because those process units are subject to federal NSPS and MACT LDAR programs. However, NWCAA 580.26 is not in the SIP, effectively requiring the NWCAA to include the LDAR requirements of NWCAA 580.8 in the AOP for those two process units.

It is noted that the Ethanol Truck Unloading Facility approved on February 16, 2012, under OAC 1111 implies that the facility is subject to the LDAR provisions of 40 CFR 60 Subpart GGGa. This is mentioned in both the OAC and the technical support worksheet for the OAC. However, on June 2, 2008, a notice was published in the Federal Register staying the 60.591a definition of “process unit” until further notice. This effectively limited the applicability of Subpart GGGa to only process units and not to storage and handling facilities such as the Ethanol Truck Unloading Facility. OAC 1111 did not include any LDAR requirements as BACT and ethanol is not a HAP containing product that would be subject to the LDAR requirements of 40 CFR 63 Subpart CC. In summary, there are no LDAR requirements for the Ethanol Truck Unloading Facility listed in the AOP.

### 3.11 Storage Vessel Regulations

Storage vessel (or “tank”) emissions result from evaporation of stored volatile organic compounds (“breathing” losses), and from displaced vapors as tanks are filled (“working” losses). Liquid residue left on the tank wall as the contents drain are also easily volatilized and emitted. There are three basic tank designs relevant to the air pollution control regulations present at the Ferndale Refinery.

- Internal floating roof (IFR) tanks
- External floating roof (EFR) tanks
- Fixed roof tanks

Control requirements stem from NSPS, NESHAP, NWCAA 580 and 560, and new source review regulations. The control requirements and applicability vary depending on the contents of the tank, vapor pressure, the date of construction or modification, tank size, and the type of emission control technology employed. Tank regulatory applicability can be complex and an applicability matrix is presented below with tanks falling into one of eight categories. For the most part, the control requirements are similar among the different regulations.

For EFR tanks, the normal configuration is a floating roof with a metallic shoe primary seal located below a rim mounted secondary seal. IFR tanks use a fixed cone roof covering the top of the tank along with an internal floating roof having at least a single seal system between the tank wall and the floating roof. A second seal on IFR tanks may be present to reduce wind and sun exposure resulting in lower fugitive emissions. In addition, IFR Tanks equipped with a double seal system are allowed a more flexible inspection schedule under NSPS and NESHAP (MACT) regulations.

Low vapor pressure liquids may be stored in fixed roof tanks. In general, the fixed roof tanks are exempt from air pollution control requirements beyond keeping records of tank dimensions and the products that they store.
For EFR tanks, secondary seals must be inspected and gap tested annually and the primary seal is inspected and gap tested every 5 years, and after the tank is degassed and refilled. There are quarterly and semiannual inspections to inspect the integrity of gasketing and other visible seal systems. For IFR tanks, periodic visual inspections are conducted through the fixed roof hatch on the top of the tank.

Internal and external floating roof tanks may not store volatile organic products that exceed a maximum true vapor pressure (TVP) of 11.1 psia. Because the vapor pressure characteristics of crude oils and other non-finished products can vary considerably, their vapor pressures are sampled and tested to assure that they remain below 11.1 psi. In addition, some tanks have internal heaters that can increase storage temperatures above ambient. Temperature and vapor pressure records are kept by the facility. Maximum true vapor pressures are calculated in using the methods in API Chapter 19.2 Evaporative Loss from Floating Roof Tanks (previously API Bulletin 2517).

The NWCAA is notified of internal tank inspections and gap testing on EFR tanks. The notices are provided in advance to allow agency staff an opportunity to attend. Any seal gap measurements or other defects found during inspections that exceed the compliance thresholds are required to be corrected within 45 days unless a 30-day extension is used by the refinery. The refinery can utilize up to two, 30-day repair extensions when alternative storage capacity is unavailable.

On March 31, 2016, the agency received a letter from the Ferndale Refinery stating that they have selected 40 CFR 63 Subpart WW as the compliance option for all of their MACT Group 1 tanks as provided in §63.660 of 40 CFR 63 Subpart CC. This option was added on December 15, 2015, the date revisions to 40 CFR 63 Subpart CC were promulgated under the refinery sector rule to address residual risk. Subpart WW provides a phase-in schedule of 10 years or the first degassing to comply with the requirement to install secondary seals on EFR tanks. This schedule is included in the AOP terms citing 40 CFR 63 Subpart WW.

The 2015 revisions to 40 CFR 63 Subpart CC allows MACT Group 1 tanks constructed, reconstructed or modified after July 23, 1984 and subject to 40 CFR 60 Subpart Kb, to comply only with Subpart WW. The MACT Group 1 tanks at the Ferndale Refinery that are subject to Subpart Kb are:

- EFR Tanks 900X1, 900X2, and 900X3 constructed in 2002.
- IFR Tank 400X1 constructed in 2000.
- IFR Tanks 300X40 and 100X98 converted from fixed roof to IFR in 1991.

Tank 70X1 is an IRF tank dedicated ethanol storage and is subject to Subpart Kb. Ethanol is not a HAP, therefore, the tank is categorized as a MACT Group 2 tank. The allowance to comply with Subpart WW instead of Subpart Kb is allowed for MACT Group 1 tanks but not for MACT Group 2 tanks. As a result Tank 70X1 must comply with the control requirements of 40 CFR 60 Subpart Kb. Tank 70X1 is the only tank at the refinery where the requirements of Subpart Kb apply directly.

The table below lists each tank at the refinery and identifies the basis for the applicable control requirements for each tank.
Table 2-10 Tank Applicable Requirements Matrix

<table>
<thead>
<tr>
<th>AOP Tank Category</th>
<th>Type</th>
<th>Applicable Control Requirements</th>
<th>Phillips 66 Tank ID #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>560 (SIP) 580 (SIP) Subpart CC (MACT) Subpart FF (BWON) Subpart Kb (NSPS) OAC</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>EFR</td>
<td>X X Group 1</td>
<td>6000X1, 3000X1, 1340X110, 1340X111, 1340X112, 1340X113, 1340X114, 1340X115, 1340X116, 1340X117, 800X141, 800X142, 800X143, 800X144, 800X145, 800X151, 550X101, 550X102, 550X106, 300X41, 300X42, 300X43, 300X44, 300X45</td>
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<tr>
<td></td>
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<td>2</td>
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<td>X X Group 1</td>
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<td>IFR</td>
<td>X X Group 2 X</td>
<td>70X1 (ethanol)</td>
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<td>8</td>
<td>FR or IFR X X Group 2</td>
<td>960X1, 800X140, 800X146, 800X147, 800X148, 800X149, 800X150, 550X100, 550X103, 550X104, 550X105, 300X36, 300X37, 300X38, 300X39, 100X91, 50X300, 50X301, 50X302, 50X303, 6X10, 6X11</td>
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EF R = external floating roof
IF R = internal floating roof
FR = floating roof

580 = NWCAA Section 580
560 = NWCAA Section 580
OAC = NWCAA Order of Approval to Construct

With regard to NWCAA Sections 560 and 580, only the SIP versions of these rules apply to tanks at the Ferndale Refinery. The current versions of Sections 580 and 560 do not apply because they are exempt under subsections 580.26 and 580.37 given that all tanks storing high VOL also contain HAPs and are considered Group 1 tanks under Refinery MACT I, 40 CFR 63 Subpart CC. However, these overlap provisions are not in the SIP, so the SIP versions of NWCAA 560 and 580 apply. The current overlap provisions in NWCAA 580 state;

580.26 Any petroleum refinery process unit, storage facility or other operation (including drains) subject to federal VOC or HAP standards (NSPS, Benzene Waste NESHAP, Petroleum Refinery NESHAP, etc.) is exempt from the requirements of NWCAA 580.3 through NWCAA 580.10.

580.37 All tanks exempt by subsection 580.26 and all tanks subject to Section 580.3 or 580.9 shall be exempt from Section 560 of this Regulation.

Compliance with NWCAA Section 560 is gap-filled by complying with the AOP terms for NWCAA Section 580. In turn, NWCAA 580 refers to the equipment and maintenance requirements of 40 CFR 60 Subpart Kb for compliance, but not the recordkeeping and reporting requirements of Subpart Kb. The AOP terms for NWCAA 580 have been gap-filled with recordkeeping and reporting requirements of Subpart Kb as revised by 63.640(n)(8) to ensure that the seal gap measurements and visual tank inspections are being conducted as proper maintenance of control equipment. A number of tanks at the refinery store benzene wastes regulated under 40 CFR 61 Subpart FF (BWON) subjecting the tanks to the control requirements of 40 CFR 60 Subpart Kb. These tanks are subject to both the equipment and
maintenance requirements, and the recordkeeping and reporting requirements of 40 CFR 60 Subpart Kb. Again the overlap provisions of 63.640(n)(8) are applied.

The Refinery MACT overlap provisions under 63.640(n)(8) revise the Subpart Kb recordkeeping and reporting requirements in a number of ways. First, the facility is allowed to utilize a repair extension without notifying the agency in advance and submitting repair extension documentation with the semiannual Refinery MACT report. For tank inspections, the facility is not required to submit the results of each tank inspection as normally required under Subpart Kb. Instead, the facility is only required to submit inspection results for tanks that were found to have defects during the inspection. Similar to repair extensions, tank inspection reports that include defects are submitted to the agency with semiannual Refinery MACT reports. Lastly, the Refinery MACT overlap provisions allow the facility to utilize an inspection extension if the tank has been determined to be unsafe. The inspection extension can be utilized without notifying the agency and the documentation justifying the extension is required to be submitted to the agency with the semiannual Refinery MACT report. The Refinery MACT overlap provision under §63.640(n)(8)(vii) adds a requirement to control fugitive emissions from guidepoles on Subpart Kb subject tanks using pole floats or sleeves. All of these overlap provisions have been included in the AOP for tanks subject to 40 CFR 60 Subpart Kb through NWCAA 580, 40 CFR 61 Subpart FF (BWON), an OAC, or in the case of Tank 70X1, Subpart Kb directly.

Except for ethanol Tank 70X1, all of the tanks at the Ferndale Refinery subject to NWCAA 580 or 40 CFR 61 Subpart FF (BWON) and their control requirements under 40 CFR 60 Subpart Kb are also considered Group 1 tanks under 40 CFR 63 Subpart CC (Refinery MACT) because they are in HAP service. On March 31, 2016, the NWCAA received a letter from the refinery notifying the agency that they had elected to comply with 40 CFR 63 Subpart WW for all of their MACT Group 1 tanks. Section 63.600 was promulgated on December 1, 2015, as a new section of Subpart CC during the refinery sector rule revisions to address MACT residual risk. Section 63.660 requires that all Group 1 tanks at the refinery follow the control provisions of Subpart WW as revised by §63.660 of Subpart CC. The requirements for Group 1 tanks under this program are consistent with the Refinery MACT overlap provisions for Subpart Kb tanks under §63.640(n)(8), i.e., use and documentation of delay of repair and delay of inspection procedures, and submit inspection reports only for tanks that were found to have failures or defects.

The Refinery MACT Group 1 storage tank requirements from Subpart WW are included in the AOP. As required in Table 11 - Compliance Dates and Requirements of Subpart CC, the refinery is required to comply with §63.660 (and §63.640(n)) by April 29, 2016 which has passed. Section 63.660 and its referenced control requirements under 40 CFR 63 Subpart WW - National Emission Standards for Storage Vessels (Tanks)—Control Level 2, include their own schedule for compliance. All of the following compliance schedules are in play at the Ferndale Refinery and are included in the AOP.

- §63.1063(a)(2)(ix) states that if an EFR or IFR tank does not meet the roof fitting/opening requirements of Subpart WW as of June 30, 2014, the requirements do not apply until the next time the tank is emptied and degassed, and in no case later than January 30, 2026.
- §63.1063(a)(1)(ii)(C) states that if an EFR is equipped with a liquid-mounted seal or mechanical shoe seal, or a vapor-mounted seal and secondary seal as of June 30, 2014, the Subpart WW seal requirements do not apply until the next time the tank is emptied and degassed, and in no case later than January 30, 2026.
- §63.1063(a)(1)(i)(D) states if an IFR tank is equipped with a vapor-mounted seal as of June 30, 2014, the seal requirements of Subpart WW do not apply until the next time the tank is emptied and degassed, and in no case later than January 30, 2026.
- §63.660(d) of Subpart CC allows uncontrolled fixed roof Group 1 storage tanks to comply the next time the tank is emptied and degassed, and in no case not later than January 30, 2026. However, this compliance schedule has not been included in the AOP because the Ferndale Refinery does not have any tanks in this category.
There are two requirements in NWCAA 580 that are inconsistent with the requirements of 40 CFR 60 Subpart Kb and 40 CFR 63 Subpart CC. First, NWCAA 580 requires a 5-day advanced agency notice prior to conducting seal gap measurements, whereas, Subpart Kb and Subpart CC require a 30-day advanced notice. Second, NWCAA 580 requires semiannual visual inspections of secondary seal gaps, whereas Subpart Kb and Subpart CC do not have this requirement. These inconsistencies are retained in the AOP.
4 Process Descriptions, Construction History, and Regulatory Applicability

The following section provides a description of each refinery process area along with a construction history and regulatory applicability discussion for each process unit or product handling system in that area. The refinery areas are presented in the same order found in the AOP for ease in cross-referencing.

4.1 Crude Distillation Process Area

4.1.1 General Operation and Background

The Crude Distillation Process Area includes crude distillation and a straight run gasoline plant. Together they are commonly referred to as the Crude Unit.

The Crude Unit separates the crude oil feedstock into its various components by boiling point temperature ranges or "cuts." Heat is supplied to the bottom of the distillation tower while cooler product is recycled or "refluxed" back into the top of the tower. This heating and cooling creates a temperature gradient across the tower. The crude oil is continuously vaporized and condensed throughout the tower. Collection trays are positioned at various levels in the tower to collect and remove liquid product of a particular boiling point or cut. These cuts are cooled through heat exchangers that in turn heat the crude feedstock to the unit.

Depending on the characteristics of a specific crude oil, the throughput of the crude unit varies. Different crude oils require different heat loads for processing. Different crude oils also produce different quantities of the various cuts. Various additives are used to control operating parameters such as pH, and to inhibit corrosion.

![Crude Distillation Process Diagram](image)

**Figure 3-1 Crude Distillation Process**

The distilled gasoline cut is further processed in towers at the straight run gas plant prior to becoming a gasoline blending component. The naphtha range cut is sent to the reformer and the kerosene cut is either sent to storage or processed further. The diesel cut is sent to storage or processed in the DHT Unit. The atmospheric bottoms are sent to the FCCU for processing into fuel oil and gasoline blending components.
Volatile organic compound and hazardous air pollutants are emitted from the Crude Unit from leaking equipment components such as valves, pumps, flanges, and compressors. There are two heaters in the Crude Unit that supply heat for distillation; the Crude Heater (1F-1) and Supplemental Crude Heater (1F-1A). These heaters emit products of combustion. There are also fugitive emissions from oily wastewater drains and sewers located in the Crude Unit.

4.1.2 Construction and Permitting History

The basic configuration of the units in the Crude Distillation Process Area was established during original refinery construction in 1953. On January 24, 1972, the NWCAA issued OAC 24 approving construction of a new Supplemental Crude Heater (1F-1A). On April 12, 1979 the NWCAA issued OAC 235 approving construction of the Combustion Air Preheater for the Crude Heater (1F-1). Both OAC 24 and OAC 235 are considered narrative with no applicable requirements, and are not included in the AOP.

There were two projects approved in by both the NWCAA and the WDOE that included changes at the Crude Unit. The Ferndale Upgrade/Clean Fuels project, permitted in 2001 under OAC 733 and PSD-00-02 (and subsequent revisions), approved new FCC and CGD process units. The project also included various modifications to process units including modifications to the #2 Hydrofiner located in the Crude Distillation Processing Area. The #2 Hydrofiner was later decommissioned to make room for the Tier III Hydrotreater Unit approved under OAC 1223. The PSD permit has been revised eight times to its current version, PSD-00-02 Amendment 8 issued September 15, 2015. PSD-00-02 Amendment 8 does not include any requirements for equipment in the Crude Distillation Process Area.

The second, dual permitted project was the Crude/Fluidized Catalytic Cracking/Sulfur Recovery Unit project. This project was approved in 2005 under OAC 908 and PSD-05-01 and their subsequent revisions. The project included modifications to process units including modifications to the #2 Hydrofiner located in the Crude Distillation Processing Area. The #2 Hydrofiner was later decommissioned to make room for the Tier III Hydrotreater Unit approved under OAC 1223. The PSD permit has been revised eight times to its current version, PSD-00-02 Amendment 8 issued September 15, 2015. PSD-00-02 Amendment 8 does not include any requirements for equipment in the Crude Distillation Process Area.

In 2011, the NWCAA approved projects to reduce fouling and corrosion in heat exchangers in the Crude Unit under OAC 1108. In 2016, the NWCAA approved a project in the Crude Distillation Process Area to replace the crude distillation tower. This project was approved under OAC 1232 and involved a replacement of the main crude distillation tower with a new tower.
The following is a summary of NSR approvals affecting the Crude Distillation Process Area.

