

# Statement of Basis for the Air Operating Permit – Draft

## **Puget Sound Energy Whitehorn Generating Station**

Blaine, Washington

**December 6, 2021**



*Serving Island, Skagit & Whatcom Counties*

**PERMIT INFORMATION**  
**PUGET SOUND ENERGY, WHITEHORN GENERATING STATION**  
**4930 Brown Road, Blaine, Washington 98230**

**SIC: 4911**

**NAICS: 221112**

**EPA AFS: 53-073-60028**

**NWCAA ID: 1310-V-W**

**Responsible Corporate Official**

**Corporate Inspection Contact**

Ryan Blood  
Director, Generation North  
Puget Sound Energy  
Snoqualmie Conference Center  
35413 SE Douglas Street  
Snoqualmie, WA 98065-9281  
(425) 457-4104

Ron Milhomme  
O&M Supervisor  
Whitehorn Generating Station  
4930 Brown Road  
Blaine, WA 98230  
(360) 371-2822

**Northwest Clean Air Agency**

1600 South Second Street  
Mount Vernon, WA 98273-5202  
(360) 428-1617

**Prepared by**

Christos Christoforou, P.E.  
Engineer  
(360) 428-1617 ext. 214

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## **1 INTRODUCTION**

Puget Sound Energy (PSE) Whitehorn Generating Station (PSE Whitehorn, permittee, or the facility) is required to obtain an air operating permit (AOP or permit) pursuant to Title V of the 1990 Federal Clean Air Act (FCAA) and chapter 173-401 of the Washington Administrative Code (WAC). The permit is required because PSE Whitehorn has the potential-to-emit more than 100 tons per year of four regulated criteria air pollutants: sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), and carbon monoxide (CO), and particulate matter (PM). These air pollutants are emitted as products of combustion during turbine operation.

The purpose of this Statement of Basis (SOB) is to set forth the legal and factual evidence for the conditions in PSE Whitehorn's AOP and to provide background information for permit review by interested parties. This Statement of Basis is not a legally enforceable document in accordance with WAC 173-401-700(8).

The Northwest Clean Air Agency (NWCAA or Agency) issued the original AOP for PSE Whitehorn on May 1, 1998 and it expired on May 1, 2003. The first renewal was issued on February 3, 2005, the second renewal was issued on January 1, 2012, and the third renewal was issued on January 31, 2017. Changes made during the previous renewals were documented in earlier SOB which are kept on file at NWCAA.

### **1.1 Changes Made During the fourth Renewal**

The NWCAA received the application for the fourth renewal of the PSE Whitehorn Generating Station on January 27, 2021. The following changes have been made to the AOP during the fourth renewal:

- Regulatory citations in the permit were revised to reflect new or modified regulations and updated revision/promulgation dates.
- Formatting throughout the entire document has been updated to current NWCAA standards.
- Contact names and information for PSE and the NWCAA were updated as appropriate. In addition, the Permit Information page reflects the updated permit number and dates for the permit renewal.
- AOP Section 2 (Standard Terms and Conditions) has been replaced with the latest NWCAA standard version, containing any new or modified regulations and updated reference dates.
- AOP Section 3 (Standard Terms and Conditions for NSPS and NESHAP) has been replaced with the latest NWCAA standard version of applicable requirements, containing any new or modified regulations and updated reference dates.
- AOP Section 4 (Generally Applicable Requirements) were reviewed and updated. Section 4 primarily lists NWCAA and Washington Administrative Code (WAC) regulations, which often lack specific methods for compliance determination and require that additional monitoring, recordkeeping and recording provisions be added to the AOP for the purpose of compliance

determination. This aspect of Air Operating Permits, known as gap-filling and sufficiency monitoring, is discussed further in Section 4.4. Gap-filled and sufficiency monitoring requirements in the AOP Section 4 were modified for this renewal to be consistent with NWCAA's new format for this section.

- AOP Section 5 was revised to include requirements for a second emergency generator at the facility. Also, NWCAA 104.2 was removed from individual permit term citations since it is cited in the introduction to Section 5.
- The Statement of Basis content and layout were revised to standardize the documents issued for the Puget Sound Energy facilities within NWCAA jurisdiction. Factual information was revised to correct for current operation and some text has been rephrased to add clarification.