**NWCAA Order of Approval to Construct 733e - Ferndale Upgrade/Clean Fuels Project**


OAC 733 originally approved modifications to the #2 Hydrofiner at the Crude Unit. However, the #2 Hydrofiner has been decommissioned. During revisions OAC 733c and OAC 733e the approval order was revised to include Consent Decree obligations so that they were federally enforceable requirements. These requirements include making the two heaters in the Crude Unit subject to 40 CFR 60 Subpart J limiting the amount of H2S in the fuel gas combusted in those heaters. Another requirement restricts those heaters from combusting fuel with a sulfur content greater than 0.05% by weight. These Consent Decree based requirements in OAC 733e are listed in the AOP. OAC 733e Conditions 19 and 20 include Consent Decree requirements for two heaters that were in the Crude Unit; No. 2 HDF Heaters 14F-1 & 2. These HDF heaters were part of the #2 Hydrofiner that was decommissioned. The HDF heaters have been removed as part of the Tier III Hydrotreater project constructed under OAC 1223.

**NWCAA Order of Approval to Construct 1108 – Projects to Reduce Fouling and Corrosion in Heat Exchangers**

Original issuance December 8, 2011. No revisions.

OAC 1108 approved four linked projects designed to reduce fouling and corrosion in heater exchangers in an effort to optimize operations between maintenance turnaround cycles. The project added equipment components at the Crude, FCCU and Alkylation Units. OAC 1108 contains a startup notice and no ongoing applicable requirements. The startup notice was received on May 7, 2012 in a letter stating that the process units were restarted on April 25, 2012 following completion of the project. This one-time only requirement has been completed. Because there are no ongoing applicable requirements, OAC 1108 is not listed in the AOP.

**NWCAA Order of Approval to Construct 1232 – Replace the Crude Distillation Tower**

Original issuance February 11, 2016. No revisions.

OAC 1232 approved a project to replace the crude distillation tower with a new tower. The project involved new equipment components at the new tower offset by a reduction in components being removed by decommissioning of the old tower. On April 7, 2017, the NWCAA received a notice from the refinery that the new crude distillation tower began operating on March 27, 2017. This notice completed the one-time only requirement in OAC 1232 Condition 1 to provide the notice. Therefore, Condition 1 is not included in the AOP.

**4.1.3 Regulatory Applicability**

Refinery fuel gas combusted in the two process heaters at the Crude Unit is required to meet the NSPS Subpart J standard for H2S concentration in the fuel gas, and periodic tune-ups are required each heater under the Boiler MACT. There are miscellaneous process vents in the Crude Unit subject to Refinery MACT provisions. And, equipment components, including two reciprocating compressors (1K-1 and 1K-1A), at the Crude Unit are under a leak detection and repair (LDAR) program required by NSPS and Refinery MACT standards.
4.2 Catalytic Cracking Process Area

4.2.1 General Operation and Background

The Catalytic Cracking process area includes the Fluidized Catalytic Cracking Unit (FCCU), the Vacuum Distillation Tower, the Vacuum Flasher Heater (4F-2), the Unsaturated Gas Plant (Unsat Gas Plant) process unit, the Carbon Monoxide (CO) Boiler and the Flue Gas Scrubber (FGS). The entire process area is commonly referred to as the FCCU or FCC Unit.

The FCCU takes heavier cuts of the crude oil, such as gas oil and residual oil, from the Crude Unit and converts them into lighter cuts of higher value products, such as olefins and gasoline, by using a catalyzed high temperature reaction to break apart the hydrocarbon bonds. The catalytic reaction occurs in the riser section of FCCU. Coke is formed during the reaction that adhere to the catalyst making the catalyst less effective. The coke is removed from the catalyst by combustion in the Regenerator, often under sub stoichiometric conditions. The carbon monoxide rich Regenerator flue gas is then combusted in the CO Boiler, where utility steam is generated for the refinery. Sulfur dioxide and particulate matter in the CO Boiler exhaust gas are removed by a wet gas scrubber, commonly referred to as the flue gas scrubber (FGS).

![FCC Process Diagram]

Figure 3-3 FCC Process

The Vacuum Distillation Tower takes crude distillation bottoms and further distills the material to produce a fuel oil blending component and additional feed for the FCCU.
Figure 3-4 FCC Feed Prep Process

Lighter hydrocarbons from the FCCU are processed in the Unsaturated Gas Plant process unit where absorber columns remove sulfur compounds (such as H₂S) from the light gases. The sulfur compounds are then sent to the Sulfur Recovery Plant for recovery.

Figure 3-5 FCC Gas Plant Process

Emissions from FCCU catalytic regeneration and from the CO Boiler are controlled by the Flue Gas Scrubber (FGS) before being discharged to the atmosphere. A second point source of emissions is from
the Vacuum Flasher Heater (4F-2) stack. The FCCU includes one miscellaneous process vent (#25-FV-007) regulated under 40 CFR 63 Subpart CC as a Group 1 vent that is controlled by the flare gas recovery system and flare. There are also two Group 2 miscellaneous process vents at the FCCU that are used to vent the cases of wet gas compressors 5K-1 and 5K-1A. These Group 2 vents are not required to be controlled under Subpart CC. There are also fugitive emissions from equipment components in VOC and HAP service at the FCCU.

4.2.2 Construction and Permitting History

The Catalytic Cracking Process Area was constructed with original refinery construction in 1953. This process area originally included a Thermofor Catalytic Cracking Unit (TCCU) that has subsequently been replaced. The following is a list of construction projects at the Catalytic Cracking Process Area that have received approvals from the NWCAA, and in some cases approval from WDOE in the form of PSD permits. Approvals that include applicable requirements at the Catalytic Cracking Process Area are described in more detail below. Those that do not include any applicable requirements at the Catalytic Cracking Process Area are described herein.

In 1981, the NWCAA approved a project to install a combustion air preheater on the Tar Separator Heater (4F-2) under OAC 340. The Tar Separator Heater is now referred to as the Vacuum Flasher Heater (4F-2). OAC 340 was superseded by OAC 1012 issued on February 7, 2008 approving installation of SCR on the Vacuum Flasher Heater (4F-2). The SCR reduces NOx emissions from the heater as an obligation of the Consent Decree. OAC 1012 has been revised twice to OAC 1012b. OAC 1012b includes applicable requirements for the Vacuum Flasher Heater and is described in more detail below.

In 1990, the NWCAA approved the Refinery Optimization Project under OAC 288. The OAC was administratively revised to OAC 288a on June 9, 2016. The Refinery Optimization Project involved modifications to the Thermofor Catalytic Cracking Unit (TCCU) including new distillation trays, higher cracking severity and an increase in the steam production capacity of the CO Boiler. OAC 288a has no applicable requirements and is not included in the AOP.

In 1994, the NWCAA approved construction of a Liquid Feed Heater in the Catalytic Cracking Process Area under OAC 523 issued December 5, 1994. The 101 MMBtu/hour Liquid Feed Heater was constructed to pretreat gas oils from the Vacuum distillation and Crude distillation towers prior to feed into the Thermo Catalytic Cracker. OAC 523 was revised to OAC 523a on December 16, 1998. The Liquid Feed Heater was decommissioned as part of the Ferndale Upgrade/Clean Fuels Project.

In 2001, the Ferndale Upgrade/Clean Fuels Project was approved by the NWCAA under OAC 733 and by the WDOE under PSD-00-02. The project involved replacing the Thermofor Catalytic Cracking Unit (TCCU) with the current Fluidized Catalytic Cracking Unit (FCCU). The associated CO Boiler was also replaced. The project did not change the nominal feed rate to the unit of 30,000 barrels per day. The new FCCU included a 70 MMBtu per hour combustion air heater used during FCCU startups. The new CO Boiler was equipped with auxiliary fuel fired burners to assist in CO combustion and for producing additional steam at the CO Boiler. All exhaust from the FCCU is routed through the CO Boiler so that emissions discharged from the CO Boiler include those from the FCCU combustion air heater, the FCCU regenerator, CO combustion in the CO Boiler, and auxiliary fuel burning in the CO Boiler. Exhaust from the CO Boiler is controlled by a Belco Technologies Corporation EDV wet flue gas scrubber before discharging to the atmosphere. This scrubber is commonly referred to in the AOP as the CO Boiler flue Gas Scrubber (FGS). The current versions of OAC 733 and PSD-00-02 have applicable requirements for equipment in the Catalytic Cracking Process Area and these approval orders are described in more detail below.

In 2005, the Crude/FCCU/SRU Upgrade Project was approved by the NWCAA under OAC 908 and by the WDOE under PSD-05-01. With regard to the Catalytic Cracking Process Area, the project involved modifications to increase the charge rate of the FCCU to 36,500 barrels per day. This was accomplished by modifying the FCCU gas plant with replacing fractionator trays with packing, installing an additional column in the gas plant to separate the absorber deethanizer tower into two, replacing the off-gas absorber with a larger tower, replacing the regenerator trays with packing, and adding another rich
ame flash drum. The current versions of OAC 908 and PSD-05-01 have no applicable requirements for equipment in the Catalytic Cracking Process Area.

In 2009, a project was approved under OAC 1047 to install an enhanced selective non-catalytic reduction (ESNCR) system on the CO Boiler to reduce NOx emissions as an obligation of the Consent Decree. OAC 1012 has been revised to OAC 1047a. OAC 1047a includes applicable requirements for the Vacuum Flasher Heater and is described in more detail below.

On December 8, 2011, a project was approved under OAC 1108 to reduce fouling and corrosion in heat exchangers at the FCCU and other process units in an effort to optimize operations between maintenance turnaround cycles. OAC 1108 contains a startup notice but no ongoing applicable requirements. The startup notice was received on May 7, 2012 in a letter stating that the process units were restarted on April 25, 2012 following completion of the project. This one-time only requirement has been completed. Because OAC 1108 has no ongoing requirements, it is not included in the AOP.

On July 14, 2014, NWCAA Compliance Order No. 13 became effective after mutual signatures by Phillips 66 and the NWCAA to memorialize Consent Decree obligations. A summary of this order is included following the NSR orders because it establishes short-term and long-term CO limits at the FCCU.

The following is a summary of NSR approvals and Compliance Order No. 13 affecting the Catalytic Cracking Process Area.

**NWCAA Order of Approval to Construct 733e - Ferndale Upgrade/Clean Fuels Project**


OAC 733 approved the FCCU constructed in 2001. The current version of this approval, OAC 733e has numerous conditions that are considered ongoing requirements for equipment at the Catalytic Cracking Process Area. All of these requirements are listed in the AOP. Some noteworthy requirements from OAC 733e are described below.

During revisions OAC 733c and OAC 733e the approval order was revised to include Consent Decree obligations making them federally enforceable requirements. These requirements include making the Vacuum Flasher Heater located in the Catalytic Cracking Process Area subject to 40 CFR 60 Subpart J limiting the amount of H2S in the fuel gas combusted in the heat. The another requirement restricts the heater from combusting fuel with a sulfur content greater than 0.05% by weight. These Consent Decree based requirements in OAC 733e are listed in the AOP. Another Consent Decree requirement in OAC 733e for equipment at the FCCU is Condition 21 that requires an alternative monitoring plan (AMP) be in place instead of monitoring opacity with a continuous opacity monitoring system (COMS) on the FCCU/CO Boiler FGS stack as explicitly required by 40 CFR 63 Subpart UUU. The AMP was needed because flue gas water condenses in the FGS stack making it impractical to operate a COMS. U.S. EPA approved the AMP dated December 7, 2009. OAC Condition 21 allows the NWCAA to formally include the AMP requirement in the AOP as a specifically applicable requirement.

OAC 733e Condition 9 requires a visual opacity limit of 20% on the CO Boiler FGS stack. Ongoing compliance monitoring has been gap-filled to using the alternative monitoring plan (AMP) prescribed in OAC 733e Condition 21. This has been done because there may be a visible plume from the stack and it would be impractical to use the commonly referred to visual monitoring method described in Section 6 of the AOP. This AMP has also been used as a gap-filled monitoring method for opacity limits on the FGS stack established under the SIP-versions of WAC 173-400-040 and NWCAA Section 451. In addition, this AMP has also been used as a gap-filled monitoring method for the PM limits related to the FCCU regenerator burn-off rates under 40 CFR 6 Subpart UUU.

OAC 733e includes a limitation on annual capacity factor for combusting natural gas in the CO Boiler as supplemental fuel providing a federally enforceable method to exempt the CO Boiler from the NOx limit of 40 CFR 60 Subpart Db.
NWCAA Order of Approval to Construct 1012d - Installation of SCR on the Vacuum Flasher Heater


The OAC 1012 approved installation a selective catalytic reduction (SCR) system on the Vacuum Flasher Heater (4F-2) to control NOx emissions. This heater was previously named the Tar Separator Heater. The OAC provides federally enforceable limits on NOx as required by the Consent Decree. The first revision to the OAC changed the NOx averaging period from 12 months to a 365-days consistent with the limit in the Consent Decree. The second revision relaxed the NOx limit from 12 ppm to 80 ppm, and from 0.011 lb/MMBtu to 0.07 lb/MMBtu, because the SCR did not operate as efficiently as planned after installation. The third OAC revision added a 189 MMBtu/hour heat input limit for the heater for Consent Decree purposes. The fourth and last OAC revision provided a 336 hour per year period for the heater to operate without SCR to facilitate maintenance and repair activities.

All of conditions of OAC 1012d are include in the AOP. Condition 3 includes a visible emissions limit of 5% opacity for the Vacuum Flasher Heater using WDOE Method 9A. This condition does not include ongoing MR&R to determine compliance. The NWCAA added a gap-filled requirement to periodically check for compliance using a refinery-wide visual emissions monitoring program listed in Section 6 of the AOP.

NWCAA Order of Approval to Construct 1047a – Installation of ESNCR on the CO Boiler


OAC 1047 approved a project to install enhanced selective non-catalytic reduction (ESNCR) on the CO Boiler to reduce NOx emissions. The ESNCR system functions by injecting vaporized ammonia enhanced with hydrogen into the combustion chamber of the CO Boiler. The ammonia reacts with nitrogen oxide (NO) in the combustion zone converting it to gaseous nitrogen (N2). The NOx reductions were required by the Consent Decree and the associated federally enforceable requirement under PSD-00-02 Amendment 7 and its subsequent revisions. The original OAC 1047 required that ESNCR be used at all times. The OAC was revised to OAC 1047 removing the provision to operate ESNCR at all times because the refinery can meet the NOx limits of PSD-00-02 without ESNCR when the FCCU is operating in full combustion mode.

The conditions of OAC 1047a have been included as applicable requirements in the AOP.

WDOE Prevention of Significant Deterioration (PSD) Permit PSD-00-02 Amendment 8 - Ferndale Upgrade/Clean Fuels Project


Similar to OAC 733, PSD-00-02 approved construction of the FCCU in 2001. The current version, PSD-00-02 Amendment 8 has numerous conditions that are considered ongoing requirements for equipment at the Catalytic Cracking Process Area. All of these requirements are listed in the AOP except as noted below.

Condition 13 requires an initial NOx source testing on the FCCU/CO Boiler. Initial testing was conducted in June 2003 demonstrating compliance with the applicable NOx limits in place at that time. This one-time only requirement has been completed and is not listed in the AOP.

Condition 20 requires that the project commence construction within 18 months of PSD-00-02 issuance. The refinery commenced construction of the project within 18 months. Condition 20 is considered obsolete and not included in the AOP.

Condition 21 is a PSD permit appeal provision. The 30 day timeline for appealing the PSD permit has expired. Condition 21 is considered obsolete and is not included in the AOP.

NWCAA Compliance Order No. 13 – Consent Decree CO limits for the FCCU.
Compliance Order No. 13 became effective July 14, 2014 implementing Consent Decree obligations at the FCCU including a carbon monoxide limit of 500 ppm, 1-hour average, and a 100 ppm limit using a 365-day average, with both concentration values corrected to 0% oxygen. The order exempts compliance with the 1-hour CO limit during periods of startup, shutdown and malfunction as long as good air pollution control practices are used. Compliance with the CO limit is continuously demonstrated with a CEMS. This order has been incorporated into the AOP. It is noted that PSD-00-02 has similar CO limits but does not provide exemptions for startup, shutdowns and malfunctions.

4.2.3 Regulatory Applicability

Refinery fuel gas combusted in the FCCU Combustion Air Heater, Vacuum Flasher Heater and used as supplemental fuel in the CO Boiler is required to meet the NSPS Subpart J standard for H2S concentration in the fuel gas. Periodic tune-ups are required on the Vacuum Flasher Heater under the Boiler MACT. There are miscellaneous process vents in the FCCU subject to Refinery MACT provisions. And, equipment components at the FCCU are under a leak detection and repair (LDAR) program required by NSPS and Refinery MACT standards.

FCCU Regenerator and CO Boiler that emit through a common stack are subject to a variety of local, state and federal requirements as summarized below.

- **Visual emissions (VE):** NWCAA 451 (40% opacity, Method 9A), OAC 733e (20% opacity, Method 9), 173-400-040 (40% opacity, Method 9A), NSPS Subpart J (30% opacity, Method 9), MACT Subpart UUU (20%, 3-hour, 30%, 6-minute, Method 9).

Visual emissions from the FCCU and CO Boiler are controlled by a wet flue gas scrubber (FGS). The FGS has a condensing moisture laden plume that makes it difficult to take visual opacity observations. Therefore, the AOP prescribes ongoing compliance with these visual emission standards by monitoring the operating parameters of the FGS consistent with the EPA alternative monitor plan for opacity incorporated into OAC 733e.

- **Particulate matter (PM):** PSD-00-02 (0.50 lb/1000 lb coke burn-off and 0.020 gr/dscf) and NSPS Subpart J (2.0 lb/1000 lb coke burn-off), MACT Subpart UUU (1.0 lb/1000 lb coke burn-off).

PM emissions from the FCCU and CO Boiler are controlled by a wet flue gas scrubber (FGS). Compliance with PM limits are determined by annual source testing supplemented by monitoring the operating parameters of the FGS consistent with the EPA alternative monitor plan incorporated into OAC 733e.

- **Sulfur dioxide (SO2):** OAC 733e (90% reduction and 50 ppmvd, 24-hour, and 95% reduction and 25 ppmvd, 365-day), NSPS Subpart J (90% reduction or 50 ppmvd, 7-day).

SO2 emissions from the FCCU and CO Boiler are controlled by a flue gas scrubber (FGS) equipped with caustic scrubbing. The concentration of SO2 in the FGS stack is continuously monitored with a CEMS. The inlet to the FGS is also monitored with a CEMS to ensure ongoing compliance with the SO2 reduction requirements. OAC 773e includes an exemption from the BACT based SO2 limit of 25 ppmvd during periods of malfunction as those periods are defined in the NSPS General Provisions.

- **Nitrogen oxides (NOx):** PSD-00-02 (123.2 ppmvd, 7-day, 127 ppmvd, 30-day, 96.1 ppmvd, 365-day, 308.10 tpy)

Ongoing compliance is determined with a NOx CEMS in the FGS stack.

- **Carbon monoxide (CO):** PSD-00-02 (500 ppmvd, 1-hour, 1000 ppmvd 356-day), NWCAA CO 13 (100 ppmvd 1-hour, 500 ppmvd 365-day), NSPS Subpart J (500 ppmvd, 1-hour), MACT Subpart UUU (500 ppmvd, 1-hour).

Ongoing compliance is determined with a CO CEMS in the FGS stack. The Refinery MACT includes an exemption from the MACT standard during periods of startup, shutdown or hot standby by keeping the regenerator exhaust gas ≥ 1% oxygen.
• Ammonia (NH₃): OAC 1047a (10 ppmvd, 24-hour)

Ammonia emissions are generated as collateral emissions from controlling NOx from the FCCU using enhanced selective non-catalytic reduction (ESNCR). The ammonia slip from the ESNCR system is measured in the stack during annual source testing. Ongoing compliance is determined by monitoring parameters of the ESNCR and FCCU in accordance with the Ammonia Emissions Monitoring Plan developed by the refinery.

OAC 733e limits the amount of natural gas that can be used for auxiliary firing in the CO Boiler to less than 10% of its annual capacity. This natural gas limit is intended to exempt the CO Boiler the 0.2 lb NOx per MMBtu standard in 40 CFR 60 Subpart Db.

The FCCU is subject to HAP control requirements under 40 CFR 63 Subpart UUU. Subpart UUU requires that the refinery develop and implement an operation, maintenance, and monitoring plan (OMMP) to ensure ongoing compliance with the emission standards of Subpart UUU. The OMMP must be submitted and approved by the agency prior to implementation. On June 30, 2016, the NWCAA received the OMMP dated “June 2016” for the FCCU. The NWCAA implicitly approves this plan as part of the 2017 AOP renewal process because the AOP terms requiring the OMMP refers to the June 2016 plan to determining ongoing compliance with Subpart UUU.

Section 63.1571(a)(6) of Subpart UUU requires an initial test of the FCCU stack for hydrogen cyanide (HCN) emissions. This performance test was completed on October 22, 2013, as documented in a letter from Phillips 66 to EPA Region 10 dated March 24, 2016. There is no emission limit for HCN in Subpart UUU. Because this one-time only requirement has been completed, it is not listed in the AOP.

4.3 Alkylation Process Area

4.3.1 General Operation and Background

The Alkylation process area includes three process units; the Alkylation Unit (Alky Unit) the Catalytic Gasoline Desulfurization Unit (CGD/S-Zorb Unit) and the Butane Isomerization Unit (Butamer). The Catalytic Gasoline Desulfurization Unit is referred in the more common vernacular (Szorb) in the AOP.

In the Alky Unit, light hydrocarbon streams of olefins and isobutene from crude distillation and catalytic cracking are combined with a hydrogen fluoride (HF) catalyst to form alkylate, a valuable gasoline blending component. A debutanizer tower within the unit recovers mixed butane. The Alky Unit includes a S/R Gas Plant and a Sat Gas Plant. Mixed butane and light ends off the S/R Gas Plant and Butamer are processed in the Sat Gas Plant to produce propane, butane, and isobutane.

In the Butamer, mixed butanes and hydrogen are combined in a reactor with perchloroethylene to convert normal butane to isobutane. Non-condensable gasses generated at the Butamer are amine scrubbed to reduce their H₂S content and sent to the main refinery fuel gas system.

In the CGD/S-Zorb Unit heavy gasoline cuts from catalytic cracking are treated to remove sulfur.
Emissions from Alkylation Process Area include emissions from the Alky Depropanizer Reboiler Heater and the S-Zorb Heater. There are miscellaneous process vents at the Alky Unit and fugitive emissions from equipment components in VOC and HAP service.

4.3.2 Construction and Permitting History
The original Alkylation Unit was constructed in 1965. The Butane Isomerization Unit (Butamer) was added in 1997. The Butamer involved addition of distillation equipment and new process sewers, but no
process heater. The Cat Gas Desulfurizer Unit was added in 2001. This unit was originally designed with
two process heaters. However, the CGD/S-Zorb Unit was constructed with a single heater and
associated NSR permits were subsequently revised to reflect the change.

The following is a summary of NSR approvals affecting the Alkylation Process Area.

**NWCAA Order of Approval to Construct 288a** - Refinery Optimization Project

The Refinery Optimization Project facilitated a capacity at the Crude Unit, TCC Units and Alky Unit with
modifications at each unit. The modification at the TCC Unit facilitated an increase in gasoline
production by higher cracking severity. TCC Unit including the original CO boiler was decommissioned
and replaced with a FCCU and new CO Boiler as approved under OAC 733 and PSD-00-02.

OAC 288a has no conditions and is therefore not cited under applicable requirements in the AOP.

**NWCAA Order of Approval to Construct No. 564a** – Construction of the Butane Isomerization Unit

OAC 564a has one condition, that requires a LDAR program at the Butane Isomerization Unit for
equipment in perchloroethylene service. This condition is included in the AOP.

Perchloroethylene is a toxic air pollutant regulated under WAC 173-460 and t-BACT established under
OAC 564 is LDAR. Perchloroethylene is also a HAP regulated under Refinery MACT. However,
perchloroethylene is not a VOC.

**NWCAA Order of Approval to Construct 715a** - Refurbished Alky Splitter Tower

OAC 715 approved a project to refurbish Splitter Tower 16C-304 within the Alky Unit. OAC 715a is
considered narrative containing no applicable requirements and is not listed in the AOP. The OAC relies
on federal requirements for equipment component leaks under NSPS Subpart GGG/VV and for
controlling emission from process wastewater under NSPS Subpart QQQ instead of establishing
separate permit requirements as BACT.

**NWCAA Order of Approval to Construct 733e - Ferndale Upgrade/Clean Fuels Project**
and September 30, 2016.

The Ferndale Upgrade/Clean Fuels project, permitted in 2001 under OAC 733 and PSD-00-02 (and
subsequent revisions), approved construction of the CGD Unit located in the Alkylation Process Area.
During revisions OAC 733c and OAC 733e the approval order was revised to include Consent Decree
obligations so that they were federally enforceable requirements. These requirements include making
the one heater in the Alkylation Process Area, the Alky Depropanizer Reboiler (17-1), subject to 40 CFR
60 Subpart J limiting the amount of H2S in the fuel gas combusted in that heater. The another Consent
Decree related requirement restricts the Alky Depropanizer Reboiler (17-1) from combusting fuel with a
sulfur content greater than 0.05% by weight. The Consent Decree based requirements in OAC 733e are
listed in the AOP.

As BACT, OAC 733e limits SO2 emissions from the S-Zorb Heater by limiting the H2S content in the fuel
gas and requires a LDAR program at the Alkylation Unit to minimize fugitive emissions from equipment
component leaks.

All of the requirements of OAC 733e applicable to equipment in the Alkylation Process Area are listed in
the AOP.
NWCAA Order of Approval to Construct 795a – Construction of the Debutanizer Tower at the Alkylation Unit


OAC 795 approved construction of the debutanizer tower at the Alkylation unit. The distillation tower assists in the recovery of butane from alkylate. The OAC was revised to OAC 795a as an administrative cleanup prior to incorporation into the AOP. OAC 795 has a single requirement for a LDAR program implemented in accordance with 40 CFR 60 Subpart VV with revisions specified in the OAC including lower leak definitions for pumps (2,000 ppm) and valves (1,000 ppm), and specific instrument monitor calibration and draft checks as BACT. This requirement has been incorporated into the AOP.

NWCAA Order of Approval to Construct 1108 – Projects to Reduce Fouling and Corrosion in Heat Exchangers

Original issuance December 8, 2011. No revisions.

OAC 1108 approved four linked projects designed to reduce fouling and corrosion in heater exchangers in an effort to optimize operations between maintenance turnaround cycles. The project added equipment components at the Crude, FCCU and Alkylation Units. OAC 1108 contains a startup notice and no ongoing applicable requirements. The startup notice was received on May 7, 2012 in a letter stating that the process units were restarted on April 25, 2012 following completion of the project. This one-time only requirement has been completed. Because there are no ongoing applicable requirements, OAC 1108 is not listed in the AOP.

NWCAA Order of Approval to Construct 1109 – MSAT Project to Reduce Benzene in Gasoline

Original issuance December 8, 2011. No revisions.

OAC 1108 approved a reconfiguration of the Crude Unit designed to reduce the benzene content of gasoline products to comply with the U.S. EPA Mobile Source Air Toxic (MSAT) Phase 2 rule. The project added equipment components at the Crude Unit. OAC 1109 contains a startup notice and no ongoing applicable requirements. The startup notice was received on May 7, 2012 in a letter stating that the Crude Unit restarted on April 25, 2012 following completion of the project. This one-time only requirement has been completed. Because there are no ongoing applicable requirements, OAC 1109 is not listed in the AOP.

WDOE Prevention of Significant Deterioration (PSD) Permit PSD-00-02 Amendment 8 - Ferndale Upgrade/Clean Fuels Project


Similar to OAC 733, PSD-00-02 approved construction of the CGD Unit located in the Alkylation Process Area in 2001. The current version, PSD-00-02 Amendment 8 has numerous conditions that are considered ongoing requirements for equipment at the Alkylation Process Area. All of these requirements are listed in the AOP except as noted below.

Condition 13 requires an initial NOx source testing on the CGD/S-Zorb Heater. Initial testing was conducted in March 2004 demonstrating compliance with the applicable NOx limits in place at that time. This one-time only requirement has been completed and is not listed in the AOP.

Condition 20 requires that the project commence construction within 18 months of PSD-00-02 issuance. The refinery commenced construction of the project within 18 months. Condition 20 is considered obsolete and not included in the AOP.

Condition 21 is a PSD permit appeal provision. The 30 day timeline for appealing the PSD permit has expired. Condition 21 is considered obsolete and is not included in the AOP.
4.3.3 Regulatory Applicability

Refinery fuel gas combusted in the Alky Depropanizer Reboiler Heater and the S-Zorb Heater is required to meet the NSPS Subpart J standard for H2S concentration in the fuel gas. Periodic tune-ups are required on the Alky Depropanizer Reboiler Heater and the S-Zorb Heater under the Boiler MACT. There are miscellaneous process vents in the FCCU subject to Refinery MACT provisions. And, equipment components at the three process units in the Alkylation Processing Area are under leak detection and repair (LDAR) programs required by NSPS, Refinery MACT and OACs. And, there are process waste drains in the Alkylation Processing Area that are subject to control under NSPS Subpart QQQ.

It is noted that the Alkylation Unit is divided into an acid-section and a non-acid section. Equipment components in the acid-section are not in HAP service and the Refinery MACT provisions for a LDAR program do not apply in the Alky acid-section. Similarly, equipment components in most areas of the Butamer that are not handling perchloroethylene are not in HAP service, and the Refinery MACT provisions for a LDAR program do not apply in those areas of the Butamer.

4.4 Tier III Hydrotreater Process Area

4.4.1 General Operation and Background

The Tier III Hydrotreater Process Area is comprised of one process unit, the Tier III Hydrotreater. The Tier III Hydrotreater Unit includes a charge heater and hydrotreating and distillation equipment. The unit is designed to remove sulfur from gasoline to meet federal Tier III gasoline standards. The feedstock to the unit is primarily light straight run naphtha that is blending stock for making gasoline products.

4.4.2 Construction History

The Tier III Hydrotreater Unit is under construction. The project was approved under OAC 1223.

NWCAA Order of Approval to Construct 1223 (OAC 1223) – Construct the Tier III Hydrotreater Unit

Original issuance October 23, 2015. No revisions.

OAC 1223 approved construction of the new Tier III Hydrotreater Unit including a 18.7 MMBtu/hour charge heater with low-NOx burner technology. The OAC includes NOx and CO limits on the heater with periodic source testing to demonstrate compliance. It also includes limits on the amount of H2S in fuel gas combusted in the heater as BACT. The agency relied on subject federal requirements as BACT for fugitive leaks from equipment components and oily wastewater drains located at the unit. All of the conditions of OAC 1223 have been listed in the AOP as applicable requirements.

4.5 Reformer/Diesel Hydrotreater Process Area

4.5.1 General Operation and Background

The Reformer/Diesel Hydrotreater Process Area includes the #3 Reformer Unit and Diesel Hydrotreater Unit (DHT).

The #3 Reformer uses a catalytic reforming process to convert the "naphtha cut" from a low-octane material to a high-octane gasoline blending component and generates hydrogen as a byproduct that is used for hydrotreating. The #3 Reformer has four catalytic reforming reactors in series with a heater pass before each reactor. There is a fifth catalytic reforming reactor that is used as a swing reactor, whereby it is used when one of the four main reactors is going through a regeneration cycle. The swing reactor allows each of the four main reactors to be regenerated on an ongoing basis to optimal ensure
conversion efficiency. The #3 Reformer is considered a “cyclic” catalytic reformer because of its ongoing catalyst regeneration capability.

![Figure 3-8 #3 Reformer Process Unit](image)

The #3 Reformer includes a pretreater process that uses catalyst and heat to remove impurities, including sulfur, from the hydrocarbon stream before it enters catalytic reforming to protect the reforming catalyst from being poisoned. The pretreater is sometimes referred to as the "Hydrofiner". The pretreater and catalytic reformer use and produce their own fuel gas.

![Figure 3-9 #3 Reformer Pretreater](image)
The Diesel Hydrotreater Unit (DHT) reduces the amount of sulfur in both virgin and cracked diesel by hydrotreating with a catalyst and hydrogen, with hydrogen being supplied from the #3 Reformer. Sulfur compounds that are removed are sent to the Sulfur Recovery Unit (SRU). Low-sulfur diesel products are sent to storage.

![Figure 3-10 Diesel Hydrotreater Unit (DHT)](image)

**Figure 3-10 Diesel Hydrotreater Unit (DHT)**

Emissions from the Reformer/Diesel Hydrotreater Process Area are from equipment component leaks (valves, pumps, compressors), products of combustion from process heaters. Emissions also generated from reformer regeneration exhaust, oily wastewater routed to drains and from miscellaneous process vents.

### 4.5.2 Construction History

The #3 Reformer was built in 1972 replacing similar catalytic reforming units that were constructed during original refinery construction. A chloride scrubber was added to the #3 Reformer 2005 allowing the catalytic regeneration vent to meet the compliance with 40 CFR 63 Subpart UUU. The Diesel Hydrotreater Unit (DHT) was built in 1992 and modified in 1995. In 2001/2002, the DHT Heater (33F-1) increased its firing capacity and was reconfigured to burn refinery fuel gas in addition to natural gas. In 2005 the DHT was modified with additional catalytic reactors to allow continuous production of Ultralow Sulfur Diesel (ULSD). The following is a summary of the construction projects at the Reformer/DHT Process Area that received formal approval from the NWCAA.

**NWCAA Order of Approval to Construct dated January 14, 1972 - #3 Reformer/Octane Improvement Project.**


This approval order authorized construction of the #3 Reformer. However, the approval letter has no requirements and is not included in the AOP.
**NWCAA Order of Approval to Construct 343** – Construct a new Diesel Hydrotreater (DHT) Unit


OAC 343 approved construction of the Diesel Hydrotreater (DHT) Unit that included the DHT Heater (33F-1) with a heat input capacity of 30.2 MMBtu per hour. The heater was approved for the combustion of purchased natural gas only.

OAC 343 was superseded upon issuance of OAC 780 on July 26, 2001. OAC 343 included; "Condition 3: The DHT shall be subject to federal New Source Performance Standards 40 CFR 60.590-593 Subpart GGG Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries". When OAC 343 was superseded, this LDAR condition was not included in OAC 780 because equipment leaks at the DHT Unit were subject to 40 CFR 60 Subpart GGG directly.

**NWCAA Order of Approval to Construct 552** – Modification to the Diesel Hydrotreater (DHT) Heater (33F-1) to increase its firing rate.


OAC 552 approved an increase to the firing rate of the DHT Heater from 30.2 MMBtu per hour 48 MMBtu per hour. This OAC did not approve the combustion of any additional fuels beyond the already approved combustion of purchased natural gas. OAC 552 was superseded upon issuance of OAC 780 on July 26, 2001.