## 2 FACILITY DESCRIPTION

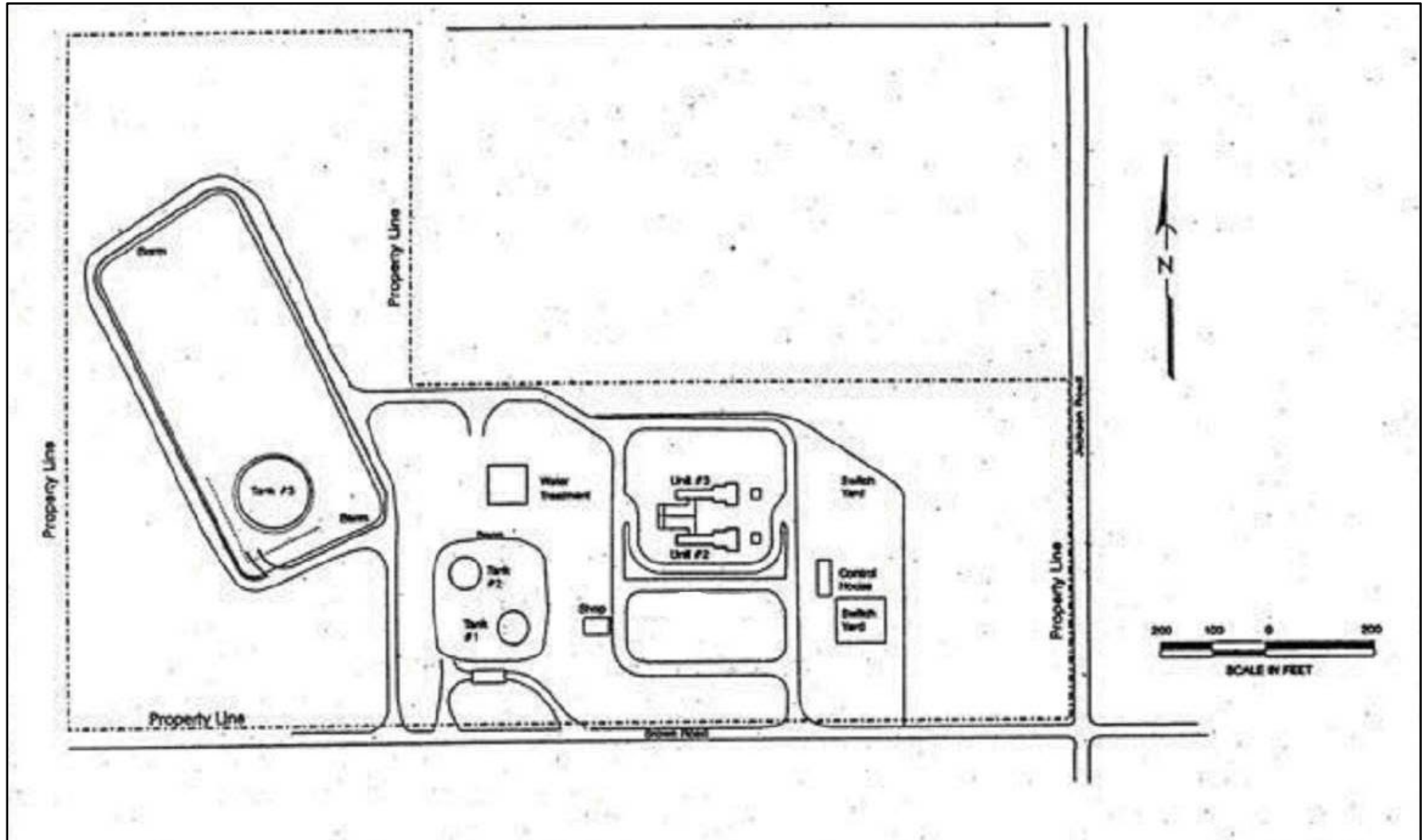
### 2.1 General Facility Description

PSE Whitehorn is a fossil fuel-fired, combustion turbine facility designed to generate electrical power for PSE customers. The facility can run on a continuous basis; however, due to economic and system conditions, the facility only runs intermittently as a peaking plant. The Whitehorn Generating Station is located west of the BP Cherry Point refinery in Whatcom County (see Figure 1).