**NWCAA Order of Approval to Construct 733e - Ferndale Upgrade/Clean Fuels Project**


OAC 733 initially did not address any equipment at the DHT Unit or #3 Reformer Unit. During revisions OAC 733c and OAC 733e the approval order was revised to include Consent Decree obligations so that they were federally enforceable requirements. These requirements include making the DHT Heater (33F-1) and all of the process heaters at the #3 Reformer subject to 40 CFR 60 Subpart J limiting the amount of H2S in the fuel gas combusted in those heaters. The another Consent Decree based requirement restricts the DHT Heater and #3 Reformer heaters from combusting fuel with a sulfur content greater than 0.05% by weight. These Consent Decree based requirements in OAC 733e are listed in the AOP.

**NWCAA Order of Approval to Construct 780a** – Modification to Diesel Hydrotreater (DHT) Heater (33F-1) to facilitate the combustion of refinery fuel gas.


Order of Approval to Construct 780 superseded in whole, previously issued OAC 343 and OAC 552 for construction of the DHT Unit including the DHT Heater. OAC 780 approved the combustion of refinery fuel gas in addition to purchased natural gas in the DHT Heater. The project did not increase the firing capacity of the heater beyond its rated capacity of 48 MMBtu/hour approved under OAC 552. The DHT Heater became subject to the SO2 limit of 40 CFR 60 Subpart J because it is considered a new refinery fuel gas combustion device under the rule. The refinery complies with Subpart J by continuously monitoring the H2S content of the refinery fuel gas to ensure compliance with the 3-hour, 162 ppmv specified by Subpart J as a surrogate to the SO2 limit.

On January 15, 2002, the NWCAA received a written notice that the DHT Heater began combusting refinery fuel gas upon startup after the modification.

OAC 780 was revised to OAC 780a for cleanup prior to incorporation onto the AOP. All of conditions of OAC 780a are include in the AOP. Condition 5, includes a visible emissions limit of 5% opacity for the DHT heater using EPA Method 9. This condition does not include ongoing MR&R to determine
compliance. The NWCAA added a gap-filled requirement to periodically check for compliance using a refinery-wide visual emissions monitoring program listed in Section 6 of the AOP.

**NWCAA Order of Approval to Construct 864a – Install a Dry Chloride Scrubber on the #3 Refiner Catalyst Regeneration Vent**


A dry chloride scrubber was installed on the #3 Refiner Catalystic regeneration vent to comply with the Refinery MACT II 40 CFR 63 Subpart UUU. The dry chloride scrubber removes hydrogen chloride (HCl) from the vent stream while the catalyst is being regenerated. In general, catalyst regeneration occurs every six months. Exhaust from the dry chloride scrubber is routed to the CO Boiler where organic air pollutants are combusted. OAC 780a revision was a cleanup prior to incorporation onto the AOP.

OAC 864a is considered narrative with no applicable requirements, and is not included in the AOP.

**NWCAA Order of Approval to Construct 886 – Addition of two Reactors to the DHT**


OAC 886 approved installation of two new reactors on the Diesel Hydrotreater (DHT) to improve catalyst run life and aid in production of ultra-low sulfur diesel fuel. The new reactors replaced the previous single reactor, increasing the total reactor volume from 2,700 to 13,000 cubic feet. The project was not intended to debottleneck the DHT Unit with the nominal diesel production of the unit remaining at 32,000 barrels per day.

All of the conditions of OAC 886 are included in the AOP with the exception of Condition 3. Condition 3 requires a notification of DHT startup following completion of the project. The NWCAA received this startup notice on February 10, 2006. This one-time only requirement has been completed and Condition 3 is not included in the AOP.

### 4.5.3 Regulatory Applicability

Equipment components at the Refomer/DHT Process Area are subject to leak detection and repair (LDAR) requirements under federal NSPS (VOC) and NESHAP (HAP) regulations. LDAR requirements under NWCAA 580.8 do not apply because feedstocks to the #3 Refomer and DHT are not butane or lighter. There are several compressors in the DHT that are considered in hydrogen service and therefore exempt from LDAR.

Refinery fuel gas combusted in the DHT Heater is subject to the NSPS 40 CFR 60 Subpart J and the H₂S content of the fuel gas is continuous monitored for compliance.

There are various oily wastewater drains in the Refomer/DHT Process Area that are subject to control requirements under the 40 CFR 61 Subpart FF (BWON) and 40 CFR 63 Subpart CC (Refinery MACT I).

There are a number of miscellaneous process vents in the Refomer/DHT Process Area subject to control requirements under 40 CFR 63 Subpart CC. Emissions from these vents are controlled by routing to the flare gas recovery system and flare.

Emissions from catalytic regeneration at the #3 Refomer is subject to HAP control under 40 CFR 63 Subpart UUU. A dry chloride scrubber is used to control HCl, the regulated metal HAP. The exhaust from the scrubber is routed to the CO Boiler. The dry chloride scrubber is considered a fixed-bed gas-solid adsorption system under Subpart UUU and compliance is demonstrated by monitoring the daily average temperature of the intake or exhaust to the scrubber with the temperature determined by a performance test for HCl that was completed in April 2005, and HCl samples taken with Draeger tubes each shift during catalyst rejuvenation. Subpart UUU also requires control of organic HAP emissions from the catalytic regeneration process. Organic HAPs are control by the flare gas recovery system and flare during initial isolation and depressurization of the catalyst bed.
The catalyst regeneration vent regulated by Subpart UUU is either the vent to the flare system or to the dry chloride scrubber and CO Boiler depending on the portion of the regeneration cycle that is occurring. The catalyst regeneration is a cyclic event that occurs about once every 60 hours in the following steps; 1. isolation and depressuring (vent to flare), 2. coke burn-off (vent to dry chloride scrubber), 3. maintenance (no venting), 4. first catalyst rejuvenation (vent to dry chloride scrubber), 5. sulfate removal (optional), 6. second catalyst rejuvenation (vent to dry chloride scrubber), 7. cool down (no venting), 8. reduction (no venting).

Under 40 CFR 63 Subpart UUU, the refinery is required to develop and implement an operation, maintenance, and monitoring plan (OMMP) to ensure ongoing compliance with the emission standards of Subpart UUU. The OMMP must be submitted and approved by the agency prior to implementation. On September 9, 2005, the NWCAA received the OMMP for the #3 Reformer dated “August 2005”. A file review during the 2017 AOP renewal process did not find a record indicating that the August 2006 plan was previously approved by the agency. Therefore, NWCAA implicitly approves the OMMP as part of the 2017 AOP renewal process because the AOP term requiring the OMMP refers to the August 2006 plan for determining ongoing compliance with Subpart UUU.

### 4.6 Sulfur Plant/Treaters Process Area

![Figure 3-11 Sulfur Recovery Process](image)

#### 4.6.1 General Operation and Background

The Sulfur Plant/Treaters Process Area includes two sulfur recovery units (SRU #1 and SRU #2), each composed of a single train, three-stage Claus sulfur recovery unit (SRU), a SCOT tail gas treating unit (TGU) and a TGU incinerator. The process area also includes various amine treating devices including a MEROX treating unit that was constructed in 2000. These process units are involved primarily in removing sulfur and, to a lesser extent, other contaminants from process streams. Individual amine absorber units at different locations within the refinery use a circulating amine to strip hydrogen sulfide (H₂S) from hydrocarbon process streams. The "acid gas" generated during amine stripping and "sour gas" from the sour water stripper, is fed to the Claus units where H₂S is converted to elemental sulfur and ammonia (NH₃) destroyed into products of combustion. The residual H₂S that is not converted into...
elemental sulfur in the Claus units is routed to the SCOT Tail Gas units for additional recovery. Any H2S remaining in the TGU exhaust is sent to TGU incinerators where it is oxidized to SO2 prior to discharge.

Emissions associated with the Sulfur Plant/Treaters process area includes products of combustion emitted at the incinerator stacks, fugitive emissions from equipment leaks (valves, pumps, elemental sulfur tank, and miscellaneous process vents and drains).

4.6.2 Construction and Permitting History

Sulfur Recovery Unit (SRU #1) was installed in 1978 under OAC 185 issued on July 15, 1976. On June 1, 1982, the agency approved an increase in the elemental sulfur recovery rate of SRU #1 to 19.5 long tons per day (LTD) (undocumented). In 1991, Tail Gas Unit #1 (TGU #1) was added to SRU #1 as approved under OAC 294 issued September 5, 1990. In 2001, OAC 294 was superseded by OAC 733.

In 1999, an oxygen enrichment system was added to SRU #1 increasing its capacity to 55 LTD. The oxygen enrichment project was approved under OAC 681. OAC 681 was also superseded by OAC 733 in 2001.

In 2006, a second sulfur recovery unit (SRU #2) was constructed to increase the sulfur removal capacity of the Sulfur Plant and to provide redundant SRU operation. The SRU #2 was approved under OAC 908.

The following summarizes NSR approvals affecting equipment in the Sulfur Plant/Treaters Process Area.

NWCAA Order of Approval to Construct 185 – Construction of Sulfur Recovery Unit #1 (SRU #1)
Original issuance July 15, 1976: No revisions.
OAC 185 is considered narrative with no applicable requirements, and is not included in the AOP.

NWCAA Order of Approval to Construct 727a – Construction of the Merox Extraction Unit
OAC 727 approved construction of the Merox Extraction Unit (Merox Unit) that employs a catalytic mercaptan oxidation system to remove sulfur from olefins that are then routed to the Alkylation Unit. OAC 727 was revised to OAC 727a for AOP cleanup prior to incorporation onto the AOP. OAC 727a includes only one condition and this condition is included in the AOP.

NWCAA Order of Approval to Construct 733e - Ferndale Upgrade/Clean Fuels Project

The Ferndale Upgrade/Clean Fuels project, permitted in 2001 under OAC 733 and PSD-00-02 (and subsequent revisions), approved construction of the Cat Gas Desulfurization Unit (CGD/S-Zorb Unit) located in the Alkylation Process Area. The CGD/S-Zorb Unit was designed to remove sulfur from gasoline to allow the refinery to produce gasoline that met upcoming federal standards at that time. This project increased sulfur loading at the SRU #1. The SRU #1 was equipped with 100% oxygen injection technology to handle the increased load. OAC 733e includes stack SO2 concentration limits as BACT for SRU #1 and limits supplemental fuel used in the SRU #1 incinerator to purchased natural gas.

During OAC 733c and OAC 733e the approval order was revised to incorporate Consent Decree (CD) obligations as federally enforceable requirements. There are two CD requirements in OAC 733e; 1. Conduct a root cause analysis for tail gas flaring events, and 2. Control emissions from the elemental sulfur pit or monitoring sulfur pit emissions with a 40 CFR 60 Subpart J quality CEMS.

All of the requirements of OAC 733e for equipment located at the Sulfur Plant/Treaters Process Area are listed in the AOP. Condition 3 is a 10% opacity limit on the SRU #1 incinerator stack. The MR&R for
this requirement has been gap-filled in the AOP with a common visual emission monitoring program for the refinery.

**NWCAA Order of Approval to Construct 908b – Crude/FCCU/SRU Upgrade Project**


The project approved under OAC 908 was for SO\(_2\) and TAPs. All other reviewable air pollutants were addressed under PSD-05-01 issued by WDOE. The project included modifications to the Crude Unit, Fluidized Catalytic Cracking Unit (FCCU) gas plant, and refinery amine system. The project was designed to increase crude charge to the Crude Unit and FCC feed charge rates at the FCCU as well as add equipment to remove the increased sulfur resulting from these higher charge rates. The project did not include any physical modifications to the process units would increase air emissions other than adding a limited number of equipment components subject to leak detection and repair. The new equipment components were incorporated into the existing leak detection and repair program, therefore, no LDAR requirements were included in the OAC.

The project included construction of a new Claus sulfur recovery unit and associated SCOT Tail Gas Unit and incinerator. This group of equipment is commonly referred to as SRU #2. The SRU #2 has a design recovery capacity of 60 long tons per day of elemental sulfur when operated with oxygen injection. The OAC has undergone two administrative revisions.

All conditions of OAC 908b have been incorporated into the AOP. Condition 2 is a 10% opacity limit on the SRU #2 incinerator stack. The MR&R for this requirement has been gap-filled in the AOP with a common visual emission monitoring program for the refinery.

**WDOE Prevention of Significant Deterioration (PSD) Permit PSD-00-02 Amendment 8 - Ferndale Upgrade/Clean Fuels Project**


Similar to OAC 733, PSD-00-02 approved construction of the CGD Unit located in the Alkylation Process Area in 2001. The current version, PSD-00-02 Amendment 8 has numerous conditions that are considered ongoing requirements for equipment at the Alkylation Process Area. All of these requirements are listed in the AOP except as noted below.

Condition 15 limits the firing rate of the SRU #1 to 23 MMBtu/hour. Combustion occurs at the SRU #1 from H\(_2\)S oxidation in the Claus sulfur recovery unit and in the SRU #1 incinerator. However, the intent of Condition 15 is to limit supplemental fuel firing in the SRU #1 Incinerator to 23 MMBtu/hour. The AOP term is written to limit the total firing rate in the SRU #1 Incinerator. This includes both natural gas supplied as supplemental fuels and acid gas from the SRU/TGU. The PSD permit limit does not asterisk the firing rate of the incinerator with the footnote “Applies when auxiliary firing fuel gas”, therefore, the 23 MMBtu/hour limit is assumed to be total of all heat inputs.

Condition 13 requires an initial NOx source testing on the SRU #1. Initial testing was conducted in June 2003 demonstrating compliance with the applicable NOx limits in place at that time. This one-time only requirement has been completed and is not listed in the AOP.

Condition 20 requires that the project commence construction within 18 months of PSD-00-02 issuance. The refinery commenced construction of the project within 18 months. Condition 20 is considered obsolete and not included in the AOP.

Condition 21 is a PSD permit appeal provision. The 30 day timeline for appealing the PSD permit has expired. Condition 21 is considered obsolete and is not included in the AOP.

**WDOE Prevention of Significant Deterioration Permit PSD-05-01 – Crude/FCCU/SRU Upgrade Project**

Original issuance November 14, 2005. No amendments.
All conditions of PSD-05-01 have been incorporated into the AOP with the following exceptions.

Condition 1 incorrectly refers to Condition 4 as the test method for NOx. Condition 4 is the test method for CO. The AOP term cites Condition 3, the correct test method for NOx.

Condition 2 incorrectly refers to Condition 5 as the test method for CO. Condition 5 does not include a test method. The AOP term cites Condition 4, that has the test method for CO.

Condition 10 requires that the project commence construction within 18 months of PSD-05-01 issuance. The refinery commenced construction of the project within 18 months. Condition 10 is considered obsolete and not included in the AOP.

Condition 11 is a provision concerning the effective date of PSD-05-01 being no earlier than the date that U.S. EPA notifies the WDOE that they have satisfied the obligation for consultation under the Endangered Species Act. Condition 11 is considered obsolete and not included in the AOP.

Condition 12 is a condition on the effective date of PSD-05-01 allowing it to be suspended if there are public comments within 30 days of issuance. There is no record of public comments on PSD-05-01. Condition 12 is considered obsolete and not included in the AOP.

4.6.3 Regulatory Applicability

Both SRU #1 and SRU #2 are subject to a 250 ppmvd, 12-hour average SO₂ standard under NSPS 40 CFR 60 Subpart J. In addition, SRU #2 has SO₂ limits established as BACT under OAC 733e. CEMS are used to determine continuous compliance with these SO₂ standards. NOx and CO limits for SRU #1 and SRU #2 are established as BACT under PSD-00-01 and PSD-05-01, respectively. Compliance with the NOx and CO limits are determined through periodic source testing. Lastly, limits on visual opacity from SRU #1 and SRU #2 is established as BACT under OAC 733e and OAC 908b, respectively.

SRU #1 and SRU #2 are subject to HAP control requirements under 40 CFR 63 Subpart UUU. In general, Subpart UUU relies of the SO₂ standard in NSPS Subpart J for HAP control. Subpart UUU requires that the refinery develop and implement an operation, maintenance, and monitoring plan (OMMP) to ensure ongoing compliance with the SO₂ standard. The OMMP must be submitted and approved by the agency prior to implementation. On June 30, 2016, the NWCAA received OMMPs dated “June 2016” for both SRUs. The NWCAA implicitly approves these plans as part of the 2017 AOP renewal process because the AOP terms requiring the OMMPs refer to the June 2016 plans to determining ongoing compliance with Subpart UUU.

Equipment components at the Sulfur Recovery Plant and Merox Unit are subject to leak detection and repair (LDAR) programs. Specifically, fugitive VOC leaks at the Merox Unit are subject to NSPS requirements under 40 CFR 60 Subpart GGG and a more stringent version of the Subpart GGG requirements as BACT under OAC 727a. Fugitive HAP leaks at both the Sulfur Recovery Plant and Merox Unit are subject to MACT requirements under 40 CFR 63 Subpart CC.

4.7 Utilities Process Area

4.7.1 General Operation and Background

The Utilities Process Area includes four utility boilers (#1-#4 Boilers) that generate steam used to provide heat and motive force at numerous process units in the refinery. The utilities area also includes two cooling towers serving the boilers. Some steam for the Ferndale Refinery is provided by the adjacent PSE Ferndale cogeneration power plant. The cogeneration plant is not owned or operated by Phillips 66 and is not part of this air operating permit (AOP).

The two, non-contact, circulating, cooling towers service two segregated cooling water systems at the refinery. One cooling tower handles cooling water from the Alkylation process area. The other cooling tower handles cooling water from the rest of the refinery.
As presented in Figure 3-12, the refinery has four gas-fired utility boilers. The #2 Boiler (22F-1A) has a heat input capacity of 91 MMBtu/hour and #3 Boiler (22F-1B) has a heat input capacity of 108 MMBtu/hour. Both the #2 Boiler and #3 Boiler were installed during initial refinery construction in 1953. The #1 Boiler (22F-1C) and #4 Boiler (22F-1E) were constructed in 1996 and 2006, respectively.

![Refinery Utility Boilers Diagram](image)

**Figure 3-12 Refinery Utility Boilers**

### 4.7.2 Construction and Permitting History

The #1 Boiler with a heat input capacity of 162 MMBtu/hour boiler, was constructed in 1996 and approved under OAC 578. The #1 Boiler replaced a temporary 99 MMBtu/hour boiler installed in January 1996 under OAC 581. The temporary boiler was decommissioned when the #1 Boiler came online. Another temporary boiler rated at 88 MMBtu/hour was constructed in 2003 under OAC 849. This temporary boiler was replaced in 2006 by the #4 Boiler. The #4 Boiler has a heat input capacity of 164 MMBtu/hour and was approved under OAC 877. The 88 MMBtu/hour temporary boiler was decommissioned when the #4 Boiler came online. All four boilers are configured to combust refinery fuel gas and for the most part all do, except the #4 Boiler. The #4 Boiler has primarily combusted natural gas since it began operating in 2006.

**NWCAA Order of Approval to Construct 578a – Construction of the #1 Boiler**


The project approved under OAC 578 involved construction of the #1 Boiler with a heat input capacity of 162 MMBtu per hour. The OAC was revised August 13, 2008 to incorporate a lower NOx limit (from 0.05 lb/MMBtu to 0.04 lb/MMBtu) as required by the refinery’s Consent Decree and to remove the option to combust fuel oil that was never utilized. The #1 Boiler is equipped with low-NOx burners and flue gas recirculation to control NOx emissions. The #1 Boiler is subject to the SO2 limit in 40 CFR 60 Subpart J as a refinery fuel gas combustion device and the NOx limit of 40 CFR 60 Subpart Db as a new industrial steam generating unit.

All of the conditions of OAC 578a are included in the AOP. Condition 3 includes a visual emission limit of 5% opacity using EPA Method 9 but does not include an ongoing compliance demonstration method.
The AOP gap-fills MR&R for the opacity limit with a requirement to use a common refinery-wide visual emission monitoring program.

**NWCAA Order of Approval to Construct 877b – Construction of the #4 Boiler**


OAC 877 approved construction of the #4 Boiler. The #4 Boiler has a heat input capacity of 164 MMBtu per hour. NOx emissions are controlled by ultra-low NOx burners combined with flue gas recirculation. The #4 Boiler is subject to the SO2 limit in 40 CFR 60 Subpart J as a refinery fuel gas combustion device and the NOx limit of 40 CFR 60 Subpart Db as a new industrial steam generating unit.

On September 15, 2008, the OAC was revised removing the requirement for biennial source testing of particulate because testing had demonstrated minimal particulate emission rates. The June 9, 2016 revision (OAC 877b) was done for cleanup prior to incorporation onto the AOP.

All of the conditions of OAC 877b are included in the AOP. Condition 2 includes a visual emission limit of 5% opacity using EPA Method 9 but does not include an ongoing compliance demonstration method. The AOP gap-fills MR&R for the opacity limit with a requirement to use a common refinery-wide visual emission monitoring program.

**NWCAA Order of Approval to Construct 733e - Ferndale Upgrade/Clean Fuels Project**


OAC 733 initially did not address any equipment at the Utilities Process Area. During revisions OAC 733c and OAC 733e the approval order was revised to include Consent Decree obligations so that they were federally enforceable requirements. These requirements include making all of the utility boilers subject to 40 CFR 60 Subpart J limiting the amount of H2S in the fuel gas combusted in those heaters. The other Consent Decree based requirement restricts the four utility boiler from combusting fuel with a sulfur content greater than 0.05% by weight. The Consent Decree based requirements in OAC 733e are listed in the AOP.

**4.7.3 Regulatory Applicability**

The #1 Boiler and #4 Boiler are subject to NOx emission limit under 40 CFR 60 Subpart Db. The #1 and #4 Boiler are also subject to more stringent NOx limits under OAC 578b and OAC 877b, respectively. OAC 877b includes a CO limit established as BACT for the #4 Boiler. These boilers are outfitted with CEMS to continuously monitor compliance with these gaseous pollutants emission limits.

Because of their construction date both the #1 and #4 Boiler are subject to the NSPS limit for sulfur dioxide set forth in 40 CFR 60 Subpart J because when combusting refinery fuel gas. The refinery meets the Subpart J compliance obligation by continuously monitoring the H2S content of the fuel gas combusted in the boiler to ensure that it does not exceed 162 ppmvd as a surrogate to the SO2 standard. OAC 877b imposes a more stringent BACT standard for the H2S content of the fuel gas combusted in the #4 Boiler at 50 ppmvd. The older #2 and #3 Boilers must meet the Subpart J sulfur standard as a requirement of OAC 733e. This condition was included in OAC 733e to memorialized this obligation from the Consent Decree.

The two cooling towers are subject to the 63.654 - Heat Exchange Systems provisions of 40 CFR 63 Subpart CC. The rule requires that the cooling towers be checked periodically for hydrocarbon leaks that can occurring into the cooling water system. When leaks are found, the refinery is required to take corrective action in a timely manner to fix the leaks. Because the hydrocarbon leaks emanate from leaking heat exchangers within various process units within the refinery, the required work practice is to identify leaking heat exchangers and initiate repairs.

The cooling towers are also subject to 40 CFR 63 Subpart Q - National Emission Standards For Hazardous Air Pollutants For Industrial Process Cooling Towers. This standard prohibits the use of
chromium-based treatment chemicals in cooling water systems. Phillips 66 provided the required initial notification by letter received August 1, 1995 and the required notification of compliance status by letter received May 1, 1996 stating that they do not use chromium-based treatment chemicals in the cooling water. These one-time notification requirements have been completed and there are no ongoing requirements for monitoring, recordkeeping, or reporting under Subpart Q. Therefore, Subpart Q is not included in the AOP.

4.8 Flare System

4.8.1 General Operation and Background

The refinery is equipped with a steam-assisted, elevated flare to combust excess hydrocarbon gasses during abnormal operations at the refinery such as unplanned process unit shutdowns. The steam is injected into the flared gasses at the flare tip to enhance destruction efficiency and to mitigate visible emissions. Excess gasses at the refinery are routed to a common flare header. The flare header is kept at or below 60 inches of water column (60” H2O) pressure by a water seal that is integrated with the elevated flare. When the flare header exceeds 60” H2O, the water seal is broken and the header relieves pressure to the elevated flare through the water seal. Flaring is minimized by a flare gas recovery unit that utilizes compressors at the Flare Gas recovery Unit (FGRU) to route gasses from the flare header to the refinery fuel gas system. An amine scrubbing system removes H2S from the gasses prior to the gas entering the fuel gas system.

4.8.2 Construction and Permitting History

During original refinery construction in 1953, the facility was equipped with a ground flare to combust excess hydrocarbon gasses. In 1972, the refinery installed a John Zink Thermal Oxidizing Flare (ZTOF) approved under a letter issued by the NWCAA on December 17, 1971. In 2010, the refinery installed a new Flare Gas Recovery Unit approved by the NWCAA under OAC 1029. The flare gas recovery unit was installed in response to Consent Decree obligations. On April 10, 2014, NWCAA Compliance Order No. 11 went into effect implementing Consent Decree obligations at the ZTOF and Emergency Ground Flare. In 2015, the ZTOF and ground flare were decommissioned and replaced during the Flare Infrastructure Upgrade Project that included a new, steam-assisted, elevated flare approved under OAC 1174. Because the ZTOF has been decommissioned, the NWCAA approval letter issued December 17, 1971 is no longer applicable and is not listed in the AOP. Similarly, NWCAA Compliance Order No. 11 is not listed in the AOP because the ZTOF and ground flare are no longer in use at the refinery.

NWCAA Order of Approval to Construct 1029 – New Flare Gas Recovery Unit


OAC 1029 approved the Flare Gas Recovery Unit at the refinery comprised of three sliding vane compressors, air-cooled discharge and intercooler exchangers, and an amine contactor. Under the Consent Decree flare gas recovery was required at the Ferndale Refinery by the end of 2011.

All conditions of OAC 1029 have been included in the AOP with the following exceptions.

Condition 2 requires monitoring of a control valve that was used to route gasses from the flare header to the flare gas recovery unit prior to the Flare Infrastructure Upgrade project. This valve was removed from service during the Flare Infrastructure Upgrade project approved in 2014 under OAC 1174. At present, the gas recovery system cannot be isolated from the flare header with a valve. Condition 2 is no longer applicable and is not listed in the AOP.

Condition 4 second sentence states “Other new fugitive leak components shall be included in the leak detection and repair programs applicable to the process areas in which they are located”. This sentence
is not practically enforceable and overlaps the requirement for LDAR in process units outside the Flare Gas Recovery Unit. Therefore, this sentence has not been included in the AOP.

Condition 6 requires that the NWCAA be notified when the Flare Gas Recovery Unit construction has been completed. On May 24, 2010 the NWCAA received a letter from Phillips 66 stating that the new Flare Gas Recovery Unit came on-line May 14, 2010. The one-time only requirement of OAC 1029 Condition 6 has been completed and is not listed in the AOP.

**NWCAA Order of Approval to Construct 1174 – Flare Infrastructure Upgrade Project**

Original issuance March 7, 2014. No revisions.

OAC 1174 approved the Flare Infrastructure Upgrade Project comprised of constructing a new 199’ foot high, steam-assisted, elevated flare, new blowdown drum to eliminate liquids from entering the flare and a new water seal located at the base of the flare. The project included decommissioning the ZTOF and ground flare.

All conditions of OAC 1174 have been included in the AOP with the following exceptions.

Condition 6 requires that the NWCAA be provided a copy of the design specifications for the new elevated flare as required under 40 CFR 60 Subpart A, prior to startup of the flare. On June 30, 2015 the NWCAA received the required information including the maximum design velocity at the flare tip. The one-time only requirement of OAC 1174 Condition 6 has been completed and is not listed in the AOP.

Condition 8 requires that the NWCAA be provided a copy of the flare management plan for the new elevated flare as required under 40 CFR 60 Subpart Ja, prior to startup of the flare. On June 30, 2015 the NWCAA received the flare management plan. The one-time only requirement of OAC 1174 Condition 8 has been completed and is not listed in the AOP.

Conditions 10 and 11 require that the NWCAA be notified of the decommissioning date of the ZTOF and ground flare, the initial firing date of the pilot on the new elevated flare, and the commissioning date of the new elevated flare. On October 14, 2015, the NWCAA received a letter stating that the ZTOF and ground flare were decommissioned prior to startup of the new elevated flare, and that initial firing of the pilot on the new flare occurred on October 5, 2015 and initial flaring of flare gasses occurred on October 6, 2015. The one-time only requirements of OAC 1174 Conditions 10 and 11 have been completed and they are not listed in the AOP.

**4.8.3 Regulatory Applicability**

The flare system is used to capture and control waste gas generated by miscellaneous process vents regulated under 40 CFR 63 Subpart CC (Refinery MACT I) and to control fugitive equipment leaks regulated under 40 CFR 60 Subparts GGG and GGGa and their respective control strategies under Subparts VV and VVa. The refinery has a flare gas header where waste gas from miscellaneous process vents and from fugitive equipment leaks are routed and the Flare Gas Recovery Unit (FGRU) recovers, to the extent it is capable, the waste gas for use as refinery fuel gas. When the FGRU reaches its recovery capacity the excess waste gas is sent to the elevated flare where it is destroyed through combustion. To ensure good destruction efficiency the flare must meet applicable standards.

Prior to January 30, 2019, the applicable standard comes from 40 CFR 60 Subpart A 60.18. However, on and after January 30, 2019, a new, more robust standard for flares is required under 40 CFR 63 Subpart CC 63.670. The new standard includes periodic or continuously monitoring of gas flare to ensure that it; 1. does not lead to excessive visual emissions, 2. The flare tip velocity does not exceed its rated capacity, and 3. the heat content of all gasses, including dilution from steam, is high enough in the combustion zone to ensure good VOC and HAP destruction efficiency.

The Refinery MACT regulation under Subpart CC provides the following overlap provision employing the new flare standards on and after January 30, 2019. The overlap provision allows the refinery the option
of using the new flare standards prior to January 30, 2019 in lieu of the existing standards, and the AOP has been written to include this option.

63.640(s) Overlap of this subpart with other regulation for flares. On January 30, 2019, flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and subject to this subpart are required to comply only with the provisions specified in this subpart. Prior to January 30, 2019, flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and elect to comply with the requirements in §§63.670 and 63.671 are required to comply only with the provisions specified in this subpart.

Once the refinery moves to the new flare standards, the old standard is no longer applicable. This non-overlap interpretation presumes that there is always HAP regulated material in the flare header during flaring events. There are minor sources of non-HAP streams routed to the flare header. However, given the wide array of HAP sources that are routed to the flare header, it is highly unlikely that the facility could claim that a flaring event did not contain any HAP regulated material. In addition, the refinery has a robust flare gas recovery system that was installed in 2010 that eliminates flaring during normal refinery operations. The flare gas recovery system routes recovered gasses to the refinery fuel gas system, so that flaring events are infrequent.

4.9 Transfer (Loading/Unloading) Terminals

4.9.1 General Operation and Background

The Receiving, Pumping and Shipping Process Area covers facilities at the refinery that are used to transfer raw materials, intermediates, and finished products. There are seven transfer terminals at the Ferndale Refinery.

- Railcar Loading Rack for Gaseous Products
- Railcar Loading Rack for Liquid Products
- Truck Loading Rack for Gaseous Products
- Truck Loading Rack for Liquid Products
- Ethanol Unloading Facility
- Crude Unloading Facility
- Marine Terminal

Railcar Loading Rack for Gaseous Products

This railcar loading rack is used to ship gaseous products to market such as liquefied petroleum gas (LPG), butane and propane. The loading rack is considered a “grandfathered” source because no NSR approval orders have been issued for construction or modification of the facility. There are no specific regulations applicable to gaseous products loading activities at the railcar loading rack. In general, loading operations are done using closed systems with vents to the atmosphere used prevent over pressurization.

Railcar Loading Rack for Liquid Products

This railcar loading rack is used to ship and receive liquid intermediates and liquid products and such as diesel, jet fuel, heating oil. The loading rack is considered a “grandfathered” source because no NSR approval orders have been issued for construction or modification of the facility. The facility is not equipped to handle high vapor pressure products such as gasoline. There are no specific regulations
applicable to liquid products loading activities at the railcar loading rack. In general, products loaded have low vapor pressures that result in relatively low VOC emission rates.

**Truck Loading Rack for Gaseous Products**

This truck loading rack is used to ship gaseous products to market such as liquefied petroleum gas (LPG). The truck rack is considered a “grandfathered” source because no NSR approval orders have been issued for construction or modification of the facility. There are no specific regulations applicable to gaseous products loading activities at the truck loading rack. In general, loading operations are done using closed systems with vents to the atmosphere used prevent over pressurization.

**Truck Loading Rack for Liquid Products**

This truck loading rack is used to ship liquid products to market such as gasoline, diesel, jet fuel, heating oil. This is the facility commonly referred to as the “Gasoline/Diesel Truck Rack” or simply “Truck Rack” because it is serves as the primary means of shipping gasoline and diesel to the Pacific Northwest market when it is not shipped via pipeline. The truck rack was originally constructed for top loading. In 1990 it was modified to bottom loading and a vapor combustion device was installed to control VOC emissions that occur when gasoline vapors are displace from cargo tanks during product loading. This modification was approved under OAC 265. The facility is also regulated under 40 CFR 63 Subpart CC, NWCAA Section 580 and Chapter 173-491 WAC.

### 4.9.2 Construction and Permitting History

**NWCAA Order of Approval to Construct 265a - Modification to Truck Rack**


Modifications to truck loading rack include retrofitting the rack from to bottom loading and installing a vapor recovery and vapor combustion device. This OAC has two conditions.

Condition 1: VOC emissions from the vapor combustor are limited to 35 milligrams per liter of gasoline transferred with compliance demonstrated through biennial source testing. This requirement is incorporated into the AOP without gap-filling.

Condition 2: Visual emissions from the vapor combustor are limited to 10% opacity as determined by EPA Method 9. This requirement is incorporated into the AOP with MR&R gap-filled by a common visual emissions monitoring program for the refinery.

### 4.9.3 Regulatory Applicability

The requirements applicable to the gasoline/diesel truck rack are somewhat complex because there are elements that apply to the vapor recovery system, vapor combustion device, the performance of the trucks cargo transport tanks and LDAR requirements for fugitive leaks from equipment components. As indicated by the operating permit, the truck rack is subject to the SIP approved version of NWCAA 580.4 and 580.10, WAC 173-491, and 40 CFR 63 Subpart CC that references the requirements of 40 CFR 63 Subpart R. Many of these requirements overlap. The following is a summary of these requirements.

The truck rack is required to capture gasoline vapors displaced as the truck cargo tanks are loaded and the vapors destroyed with a vapor combustion device. When diesel is being loaded it is assumed that that tank previously held gasoline and that those gasoline vapors need to be captured and controlled as well. During loading the vapor recovery system must be leak tight and the overpressure valves set to remain closed during loading operations. In addition, truck cargo tanks are required to be leak tightness tested every year and the refinery is required to keep a copy of the annual cargo tank leak tightness certification for each tank that is loaded at the truck rack. The vapor combustion device must reduce emissions to less than 10 mg total organic compound emissions per liter of gasoline transferred and biennial source testing is conducted to ensure compliance. For ongoing compliance, the combustion
temperature of the combustion device is continuously monitored and propane is used as a supplemental fuel to assure that the temperature is at or above 450°F.