**Figure 1 PSE Whitehorn Location Map**

The facility consists of two combustion turbine generators, lubricating oil ventilation systems, three distillate fuel storage tanks, a water treatment system, two emergency generators, and an electric substation. Figure 2 is the facility plot plan.



**Figure 2 PSE Whitehorn Site Plan**



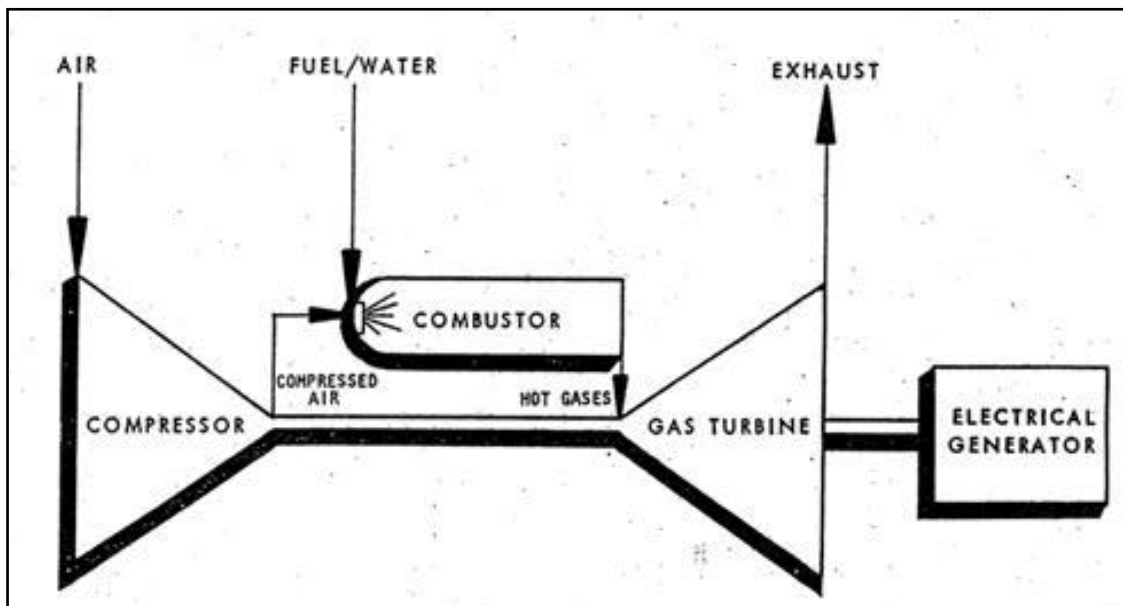
## 2.2 Emission Unit Description

### 2.2.1 Turbine Units

The facility, originally permitted by the NWCAA in 1973, became operational in January 1975. The 1975 operation consisted of one distillate-fired Turbo Power Marine (TPM) Twin Pak simple cycle combustion turbine generator designated as Unit 1. It had a base-load rating of 55.9 megawatts (MW). Unit 1 combustion turbine was decommissioned and removed from the facility in 2000.

PSE Whitehorn was expanded in 1979 with the addition of two General Electric (GE) Frame 7, type 7101E simple cycle combustion turbine generators (Units 2 and 3) with individual stacks, along with a water treatment system. These units have a base-load rating of 74.4 MW each and a peak cold weather rating of 80.5 MW each when burning natural gas. The primary fuel for the combustion turbine generators is natural gas supplied via underground pipeline by Cascade Gas/Northwest Pipeline Company. Distillate fuel oil is the alternate fuel for Units 2 and 3.

To control emissions and meet best available control technology (BACT) standards, Units 2 and 3 have been equipped with water injection to reduce NO<sub>x</sub> emissions. NO<sub>x</sub> emissions are controlled by injecting purified water into the turbine combustion chambers. The added water reduces formation of NO<sub>x</sub> by limiting combustion temperatures to approximately 1,900°F. Figure 3 shows a combustion turbine flow diagram for the turbines at PSE Whitehorn.



**Figure 3 Combustion Turbine Flow Diagram**

The combustion turbine generators typically can be started, operated, and be shut down remotely from PSE's Redmond dispatch center or locally by operators onsite.