40 CFR 60 Subpart J for SO₂ is applicable to the combustion device because it is combusting hydrocarbon gas generated at the refinery. On April 4, 2003, the U.S. EPA issued an alternative monitoring plan (AMP) for compliance with Subpart J at the Ferndale Refinery truck rack because it is impractical to operate a fuel gas hydrogen sulfide monitoring system in the truck rack vapor recovery system. This AMP is listed in the AOP.

The truck rack is not directly subject to 40 CFR 60 Subpart XX, because it was not constructed and has not been modified or reconstructed since the December 17, 1980 the applicability date of the rule.

**Ethanol Truck Unloading Facility**

The ethanol unloading facility was constructed in 2012 to unload ethanol from trucks. The ethanol is used as a blending stock for gasoline. The ethanol is transferred to a dedicated ethanol Tank 70X1 located at the refinery. Tank 70X1 is an internal floating roof tank. Both the ethanol unloading facility and Tank 70X1 were approved under OAC 1111. Ethanol is not a HAP regulated under 40 CFR 63 Subpart CC and there are no state of local regulations pertaining to the unloading facility, except that the new drain at the ethanol unloading facility is subject to 40 CFR 60 Subpart QQQ for VOC emissions. See Tank 70X1 for information on regulations applicable to the ethanol tank.

4.9.4 Construction and Permitting History

**NWCAA Order of Approval to Construct 1111 – Ethanol Unloading Facility**

Original issuance February 16, 2012. No revisions.

This OAC approved the new truck ethanol unloading facility including a truck unloading pad, pumping equipment and Tank 70X1 for storing ethanol. The ethanol is used as a blending stock in gasoline. OAC 1111 has two conditions.

Condition 1: Requires Tank 70X1 to be equipped with an internal floating roof and both primary and secondary seals. This requirement is included in the tanks section of the AOP.

Condition 2: A startup notice is required to be submitted for the new ethanol unloading facility. On March 1, 2013, the NWCAA received notice that the facility began operating on February 22, 2013. This one-time only requirement has been completed and it not listed in the AOP.

**Crude Unloading Facility**

The crude unloading facility was constructed in 2013 to unload readily available mid-continental crude oils delivered via railcar. The facility can unload 54 railcars at a time with vapors controlled with vapor balancing and vacuum breaker equipment. The facility was approved under OAC 1152. There are no specific regulations pertaining to the crude unloading facility other than 40 CFR 63 Subpart CC requiring HAP control from equipment leaks and 40 CFR 60 Subpart QQQ requiring oily wastewater systems to be controlled to mitigate VOC emissions.

4.9.5 Construction and Permitting History

**NWCAA Order of Approval to Construct 1152 – New Crude Unloading Facility**

Original issuance June 7, 2013. No revisions.

OAC 1152 approved construction of the Crude Unloading Facility to transfer crude oil from railcars to existing storage tanks at the refinery. The project included construction of a rail spur, a railcar unloading area and associated piping, conveyance and spill containment systems. The facility has the capacity to simultaneous unload up to 54 railcars. The OAC requires that unloading be done without VOC leaks above 500 ppm using closed vent and vapor balancing systems. The OAC also requires an
LDAR program on equipment components at the facility, and that the oily wastewater vents be controlled.

All the requirements of OAC 1152 are included in the AOP except Condition 8 that is a startup notice for the Crude Unloading Facility. On November 21, 2014, the NWCAA received a letter from the refinery stating that the Crude Unloading Facility began operating on November 18, 2014. This one-time only startup notice has been completed and is not listed in the AOP.

Marine Terminal

The marine terminal ships and receives a variety of commodities at the marine dock including crude oil and refinery intermediates, as well as finished products such as jet fuel, diesel and gasoline. The facility is considered a “grandfathered” source because it was constructed and has not been modified in a manner that would triggered new source review. In 2002, the NWCAA issued OAC 733a. This was a revision to the original approval order for the Ferndale Upgrade and Clean Fuels Projects. This revision included a limit on the amount of gasoline that could be loaded at the marine terminal to 10 million barrels in any 12-month period. It also established a VOC emission limit at the marine terminal of 819 tons in any 12-month period. The current version of this order, OAC 733e includes these limits and they are listed in the AOP for the Marine Terminal.

4.9.6 Regulatory Applicability

40 CFR 63 Subpart CC requires that the marine terminal meet the requirements of 40 CFR 63 Subpart Y. Because annual HAP emissions at the marine terminal are less than the 10/25 tpy thresholds, and because annual gasoline loading is below 10 million barrels and annual crude oil loading is below 200 million barrels; the marine terminal is not required to control emissions beyond employing submerged filling when loading commodities with vapor pressures that exceed 1.5 psia. The requirement for submerged filling was added to Subpart CC in 2015 as part of the refinery sector rule revisions.

In accordance with 40 CFR 63 Subpart CC, equipment components at the marine terminal that are in HAP service are required to be under a LDAR program.

4.10 Reciprocating Internal Combustion Engines (RICE)

4.10.1 General Operation and Background

There are numerous stationary reciprocating internal combustion engines (RICE) located throughout the refinery. All of these engines are considered in dedicated emergency service and they are infrequently operated other than during monthly maintenance and readiness testing. No NSR approvals have been issued for these engines because NWCAA Section 300 categorically exempts emergency RICE from NSR. There are federal regulations that apply to the RICE located at the refinery. Please refer to the following sections above for detailed information on these engines.

- Section 2.1.6 - NSPS 40 CFR 60 Subpart IIII for compression-ignition RICE
- Section 2.2.6 – MACT 40 CFR 63 Subpart ZZZZ for compression-ignition RICE
- Section 2.2.8 – MACT 40 CFR 63 Subpart PPPP for spark-ignition octane test RICE

4.11 Effluent Collection, Conveyance and Treatment

4.11.1 General Operation and Background

Effluent collection, conveyance and treatment of includes wastewater collected by process drains, conveyed in sewer lines (both oily and phenolic), temporarily stored in tanks, treated at the refinery’s
wastewater treatment plant, and other activities related to handling of wastes such as treatment plant sludge and wastes from turnaround activities.

Wastewater collected at process units and drawn from petroleum storage tanks is collected by individual drain systems that empty to sewer trunk lines. These trunk line flow to lift (pump) stations for conveyance to wastewater storage tanks prior to treatment. Wastewater treated is done through a series of devices that provide physical, chemical, and biological treatment. The wastewater is physically treated by routing to an API Oil/Water Separator then to an Induced Gas Flotation Unit via closed sewers. Water leaving the Induced Gas Flotation Unit is biologically treated in a moving bed biological reactor (MBBR) and activated sludge units to further remove organic compounds. The treated wastewater is then clarified and combined with non-process surface runoff (storm water) prior to discharged into the Georgia Strait. The wastewater treatment plant is regulated under a NPDES-permit that is not part of the AOP. Oil recovered at the treatment plant is recycled to refinery process units and solids in the recovery oil is removed, concentrated, and shipped off-site.

**Figure 3-13 Wastewater Treatment Plant**

### 4.11.2 Construction and Permitting History

The basic configuration of the oily wastewater effluent system was established during original refinery construction in 1953. Since its initial construction, sewers have been extended to new process units, several tanks were added to replace open storage basins, and emission controls have been installed on various waste management units.

In 1990, the U.S. EPA promulgated benzene waste operations NESHAP under 40 CFR 61 Subpart FF (BWON). This federal regulation required a phase in of vapor control systems on benzene containing waste at refineries, primarily on related to oily wastewater collection, conveyance and treatment systems. In anticipation of future emission control requirements imposed by BWON, the refinery installed various vapor control strategies including installing seals on hatches, carbon adsorption units on vents, and covers on the API Separator. The refinery also constructed new floating storage tanks and modified other existing storage tanks to improve the control of emissions from oily wastewater.

On August 2, 1995, the NWCAA issued OAC 559 for the installation of vapor control equipment on select benzene waste management units associated with the oily wastewater effluent system. OAC was revised on June 9, 2016 to OAC 559a. OAC 559a has no applicable requirements and is not listed in the AOP.

On December 28, 2000, the NWCAA issued OAC 752 for installation of a doom roof on the wastewater treatment plant rouging filter. The roughing filter was decommissioned by December 31, 2005 as required by the Consent Decree. Because OAC 752 contains no applicable requirements and does not apply to any existing equipment at the refinery, it is not listed in the AOP.

On February 6, 2001, the NWCAA issued OAC 756 approving portable reactor tanks utilizing recirculating air to biologically decompose sludge with vents controlled by activated carbon. The system was installed, never put into service, and subsequently decommissioned within a year of OAC issuance.
On June 10, 2016, the NWCAA issued a letter stating that OAC is null and void due to the refinery not completing the project within the 18 month NSR prescribed time period. Consequently, OAC 756 is not listed in the AOP.

In 2007, the wastewater treatment plant infrastructure was upgraded including installation of the MBBR and activated sludge units. These upgrades were required by the Consent Order and helped ensure stable wastewater treatment plant operation. No NSR approval orders were issued by the NWCAA for these upgrades.

OAC 314 is the only approval order that has been issued that includes applicable requirements for oily wastewater effluent handling equipment at the refinery. This OAC was issued in 1991 for construction of new wastewater storage tanks, and for modifications to other tanks that storage wastewater. A detailed discussion regarding the project approved under OAC 314 and its subsequent revision to OAC 314a is included in this document under Storage Vessels. The requirements of OAC 314a have been incorporated in the AOP.

4.11.3 Regulatory Applicability

Light hydrocarbons dissolved in or floating on the wastewater have the potential to evaporate and discharge to the atmosphere. For the most part these emissions are contained and controlled under the refinery-wide, federally regulated Benzene Waste Organic NESHAP (BWON) program prescribed under 40 CFR 61 Subpart FF. This containment and control program is supplemented by two other federal regulations; NSPS 40 CFR 60 QQQ and Refinery MACT 40 CFR 63 Subpart CC, as applicable.

The BWON program is required under Subpart FF because the Ferndale Refinery has greater than 10 megagrams per year of benzene in its wastewater and other wastes. Refinery MACT regulations under Subpart CC include an overlap provision that requires the BWON program for the control of hazardous air pollutants (HAPs). Therefore, AOP Terms that cite Subpart FF also cite Subpart CC.

The BWON regulation under Subpart FF requires controls and work practices to reduce benzene emissions from equipment handling oily wastewater and other benzene containing wastes throughout the refinery. This includes requirements on final disposition of waste, waste treatment criteria, waste generation tracking, and controls on waste handling activities such as vacuum trucks and cleanup operations. Equipment that does not handle benzene containing waste and at equipment at very last stages of treatment are not required to be controlled. The vast majority of drains and sewers at the refinery must be sealed. This includes water seals on drain p-traps, seals on sewer hatches, and activated carbon adsorption beds to control emissions from sewer vents. Storage tanks and portions of wastewater treatment devices (Oil/Water Separator) are fitted with floating roofs to control emissions.

Unlike Subpart FF and CC that target HAP emissions, NSPS Subpart QQQ regulates VOC emissions. Drain systems constructed, reconstructed or modified after May 4, 1987 at the refinery are subject to Subpart QQQ. Similar to BWON, drains system subject to Subpart QQQ must be sealed to prevent emissions to the atmosphere. However, Subpart QQQ has more stringent inspection requirements than those required under BWON. Refinery MACT overlap provisions allow MACT Group 1 waste streams that are also subject to Subpart QQQ to comply only with the BWON requirements. If it is not considered a Group 1 waste stream under MACT, the more stringent requirements of Subpart QQQ apply. There are four individual drain systems at the refinery where the requirements of Subpart QQQ apply.

4.12 Storage Vessels (Tanks)

4.12.1 General Operation and Background

The general operation of refinery storage systems and applicable regulations are described in Section 2.11 above.
4.12.2 Construction and Permitting History

The basic configuration of the storage vessels (tanks) was established during original refinery construction in 1953. The majority of tanks are located in the tank farm located on the eastside of the refinery. The following is a summary of the storage tank projects that have gone through NSR by the NWCAA.

**NWCAA Order of Approval to Construct 34 (OAC 34) – Construction of External Floating Roof Tank 1340X117 and Butane Pressure Vessel 200X100**


OAC 163 is considered narrative with no applicable requirements, and is not included in the AOP.

**NWCAA Order of Approval to Construct 161 - Installation of Internal Floating Roofs on Tanks 100X93, 100X94 and 100X96**


On September 27, 2016, the refinery informed the agency that Tank 100X96 was taken out of service with no plan to put it back into service. Therefore, Tank 100X96 is not listed in the AOP.

OAC 161 is considered narrative with no applicable requirements, and is not included in the AOP.

**NWCAA Order of Approval to Construct 163 (OAC 163) – Construction of External Floating Roof Tank 6000x1 for Crude Oil**


OAC 163 is considered narrative with no applicable requirements, and is not included in the AOP.

**NWCAA Order of Approval to Construct 196 (OAC 196) – Construction of Internal Floating Roof Tank 100x99 for Recovered Oil.**

Original issuance August 12, 1977. No revisions.

OAC 196 is considered narrative with no applicable requirements, and is not included in the AOP.

**NWCAA Order of Approval to Construct 314a - Tank Construction and Upgrade Project.**


The project included construction of three new 90,000 barrel, external floating roof tanks (900x1, 900x2, 900x3) to store wastewater prior to the wastewater being fed into the oily wastewater treatment plant. The new storage allowed closure of several open wastewater storage basins. The project also included retrofitting two external floating roof tanks with secondary seals (100x92 and 100x95) and upgrading two tanks to internal floating roof tanks (300x40 and 100x98).

OAC 314a does not have any applicable requirements for new tanks 900x1, 900x2, and 900x3 because they are required to be constructed and operated under subject federal standards 40 CFR 60 Subpart Kb and/or 40 CFR 61 Subpart FF where applicable.

OAC 314a includes requirements for tanks 300x40, 100x98, 100x92, and 100x95 that were retrofitted as part of this project. These are included as specifically applicable requirements in the AOP.

**NWCAA Order of Approval to Construct 715a (OAC 715a) – Construct the Splitter Tower at the Alkylation Unit.**


OAC 715 and its subsequent revision OAC 715a, approved a project involving construction of a new splitter tower (debutanizer) at the Alkylation Unit designed to remove butane from gasoline produced
from the TCCU. The project resulted in a change in service to tanks 1340X115, 550X101, and 300X44. Past agency records indicate the change in service to Tank 300X44 resulted in the tank being modified under NSPS subjecting Tank 300X44 to 40 CFR 60 Subpart Kb. A review of this matter during the 2017 AOP renewal finds that there were no physical modifications to the tank during this project, and that the tank was already capable of accommodating high vapor pressure liquids as an external floating roof equipped with primary and secondary seals. Therefore, the change in service of Tank 300X44 did not result in the tank being subject to 40 CFR 60 Subpart Kb. In summary, the project did not result in an NSPS construction, modification or reconstruction to any of the tanks listed in the OAC, i.e., 1340X115, 550X101, or 300X44.

OAC 715a is considered narrative with no applicable requirements for storage tanks, and is not included in the AOP.

**NWCAA Order of Approval to Construct 736a** (OAC 736a) – Construction of Internal Floating Roof Tank 400X1


OAC 736a is considered narrative with no applicable requirements, and is not included in the AOP.
5 Air Operating Permit Administration

Section 4 explains the basis for how the air operating permit was written including layout, organization elements and specific action taken under Title V authority.

5.1 One-Time Only Requirements

Applicable requirements that were satisfied by a single past action on the part of the source are not included in the AOP, but are discussed in the Statement of Basis. Regulations that require action by a regulatory agency, but not of the regulated source are not included as applicable permit conditions.

5.2 Federal Enforceability

Federally enforceable requirements are terms and conditions required under the Federal Clean Air Act (FCAA) or under any of its applicable requirements. Local and state regulations become federally enforceable by formal approval and incorporation into the State Implementation Plan (SIP) or through other delegation mechanisms. Federally enforceable requirements are enforceable by the EPA and citizens. All applicable requirements in the permit including standard terms and conditions, generally applicable requirements, and specifically applicable requirements are federally enforceable unless identified in the permit as “state only” meaning they are enforceable only by the state (i.e., NWCAA).

Permit terms list citations of an underlying requirement followed by a date in parentheses. The date represents the promulgation date for federal regulations (date of final rule publication in the Federal register), the effective date for state WAC regulations and the board adoption date for NWCAA regulations. In some cases, there are two dates listed for a particular citation. When this is the case, one date is the federally enforceable requirement because it has been adopted into the Washington State SIP, and the other date is the current version of the regulation that has not yet been adopted into the SIP. The date associated with an OAC or PSD permit represents the issuance date of that permit. Federal regulations are always federally enforceable, therefore, citation date for federal regulations is the most recent date of promulgation.

Chapter 173-401 WAC is not federally enforceable although the requirements of this regulation are based on federal requirements for the air operating permit program. Upon issuance of the permit, the terms based on Chapter 173-401 WAC will become federally enforceable for the source.

5.3 Future Requirements

Applicable requirements that have been promulgated with future compliance dates are included in the permit with the compliance date listed in the permit term. Requirements that are not applicable until triggered by an action, such as the requirement to file a Notice of Construction application prior to building a new emission unit, are included in standard terms and conditions under Sections 2 and 3 of the permit.

5.4 Compliance Options

The source did not request emissions trading provisions or specify more than one operating scenario in the air operating permit application, and the permit does not address these options as allowed under WAC 173-401-650. This permit does not condense overlapping applicable requirements (streamlining) nor does it provide any alternative emission limitations. The permit includes an alternative monitoring plan for the SO2 from the Truck Loading Rack and for visual and particulate emissions from the FCCU.

5.5 Permit Elements

The permit is organized in the following sequence:

- Permit Information
5.5.1 Permit Information, Attest, and Emissions Unit Descriptions

The General Information section identifies the source, the responsible corporate official, and the agency personnel responsible for permit preparation, review, and issuance. The Attest section provides authorization by the NWCAA for the source to operate under the terms and conditions contained in the permit. The Emissions Unit Descriptions section lists the significant emissions units, associated control equipment, years that equipment was constructed, reconstructed or modified, a high level list of the underlying requirements, and general information about the equipment such as size, type, capacity, and configuration.

5.5.2 Standard Terms and Conditions

The Standard Terms and Conditions section contains administrative requirements and prohibitions that do not have ongoing compliance monitoring requirements. The citations contained in this section provide a legal basis for the Standard Terms and Conditions. Often requirements are paraphrased. In this case the language of the cited regulation takes precedence over the paraphrased summary. For understanding and readability, the terms and conditions have been grouped by function where similar requirements from State and NWCAA regulations are grouped together. Many of the requirements in this section are only applicable when triggered by an action.

5.5.3 Standard Terms and Conditions for NSPS and NESHAP

The Standard Terms and Conditions for New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutant (NESHAP) specifies administrative requirements or prohibitions with no ongoing compliance monitoring requirements. The conditions in this section are from the Subpart A General Provisions of 40 CFR Parts 60, 61, and 63. They apply specifically to the affected sources, affected facilities, or stationary sources subject to NSPS and NESHAP standards. The affected sources, affected facilities, or stationary sources are identified in Section 5 of the permit including a reference to the Standard Terms and Conditions for NSPS and NESHAP.

5.5.4 Generally Applicable Requirements

The Generally Applicable Requirements section identifies requirements that apply broadly to the refinery. In general, these requirements are found in general air pollution rules such as NWCAA Regulation or the Washington Administrative Code (WAC).

The tables in Section 4 (generally applicable) and Section 5 (specifically applicable) of the permit are organized as follows. The first column lists the permit term number and pollutant regulated by the underlying requirement. If the underlying requirement limits the type of fuel or the amount of fuel that can be combusted, the terms says “fuel” instead of a specific pollutant. The permit terms are numbered consecutively within each process area at the refinery.

The second column in the permit term lists the underlying legal citation for the requirement. This legal citation is federally enforceable unless listed as “state only”. The third column provides a paraphrased
description of the requirement. This paraphrase is not intended to be complete or enforceable as written. The paraphrased text serves as a descriptive summary of the requirement only.

The last column is a summary of the monitoring, recordkeeping and reporting obligations of the underlying requirement. Similar to the third column, the text in the monitoring, recordkeeping and reporting column is a paraphrase of the cited requirement and is not intended to be complete or enforceable as written. It is including in the term as a descriptive summary only. Enforceability of the permit term is based on the citation of the underlying requirement in the second column of the table.

When the monitoring, recordkeeping and reporting column includes a “Directly Enforceable”, this indicates that the monitoring, recordkeeping and reporting text below that statement has been gap filled under the agency’s Title V gap filling authority. Gap filling is done when the underlying requirement lacks specifics with regard to the method required to demonstrate compliance.

5.5.5 Gap-Filling

Some air pollution regulations and conditions of orders do not specify sufficient monitoring, recordkeeping and reporting methods to demonstrate compliance with the underlying requirement. In these cases, the permitting agency may develop site-specific monitoring, recordkeeping and reporting requirements in the AOP. The inclusion of these customized requirements is called "gap filling". The refinery has many specific monitoring, recordkeeping and reporting requirements in the form of continuous emission monitors and periodic reporting. However, gap filling has been included in some permit terms to ensure a method for determining and documenting compliance. For instance, nuisance rules and visible emission requirements have been gap-filled in this permit with monitoring, recordkeeping and reporting requirements that are not in the underlying requirement. Where gap filling has taken place, the monitoring, recordkeeping and reporting for that term states “Directly Enforceable” above the gap filled text. The agency’s gap filling authority is provided under WAC 173-401-615.

5.5.6 Specific Requirements for Emission Units

This section lists applicable requirements that specifically apply to the emission units at the refinery. The emission units are grouped by process area. The emission limitations, and monitoring, recordkeeping and reporting requirements are derived from BACT determinations and/or from applicable regulations. The format and organization of this section is the same as the table for generally applicable requirements. As with generally applicable requirements some specifically applicable requirements do not have source monitoring requirements due to the inherent nature of the source and the likelihood that the legal requirement will not be violated.

The refinery uses CEMS to continuously monitor various emission units for gaseous pollutants including NOx and CO, as well as H2S and TRS as surrogates to SO2. Where CEMS are used, continuous compliance with concentration limits, and to some extent mass emission rate limits, is relatively straightforward. Pollutants not continuously monitored are visual emissions, PM, NH3 and VOC. For these pollutants periodic opacity observations and source testing is conducted often supplemented with continuous parameter monitoring to ensure compliance.

5.5.7 Inapplicable Requirements

WAC 173-401-640 requires that the permitting agency make a determination regarding the applicability of requirements with which the source must comply. The Air Operating Permit lists requirements that are deemed inapplicable to the facility and the basis for each determination.
6 Insignificant Emissions Units

There are categorically exempt activities and emission units at the Ferndale Refinery that have very low or no emissions, and this equipment is considered to be insignificant for the purposes of Title V permitting in accordance with WAC 173-401-532.

It is noted that Refinery MACT Group 2 miscellaneous process vents regulated under 40 CFR 63 Subpart CC are not insignificant because they can emit up to 13.2 tons per year of VOC and above the 2.0 ton per year insignificant emissions unit threshold listed in WAC 173-401-530.

Table 5-1 Insignificant Activities and Emission Units at the Ferndale Refinery

<table>
<thead>
<tr>
<th>Primary Crude Oil Process Area</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems Note: Sewer manholes, junction boxes, sumps and lift stations regulated under 40 CFR 61 Subpart FF and 40 CFR 63 Subpart CC are not included in this exemption.</td>
<td>WAC 173-401-532(120)</td>
</tr>
<tr>
<td>Sampling connections used exclusively to withdraw materials for laboratory analysis and testing</td>
<td>WAC 173-401-532(51)</td>
</tr>
<tr>
<td>Steam vents</td>
<td>WAC 173-401-532(87)</td>
</tr>
<tr>
<td>Vents from continuous emissions monitors and other analyzers</td>
<td>WAC 173-401-532(8)</td>
</tr>
<tr>
<td>Sample gathering, preparation, management</td>
<td>WAC 173-401-532(73)</td>
</tr>
<tr>
<td>Lube oil storage and use</td>
<td>WAC 173-401-532(3) and (69)</td>
</tr>
<tr>
<td>Maintenance activities not involving installation of an emission unit and not increasing potential to emit and not otherwise subject to a federally enforceable applicable requirement.</td>
<td>WAC 173-401-532(74)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Catalytic Cracking Process Area</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCCU Catalyst: Batch loading and unloading of solid phase catalysts</td>
<td>WAC 173-401-532(60)</td>
</tr>
<tr>
<td>Sampling connections used exclusively to withdraw materials for laboratory analysis and testing</td>
<td>WAC 173-401-532(51)</td>
</tr>
<tr>
<td>Sample gathering, preparation, management</td>
<td>WAC 173-401-532(73)</td>
</tr>
<tr>
<td>Maintenance Activities not involving installation of an emission unit and not increasing potential to emit and not otherwise subject to a federally enforceable applicable requirement.</td>
<td>WAC 173-401-532(74)</td>
</tr>
<tr>
<td>Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems. Note: Sewer manholes, junction boxes, sumps and lift stations regulated under 40 CFR 61 Subpart FF and 40 CFR 63 Subpart CC are not included in this exemption.</td>
<td>WAC 173-401-532(120)</td>
</tr>
<tr>
<td>Misc. Tanks (Seal Oil, Anti-Corrosive): Storage tanks, reservoirs and pumping and handling equipment of any size limited to soaps, lubricants, hydraulic fluid, vegetable oil, grease, animal fat, aqueous salt solutions or other materials and processes using appropriate lids</td>
<td>WAC 173-401-532(4)</td>
</tr>
</tbody>
</table>
### Catalytic Cracking Process Area

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>and covers where there is no generation of objectionable odor or airborne particulate matter</td>
<td></td>
</tr>
<tr>
<td>Vents from continuous emissions monitors and other analyzers</td>
<td>WAC 173-401-532(8)</td>
</tr>
<tr>
<td>Steam vents</td>
<td>WAC 173-401-532(87)</td>
</tr>
<tr>
<td>Lube Oil Storage and Use</td>
<td>WAC 173-401-532(3) and (69)</td>
</tr>
</tbody>
</table>

### Alkylation Process Area

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small tanks: Operation, loading and unloading of storage tanks, not greater than one thousand one hundred gallon capacity, with lids or other appropriate closure, not for use with hazardous air pollutants (HAPs), maximum (max.) vp 550mm Hg</td>
<td>WAC 173-401-533(b)</td>
</tr>
<tr>
<td>Acid Storage Tanks: Tanks vessels and pumping equipment, with lids or other appropriate closure for storage or dispensing of aqueous solutions of inorganic salts, bases and acids excluding: (i) 99% or greater H₂SO₄ or H₃PO₄ (ii) 70% or greater HNO₃ (iii) 30% or greater HCl (iv) More than one liquid phase where the top phase is more than one percent VOCs</td>
<td>WAC 173-401-533(2)(s)</td>
</tr>
<tr>
<td>Sampling connections used exclusively to withdraw materials for laboratory analysis and testing</td>
<td>WAC 173-401-532(51)</td>
</tr>
<tr>
<td>Saturated Gas Plant: Steam vents</td>
<td>WAC 173-401-532(87)</td>
</tr>
<tr>
<td>Lube Oil Storage and Use</td>
<td>WAC 173-401-532(3) and (69)</td>
</tr>
<tr>
<td>Open Vessel-Equipment Neutralizer: Salt baths using nonvolatile salts and not used in operations which result in air emissions</td>
<td>WAC 173-401-532(80)</td>
</tr>
<tr>
<td>Open Vessel-Equipment Neutralizer: Storage tanks, reservoirs and pumping and handling equipment of any size limited to soaps, lubricants, hydraulic fluid, vegetable oil, grease, animal fat, aqueous salt solutions or other materials and processes using appropriate lids and covers where there is no generations of objectionable odor or airborne particulate matter</td>
<td>WAC 173-401-532(4)</td>
</tr>
<tr>
<td>Alkylation Unit and Saturated Gas Plant: Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems. Note: Sewer manholes, junction boxes, sumps and lift stations regulated under 40 CFR 61 Subpart FF and 40 CFR 63 Subpart CC are not included in this exemption.</td>
<td>WAC 173-401-532(120)</td>
</tr>
<tr>
<td>Vents from continuous emissions monitors and other analyzers</td>
<td>WAC 173-401-532(8)</td>
</tr>
<tr>
<td>Maintenance activities not involving installation of an emission unit and not increasing potential to emit and not otherwise subject to a federally enforceable applicable requirement.</td>
<td>WAC 173-401-532(74)</td>
</tr>
<tr>
<td>Sample gathering, preparation, management</td>
<td>WAC 173-401-532(73)</td>
</tr>
</tbody>
</table>
### Refiner/Diesel Hydrotreater Process Area

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>#3 Reformer: Sampling connections used exclusively to withdraw materials for laboratory analysis and testing</td>
<td>WAC 173-401-532(51)</td>
</tr>
<tr>
<td>#3 Reformer: Steam vents</td>
<td>WAC 173-401-532(87)</td>
</tr>
<tr>
<td>#3 Reformer: Batch loading and unloading of solid phase catalysts</td>
<td>WAC 173-401-532(60)</td>
</tr>
<tr>
<td>Maintenance activities not involving installation of an emission unit and not increasing potential to emit and not otherwise subject to a federally enforceable applicable requirement.</td>
<td>WAC 173-401-532(74)</td>
</tr>
<tr>
<td>DHT: Lube Oil Reservoirs</td>
<td>WAC 173-401-532(3)</td>
</tr>
<tr>
<td>Vents from continuous emissions monitors and other analyzers</td>
<td>WAC 173-401-532(8)</td>
</tr>
<tr>
<td>Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems. Note: Sewer manholes, junction boxes, sumps and lift stations regulated under 40 CFR 61 Subpart FF and 40 CFR 63 Subpart CC are not included in this exemption.</td>
<td>WAC 173-401-532(120)</td>
</tr>
<tr>
<td>Sample gathering, preparation, management</td>
<td>WAC 173-401-532(73)</td>
</tr>
</tbody>
</table>

### Sulfur Plant/Treaters Process Area

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam vents</td>
<td>WAC 173-401-532(87)</td>
</tr>
<tr>
<td>Maintenance activities not involving installation of an emission unit and not increasing potential to emit and not otherwise subject to a federally enforceable applicable requirement.</td>
<td>WAC 173-401-532(74)</td>
</tr>
<tr>
<td>Vents from continuous emissions monitors and other analyzers</td>
<td>WAC 173-401-532(8)</td>
</tr>
<tr>
<td>Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems. Note: Sewer manholes, junction boxes, sumps and lift stations regulated under 40 CFR 61 Subpart FF and 40 CFR 63 Subpart CC are not included in this exemption.</td>
<td>WAC 173-401-532(120)</td>
</tr>
<tr>
<td>Sample gathering, preparation, management</td>
<td>WAC 173-401-532(73)</td>
</tr>
<tr>
<td>Lube Oil Storage and Use</td>
<td>WAC 173-401-532(3) and (69)</td>
</tr>
<tr>
<td>ESP Electrical System Vents: vents from rooms, buildings and enclosures that contain permitted emission units or activities from which local ventilation, controls and separate exhaust are provided</td>
<td>WAC 173-401-532(9)</td>
</tr>
<tr>
<td>Sampling connections used exclusively to withdraw materials for laboratory analysis and testing</td>
<td>WAC 173-401-532(51)</td>
</tr>
<tr>
<td>Treater Caustic, and Caustic Neutralization Tanks: Tanks vessels and pumping equipment, with lids or other appropriate closure for storage or dispensing of aqueous solutions of inorganic salts, bases and acids excluding: (i) 99% or greater H₂SO₄ or H₃PO₄ (ii) 70% or greater HNO₃ (iii) 30% or greater HCl</td>
<td>WAC 173-401-533(2)(s)</td>
</tr>
</tbody>
</table>
### Sulfur Plant/Treaters Process Area

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(iv) More than one liquid phase where the top phase is more than one percent VOCs</td>
<td></td>
</tr>
</tbody>
</table>

### Utilities

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler Area Steam vents</td>
<td>WAC 173-401-532(87)</td>
</tr>
<tr>
<td>Boiler Area Transfer – Bag Dump: Batch loading and unloading of solid phase catalysts</td>
<td>WAC 173-401-532(60)</td>
</tr>
<tr>
<td>Boiler Area Slurry Basin: Demineralization and oxygen scavenging (deaeration) of water</td>
<td>WAC 173-401-532(61)</td>
</tr>
<tr>
<td>Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems. Note: Sewer manholes, junction boxes, sumps and lift stations regulated under 40 CFR Part 61 FF and 40 CFR 63 Subpart CC are not included in this exemption.</td>
<td>WAC 173-401-532(120)</td>
</tr>
<tr>
<td>Maintenance activities not involving installation of an emission unit and not increasing potential to emit and not otherwise subject to a federally enforceable applicable requirement.</td>
<td>WAC 173-401-532(74)</td>
</tr>
<tr>
<td>Firefighting Fire Foam Storage</td>
<td>WAC 173-401-532(52)</td>
</tr>
<tr>
<td>Miscellaneous Cooling Tower Chemical Storage Tanks: Tanks vessels and pumping equipment, with lids or other appropriate closure for storage or dispensing of aqueous solutions of inorganic salts, bases and acids excluding: (i) 99% or greater H₂SO₄ or H₃PO₄ (ii) 70% or greater HNO₃ (iii) 30% or greater HCl (iv) More than one liquid phase where the top phase is more than one percent VOCs</td>
<td>WAC 173-401-533(2)(s), and 532(42)</td>
</tr>
<tr>
<td>Miscellaneous Cooling Tower Chemical Storage Tanks: Polymer tanks and storage devices and associated handling equipment, used for solids dewatering and flocculation</td>
<td>WAC 173-401-532(117)</td>
</tr>
<tr>
<td>Miscellaneous Cooling Tower Chemical Storage Tanks: Mixing, packaging, storage and handling activities of any size, limited to soaps, animal fat, aqueous salt solutions</td>
<td>WAC 173-401-532(69)</td>
</tr>
<tr>
<td>Lube Oil Storage and Use</td>
<td>WAC 173-401-532(3) and (69)</td>
</tr>
<tr>
<td>Sampling connections used exclusively to withdraw materials for laboratory analysis and testing</td>
<td>WAC 173-401-532(51)</td>
</tr>
<tr>
<td>Sample gathering, preparation, management</td>
<td>WAC 173-401-532(73)</td>
</tr>
</tbody>
</table>