### **2.2.2 Oil Mist Collection Systems**

Units 2 and 3 are equipped with oil mist collection systems (also referred to as lubricating oil system ventilation or lube oil mist eliminator systems). These systems collect the oil mist generated from the lubricating oil (for the engines) and seal oil (for the bearings) circulating systems. The oil reservoirs are equipped with electric heaters to manage oil viscosity during cold weather. For proper equipment operation, these systems must be operated under negative pressure, which requires them to vent to the atmosphere. Each collection system is equipped with one vent stack for each unit.

The primary emissions from these systems are particulate matter (PM). For Units 2 and 3, emissions are minimized by utilizing a mist eliminator filter. Emissions from the oil mist collection systems are also minimized by using good operation and maintenance practices.

An electrostatic precipitator was originally installed with the turbines as the oil mist collection system. The electrostatic precipitator was very messy, difficult to maintain, and not very effective. When GE phased out the electrostatic precipitator, PSE replaced the electrostatic precipitator with a mist eliminator in 1993.

These sources are not considered Insignificant Emission Units under WAC 173-401-532(4) because these reservoirs are process equipment that are heated as necessary and require more than "lids or covers" to prevent "airborne particulate matter". Additionally, if the control equipment fails, these sources have the potential for opacity emissions, which is contrary to the concept of an insignificant emission unit.

### **2.2.3 Distillate Oil Storage Tanks**

Fuel oil for the facility is stored in two 1,050,000-gallon internal floating roof storage tanks (Tanks 1 and 2) and one 4,200,000-gallon fixed roof tank (Tank 3). Distillate fuel oil is purchased periodically in batch quantities and stored in the facility storage tanks. Distillate fuels are analyzed for sulfur content whenever new fuel is received at the facility in accordance with 40 CFR 60 Subpart GG and 40 CFR 75.

Tanks 1 and 2 were included in the original facility permitting in 1973 and were operational January 1975. These two internal floating roof tanks originally held JP4 as the lightest fuel but are currently used for distillate fuel oil (No. 2).

Tank 3 was constructed in 1979. This distillate tank is an above-ground tank equipped with a fixed cone roof. The tank is only used to store material with a low vapor pressure (i.e., less than 3.5 kPa maximum true vapor pressure).

### **2.2.4 Emergency Generators**

PSE Whitehorn operates two emergency generators at the facility: a 50 kW diesel-fired compression-ignition emergency generator (Onan 50DGCA serial number B920449397) and a 500 kW diesel-fired compression-ignition emergency generator (Cummins/Onan 500DFFB serial number H940551576). The emergency generators supply back-up power for some communication and substation equipment, as well

as some office equipment, during a power outage. The 50 kW emergency generator was installed in October 1992, while the 500 kW emergency generator was commissioned in May 2020.

## 2.3 Emission Inventory

### 2.3.1 Potential to emit (PTE)

Table 2-1 presents the estimated worst case annual PTE for the facility. That is the sum of the PTE for the 2 individual turbines by pollutant.

The PTE for each pollutant is based on most stringent permit limit. If no limit exists for a pollutant (i.e., CO and VOC) for an individual unit, PTE for that pollutant/unit is based on worst-case calculation of annual emissions assuming full operations (8,760 hr/yr). For calculated emissions, worst-case is determined from full operation of that unit on either fuel (highest emission). Note that there are no permit conditions restricting hours of operation for any unit, nor are there any restrictions on fuel usage.

VOC PTE from diesel at 6 tpy is lower than that from natural gas at 29 tpy. However, the PTE for all other pollutants is higher from diesel, thus on Table 2-1 emissions from diesel are presented.

Total HAP PTE from diesel at 12.8 tpy is larger than that from natural gas at 8.5 tpy. The largest single HAP from diesel is hydrogen chloride at 4 tpy. The largest single HAP from natural gas is formaldehyde at 6.2 tpy.

**Table 2-1 PTE based on diesel combustion**

	PM	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	Total HAP
PTE, tons/yr	473	6,132	4,380	6*	1,039	13

\* 29 tpy VOC when firing natural gas.