### Effluent Collection, Conveyance and Treatment Plant

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymer tote: Polymer tanks and storage devices and associated handling equipment, used for solids dewatering and flocculation</td>
<td>WAC 173-401-532(117)</td>
</tr>
<tr>
<td>Stormwater System</td>
<td>WAC 173-401-533(3)(d)</td>
</tr>
<tr>
<td>Spill Basin</td>
<td>WAC 173-401-533(3)(d)</td>
</tr>
<tr>
<td>Steam vents</td>
<td>WAC 173-401-532(87)</td>
</tr>
</tbody>
</table>
### Storage Vessels

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1X726, 100-Barrel Sulfuric Acid Storage Tank, 2X196, 200-Barrel Caustic Storage Tank, 1X722 Sodium Silicate: Tanks vessels and pumping equipment, with lids or other appropriate closure for storage or dispensing of aqueous solutions of inorganic salts, bases and acids excluding: (i) 99% or greater H₂SO₄ or H₃PO₄ (ii) 70% or greater HNO₃ (iii) 30% or greater HCl (iv) More than one liquid phase where the top phase is more than one percent VOCs</td>
<td>WAC 173-401-533(2)(s)</td>
</tr>
<tr>
<td>Polymer Tank: Polymer tanks and storage devices and associated handling equipment, used for solids dewatering and flocculation</td>
<td>WAC 173-401-532(117)</td>
</tr>
<tr>
<td>Boiler Area 50X306 Storage Tank, Boiler Area 5X1244 Storage Tank, Boiler Area 20X1300 Storage Tank, Boiler Area 250X25 Storage Tank: Storage tanks, reservoirs and pumping and handling equipment of any size limited to soaps, lubricants, hydraulic fluid, vegetable oil, grease, animal fat, aqueous salt solutions or other materials and processes using appropriate lids and covers where there is no generations of objectionable odor or airborne particulate matter</td>
<td>WAC 173-401-532(4)</td>
</tr>
<tr>
<td>1X723 Alum Storage Tank</td>
<td>WAC 173-401-532(97)</td>
</tr>
<tr>
<td>Cleaning and Painting: Maintenance activities not involving installation of an emission unit and not increasing potential to emit and not otherwise subject to a federally enforceable applicable requirement.</td>
<td>WAC 173-401-532(74)</td>
</tr>
</tbody>
</table>

### Other Areas

<table>
<thead>
<tr>
<th>Equipment</th>
<th>WAC Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab water heaters: Space heaters and hot water heaters using natural gas, propane or kerosene and generating less than five million Btu/hr</td>
<td>WAC 173-401-533(2)(r)</td>
</tr>
<tr>
<td>Vehicle exhaust from auto maintenance and repair shops</td>
<td>WAC 173-401-532(7)</td>
</tr>
<tr>
<td>Painting: Plant upkeep including routine housekeeping, preparation for and painting of structures or equipment, retarring roofs, applying insulation to buildings in accordance with applicable environmental and health and safety requirements and paving or stripping parking lots</td>
<td>WAC 173-401-532(33)</td>
</tr>
<tr>
<td>Drum storage: Portable drums and totes</td>
<td>WAC 173-401-532(42)</td>
</tr>
<tr>
<td>Fire and Emergency Response Training: Firefighting and similar safety equipment and equipment used to train fire fighters excluding fire drill pits</td>
<td>WAC 173-401-532(52)</td>
</tr>
<tr>
<td>Fuel Truck: Mobile transport tanks on vehicles, except for those containing asphalt</td>
<td>WAC 173-401-532(2)</td>
</tr>
<tr>
<td>Turnaround Equipment (Diesel Cranes, Air Compressors, Diesel Generators, Diesel Aggregate Blaster-Painting): Plant upkeep including routine housekeeping, preparation for and painting of structures or equipment, retarring</td>
<td>WAC 173-401-532(33)</td>
</tr>
<tr>
<td>Equipment</td>
<td>WAC Citation</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>roofs, applying insulation to buildings in accordance with applicable environmental and health and safety requirements and paving or stripping parking lots</td>
<td></td>
</tr>
<tr>
<td>Trucks, Forklifts, Autos, etc.: Internal combustion engines for propelling or powering a vehicle</td>
<td>WAC 173-401-532(10)</td>
</tr>
<tr>
<td>Infirmary</td>
<td>WAC 173-401-532(53)</td>
</tr>
<tr>
<td>Refinery Laboratory</td>
<td>WAC 173-401-533(3c)</td>
</tr>
<tr>
<td>Maintenance activities not involving installation of an emission unit and not increasing potential to emit and not otherwise subject to a federally enforceable applicable requirement.</td>
<td>WAC 173-401-532(74)</td>
</tr>
<tr>
<td>Carpenter Shop</td>
<td>WAC 173-401-532(55)</td>
</tr>
<tr>
<td>Welding Activities</td>
<td>WAC 173-401-532(12)</td>
</tr>
<tr>
<td>Warehouse Drum Storage</td>
<td>WAC 173-401-532(42)</td>
</tr>
<tr>
<td>Warehouse Forklift Propane Tanks</td>
<td>WAC 173-401-532(10) and (2)</td>
</tr>
<tr>
<td>Lube Oil Storage and Use</td>
<td>WAC 173-401-532(3) and (69)</td>
</tr>
<tr>
<td>Sample gathering, preparation, management</td>
<td>WAC 173-401-532(73)</td>
</tr>
<tr>
<td>Steam vents</td>
<td>WAC 173-401-532(87)</td>
</tr>
<tr>
<td>Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems. Note: Sewer manholes, junction boxes, sumps and lift stations regulated under 40 CFR 61 Subpart FF and 40 CFR 63 Subpart CC are not included in this exemption.</td>
<td>WAC 173-401-532(120)</td>
</tr>
</tbody>
</table>
7 Summary of Changes in AOP Renewal 2

Changes throughout the AOP

Dates for all regulatory citations have been checked, and updated as necessary to reflect the most recent dates for federal, state and NWCAA regulations. New regulatory applicable requirements were added where required by the newer regulation.

Information page

The Air Operating Permit number has been changed from 016R1 to 016R2 reflecting this being the second AOP renewal. There were no modifications to 016R1 prior to 016R2 being issued. Other dates have been changed on this page to reflect the application and permit expiration timing. The Corporate Responsible Official was changed to reflect the current refinery manager.

SECTION 1 Emission Unit Descriptions

Additional information was added to the tables in Section 1 to reflect additional emission units that have been added due to new regulation or due to being constructed recently. The notes in the table has been improved with more information about emission units size and capacity, and brief regulatory citations have been added for reference.

SECTION 2 Standard Terms and Conditions

Regulatory citations and dates were updated as necessary along with associated changes to the requirements. WAC 173-442 - Greenhouse Gas Clean Air Rule (CAR) was added to Section 2 of the AOP. The refining process at the Ferndale Refinery is considered a non energy-intensive trade exposed (non-EITE) industry with greenhouse gas emissions greater than 100,000 metric tons per year of CO2e.

SECTION 3 Standard Terms and Conditions for NSPS and NESHAP

Regulatory citations and dates were updated as necessary along with associated changes to the requirements. This included removing requirements for startup, shutdown and malfunction plans that are no longer required under 40 CFR 63 MACT regulations.

SECTION 4 Generally Applicable Requirements

Regulatory citations and dates were updated as necessary along with associated changes to the paraphrased requirements. Gap filled MR&R requirements imposed under WAC 173-401-615(1) were better identified by inserting “directly enforceable” above only those gap-filled requirements. Fenceline monitoring for benzene required under the refinery sector rule revisions to 40 CFR 63 Subpart CC was added to Section 4. In addition, the due dates for submitting periodic reporting was clarified. The permit terms were reorganized in the following order based on the air pollutant regulated by the permit term; VE (visual emissions), PM (particulate matter including total PM, PM10 or PM2.5), SO2, NOx, CO, NH3 (ammonia), VOC and HAP (includes TAPs).

SECTION 5 Specifically Applicable Requirements

Regulatory citations and dates were updated as necessary along with associated changes to the paraphrased requirements. This included new and revised requirements under 40 CFR 63 Subpart CC and Subpart UUU related to the refinery sector rule. It also included numerous new and revised OACs issued recently by the agency.

Gap filled MR&R requirements imposed under WAC 173-401-615(1) were better identified by inserting “directly enforceable” above only those gap-filled requirements. The citation of NWCAA Section 104 that incorporated federal regulations by reference was removed from individual permit terms and added to the introduction portion of Section 5 instead. The permit terms were reorganized in the following order based on the air pollutant regulated by the permit term; VE (visual emissions), PM (particulate matter including total PM, PM10 or PM2.5), SO2, NOx, CO, NH3 (ammonia), VOC and HAP (includes TAPs).
A some of the more significant changes to Section 5 include incorporating new and revised requirements under the refinery sector rule revisions to 40 CFR 63 Subpart CC and Subpart UUU. The table for the Flare System was revised to incorporate new provisions for flares due January 30, 2019 required under the refinery sector rule. The table for storage vessels (tanks) was rewritten to reflect the Ferndale Refinery’s recent option to use the control and work practice standards under 40 CFR 63 Subpart WW as allowed under the refinery sector rule revisions. Other refinery sector rule revisions include alternative standards for emission units during startup and shutdowns activities, and adding provisions to limit emissions during the opening of maintenance process vents.

Table 6-1 lists the new or revised orders that have been added to the permit during this AOP renewal. The orders include Orders of Approval to Construct (OAC) and a compliance order issued by the NWCAA. It also includes a Prevention of Significant Deterioration (PSD) permit issued by Ecology. A number of OACs that have been added to the permit were revised for AOP cleanup prior to incorporation into the AOP.

<table>
<thead>
<tr>
<th>Issued</th>
<th>Order</th>
<th>Original Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 30, 2016</td>
<td>OAC 733e</td>
<td>Ferndale Upgrade and Clean Fuels Project (new FCCU and modify Alky Unit and SRU #1)</td>
</tr>
<tr>
<td>June 9, 2016</td>
<td>OAC 265a</td>
<td>Modify Truck Loading Rack</td>
</tr>
<tr>
<td>June 9, 2016</td>
<td>OAC 578b</td>
<td>New #1 Boiler</td>
</tr>
<tr>
<td>June 9, 2016</td>
<td>OAC 727a</td>
<td>New Merox Unit</td>
</tr>
<tr>
<td>June 9, 2016</td>
<td>OAC 780a</td>
<td>Modify DHT Heater</td>
</tr>
<tr>
<td>June 9, 2016</td>
<td>OAC 795a</td>
<td>Modify Alky Unit with new Debutanizer Tower</td>
</tr>
<tr>
<td>June 9, 2016</td>
<td>OAC 877b</td>
<td>New #4 Boiler</td>
</tr>
<tr>
<td>June 9, 2016</td>
<td>OAC 908b</td>
<td>New SRU #2 and modify Crude and FCCU Units.</td>
</tr>
<tr>
<td>February 11, 2016</td>
<td>OAC 1232</td>
<td>Modify Crude Unit with a new Distillation Tower</td>
</tr>
<tr>
<td>September 9, 2015</td>
<td>PSD-00-02 Amd 8</td>
<td>Ferndale Upgrade and Clean Fuels Project (new FCCU and modify Alky Unit and SRU #1)</td>
</tr>
<tr>
<td>April 21, 2015</td>
<td>OAC 1012d</td>
<td>Modify Vacuum Flasher Heater with SCR</td>
</tr>
<tr>
<td>October 23, 2015</td>
<td>OAC 1223</td>
<td>New Tier III Hydrotreater Unit</td>
</tr>
<tr>
<td>October 21, 2014</td>
<td>OAC 1047a</td>
<td>Modify CO Boiler with ESNCR</td>
</tr>
<tr>
<td>July 14, 2014</td>
<td>Compliance Order 13</td>
<td>Consent Decree CO limits on the FCCU/CO Boiler</td>
</tr>
<tr>
<td>March 7, 2014</td>
<td>OAC 1174</td>
<td>Flare Infrastructure Upgrade Project</td>
</tr>
<tr>
<td>June 7, 2013</td>
<td>OAC 1152</td>
<td>New Crude Unloading Facility</td>
</tr>
<tr>
<td>February 16, 2012</td>
<td>OAC 1111</td>
<td>New Ethanol Unloading Facility and Storage Tank</td>
</tr>
</tbody>
</table>

One order, OAC 49 issued January 29, 1972, was removed from the AOP during this renewal because it was deemed to be narrative with no ongoing requirements. OAC 49 was issued for construction of Supplemental Crude Heater (1F-1A).

**SECTION 6 Inapplicable Requirements**

The following regulations have been added to the list of inapplicable requirements in Section 6 of the AOP because there are no emission units at the refinery subject to their requirements.
The following regulations have been removed from the list of inapplicable requirements in Section 6 of the AOP.

- 40 CFR 60 Subpart NNN - Standards of Performance for Asphalt Processing and Asphalt Roofing Manufacture
- 40 CFR 60 Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The following regulations have been removed from the list of inapplicable requirements in Section 6 of the AOP.

- 40 CFR 60 Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units has been removed because there are two utility boilers at the refinery subject to Subpart Db.
- 40 CFR 63 Subpart R - National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations) has been removed because the Truck Loading Rack is required to employ control requirements of Subpart R as referenced by 40 CFR 63 Subpart CC.
- 40 CFR 63 Subpart Y - National Emission Standards for Marine Tank Vessel Loading Operations has been removed because the Marine Terminal is required to employ a control requirement of Subpart Y as referenced by 40 CFR 63 Subpart CC.
8 Public Docket

Copies of Phillips 66 Ferndale Refinery’s Air Operating Permit application and technical support documents are available at the following location:

Northwest Clean Air Agency
1600 South Second Street
Mount Vernon, WA 98273-5202

http://www.nwcleanairwa.gov
9 Response to Comments on Draft AOP

During AOP renewal 2 (016R2), the agency provided a 30-day public comment period on the draft air operating permit with the comment period ending on November 10, 2017. During this comment period the agency received one letter containing comments on the draft AOP and no other correspondence regarding comments. The letter was from the Phillips 66 Ferndale Refinery. Most of the comments pertain to clarifications and minor typographical corrections suggested for the AOP and Statement of Basis and all were accommodated as suggested.

A comment regarding Tank 70X1 resulted in a review of the regulations applicable to this ethanol storage tank. It was determined that the draft AOP inadvertently categorized Tank 70X1 as a Refinery MACT Group 1 tank when in fact it is a MACT Group 2 tank because it is not in HAP service. Corrections to the AOP and Statement of Basis were made to reflect this including making 40 CFR 60 Subpart Kb directly applicable and removing the refinery’s option to comply with 40 CFR 63 Subpart WW instead of Subpart Kb.

The comment letter from Phillips 66 found that the AOP erroneously required that external floating roof tanks in high vapor pressure liquid service be degassed and internally inspected at least once every ten years. The correct requirement is for these tanks to be internally inspected each time they are degassed and refilled, but not at any minimum interval. Upon review the agency found that this ten year minimum inspection provision is applicable to internal floating roof (IFR) tanks but not to external floating roof (EFR) tanks. The ten year internal inspection interval for external floating roof tanks was removed from the AOP to properly reflect the applicable regulations for these tanks.
10 Definitions and Abbreviations/acronyms

Definitions are assumed to be those found in the underlying regulation. A short list of definitions has been included to cover those not previously defined.

An "applicable requirement" is a provision, standard, condition or requirement in any of the listed regulations or statutes as it applies to an emission unit or facility at a stationary source.

An "emission unit" is any part or activity of a stationary source that emits or has the potential to emit any regulated air pollutant.

A "permit" means for the purposes of the air operating permit program an air operating permit issued pursuant to Title 5 of the 1990 Federal Clean Air Act.

"Technology-Based Emission Standard" means a standard, the stringency of which is based on determinations of what is technologically feasible considering relevant factors.

"State" means for the purposes of the air operating permit program the NWCAA or the Washington State Department of Ecology.

The following is a list of abbreviations and acronyms possibly used in the Air Operating Permit or Statement of Basis:

- AMP: Alternative monitoring plan
- AOP: Air operating permit
- ASTM: American Society for Testing and Materials
- BACT: Best available control technology
- Bbl: Barrel (42 U.S. gallons)
- BQ2: Benzene waste quantity under 2 Mg/year (wastewater)
- BWON: Benzene waste operations NESHAP (40 CFR 61 Subpart FF)
- CAA: Clean Air Act
- CAM: Compliance assurance monitoring
- CEMS: Continuous emission monitoring system
- CD: Consent decree
- CEM: Continuous emission monitor
- CGD: Cat Gas Desulfurization (CGD/S-Zorb Process Unit)
- COB: CO Boiler
- COM: Continuous opacity monitor
- CFR: Code of Federal Regulations
- DHT: Diesel Hydro Treater (Unit)
- EFR: External floating roof (tank)
- ESNCR: Enhanced selective non-catalytic reduction (at FCCU)
- FCAA: Federal Clean Air Act
- FCCU: Fluid Catalytic Cracking Unit
- FGS: Flue Gas Scrubber (at FCCU) include
- HAP: Hazardous air pollutants (and TAPs)
- HON: Hazardous Organic NESHAP
- H2S: Hydrogen sulfide
- IFR: Internal floating roof (tank)
- kPa: Kilopascals (pressure)
- LEL: Lower explosive limit
- LDAR: Leak detection and repair
- LTPD: Long tons per day (2,240 pounds per day)
- MACT: Maximum Achievable Control Technology (under 40 CFR 63)
- EPA Method: U.S. EPA Test Method found under 40 CFR 60 Appendix A
- Mg: Megagram (10⁶ grams mass)
- MMBtu: Million British thermal units (higher heating value)