### 2.3.2 Actual Emissions

Tables 1 and 2 show the annual emissions inventory for PSE Whitehorn as submitted to the NWCAA. The turbines are typically used to provide electrical capacity during peak use periods or during periods when power supply economics dictate their use. These units may go months or years without any significant operation except for testing but may operate continuously for weeks when the power situation warrants. The facility permit does not contain limitations on hours of operation.

**Table 2-2 Criteria Pollutant Emissions Inventory, tons per year**

	2015	2016	2017	2018	2019	2020
PM	2	3	4	3	0	0
PM <sub>10</sub>	2	3	4	3	0	0
PM <sub>2.5</sub>	2	3	4	3	0	0
SO <sub>2</sub>	1	1	1	1	0	0

NO <sub>x</sub>	112	132	208	139	20	14
VOC	1	1	1	1	0	0
CO	11	13	19	13	1	1
NH <sub>3</sub>	0	0	0	0	0	0
CO <sub>2</sub>	39,292	46,532	69,850	46,126	7,095	4,825

**Table 2-3 Toxic Pollutant Emissions Inventory, pound per year**

	2015	2016	2017	2018	2019	2020
Acetaldehyde	28.2	33.7	49.5	33.4	4.7	3.3
Acrolein	4.5	5.4	7.92	5.4	0.7	0.5
Benzene	8.8	10.3	16.1	10.2	1.8	1.2
Ethylbenzene	22.6	27.0	39.6	26.7	3.8	2.6
Formaldehyde	502.5	598.7	884.7	593.4	86	59.5
Manganese compounds	5.1	2.2	18.3	2.2	6	3
Naphthalene	1.1	1.2	2.4	1.2	0.4	0.2
PAH	1.8	2.0	2.7	2.0	0.4	0.3
Propylene oxide	20.4	24.4	35.9	24.2	3.4	2.4
Selenium	0.2	0.1	0.6	0.1	0.2	0.1
Toluene	91.7	109.5	160.8	108.5	15.4	10.7
Xylene	45.1	53.9	79.2	53.4	7.6	5.3

## 2.4 Permitting History

**Order of Approval to Construct (OAC) issued November 14, 1973:** The NWCAA initially permitted a 60 MW Twin Pac combustion turbine (Unit 1), one 24,000 barrel internal floating roof tank onsite, and one 150,000 barrel internal floating roof tank at the ARCO (now BP) refinery. PSE modified the OAC to relocate the site to the west side of the ARCO refinery and to build a second 24,000 barrel internal floating roof storage tank onsite. The file does not include any comments on this revision; as such, NWCAA approval for this modification became effective on March 27, 1974. Unit 1 was decommissioned and removed from the facility in 2000. This permit contains no ongoing requirements and, therefore, is not included in the AOP.

**PSD X-80-02 issued December 19, 1979 & OAC issued November 21, 1979:** PSE submitted a Notice of Construction (NOC) application June 29, 1979 and simultaneously applied for a PSD permit on June 11, 1979 to U.S. EPA Region 10 to construct two GE Frame 7 simple-cycle combustion turbines (Units 2 and 3) and three 100,000 barrel tanks. Only one of the three 100,000 barrel tanks was constructed. The OAC contains no ongoing requirements and, therefore, is not included in the AOP.

An initial performance test for NO<sub>x</sub> was conducted during November 5 - 12, 1981 while burning natural gas and distillate fuel oil. At that time, PSE demonstrated that Units 2 and 3 were operating within the emission limits established in the applicable approvals and regulations. The performance test data was used by GE to generate NSPS compliance charts included in the AOP Appendix. These charts are used to maintain water injection rates adequate to meet NO<sub>x</sub> emission limitations in accordance with 40 CFR 60 Subpart GG.

**EPA Administrative Order on Consent CAA-10-2001-0107, Conditions 9a and 9b, issued April 6, 2001:** On May 4, 2001, PSE submitted an NOC to construct and operate two Pratt and Whitney Model FT-8 Twin Pac simple-cycle units at another PSE generating station (Units 3 and 4 at the PSE Fredonia Generating Station) for power production during peak use periods. PSE was allowed to begin construction on the new units on an accelerated schedule (without a PSD permit) as a result of an Administrative Order (CAA-10-2001-0107 dated April 6, 2001 – PSE Order) issued by EPA Region 10 at the request of the Governor of Washington, Gary Locke. The accelerated schedule was allowed in order to provide additional electrical generation capacity in the face of severe expected energy shortfalls during latter part of 2001.

This PSE Order required that PSE offset new emissions by taking specified actions. One of those actions (Condition 9b) was for PSE to purchase 3,000,000 gallons of low sulfur diesel instead of high sulfur diesel for use at PSE Whitehorn. This fuel substitution was to yield sufficient secondary PM<sub>10</sub> emissions reductions to offset some of the pre-permit PM<sub>10</sub> emissions increases from the new turbines at PSE Fredonia.

In addition, Administrative Order of Consent CAA-10-2001-0096 (BP Order) allowed the BP (then ARCO) Cherry Point refinery to construct 14 natural gas turbines to replace 26 non-road diesel engines without first obtaining a PSD permit. This BP Order required that BP offset PM<sub>10</sub> emissions by, among other things, replacing orders of high sulfur diesel totaling 50,000 gallons with low sulfur diesel and absorbing the cost differential. According to the PSE Order Condition 9b, the fuel in this BP offset is to be separate from the PSE Fredonia swap and cannot be included in the PSE 3,000,000 gallon totals. According to BP (Liz Daly, 12/20/10 email), the BP fuel swap was completed on September 25, 2001 and PSE Whitehorn was not a recipient of the low sulfur diesel. BP shipped the distillate involved in this swap via the Olympic Pipeline to the Tesoro Terminal in Vancouver for use by Burlington Northern Santa Fe Railway. As such, all the qualifying distillate consumed at PSE Whitehorn can be counted toward the 3,000,000 gallon requirement.

Another action that was mandated by the PSE Order (Condition 9a) was that the water injection for one of the turbines at PSE Whitehorn be increased such that the NO<sub>x</sub> emissions be reduced to below 50 ppm<sub>vd</sub> at 15% oxygen for a period specified in the PSE Order to offset NO<sub>x</sub> emissions from the turbines at PSE Fredonia. Testing was required to demonstrate compliance with the limit. See SOB Section 4.2 for a discussion of the test results.

**Air Operating Permit 012:** PSE submitted the facility AOP application on June 7, 1995. The original AOP for PSE Whitehorn was issued by the NWCAA on May 1, 1998.

The first AOP renewal application for PSE Whitehorn was submitted on October 16, 2002. The first AOP renewal (012R1) was issued by the NWCAA on February 3, 2005.

AOP 012R1 was issued with a typo in the date the renewal was due. The renewal application was submitted in a timely fashion on July 31, 2009 prior to the August 3, 2009 due date. The second renewal, AOP 012R2, was issued on January 1, 2012.

AOP 012R2 was administratively amended twice. AOP 012R2M1 was issued on 23 October 2012 to correct typographical errors and AOP 012R2M2 was issued on 5 February 2013 to change the responsible official.

AOP 012R3 was issued on January 31, 2017. AOP 012R3M1 was issued on January 26, 2021 to change the responsible official from Ron Roberts to Ryan Blood.

## **2.5 Compliance History**

### **2.5.1 Notices of Violation**

There have been no NOVs against the facility since 2002.

### **2.5.2 Compliance Reports**

The PSE Whitehorn AOP requires periodic, semiannual, and annual reports to be submitted to the NWCAA as part of the facility's ongoing compliance demonstration. When a permit deviation occurs, the facility is required to submit a periodic report within 30 days after the end of the month during which the deviation occurred identifying any excess emissions and provide a discussion as to the cause and what was done to correct the problem. The facility submits a semiannual summary report of emissions, process information, and continuous monitoring system performance. In addition, semiannual reports are submitted providing for the certification by the responsible corporate official of the truth, accuracy, and completeness of reports submitted during the previous six-month period. Annually, the responsible corporate official also certifies compliance with all applicable requirements in the AOP term by term and whether the facility was fully or intermittently in compliance with each term.

### **3 BASIS OF REGULATION APPLICABILITY**

#### **3.1 New Source Performance Standards (NSPS)**

**40 CFR 60 Subpart K - Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978:** Tanks 1 and 2 (1,050,000-gallon each of which began operation in 1975) are potentially subject to 40 CFR 60 Subpart K based on size and construction date. However, these tanks currently store No. 2 distillate fuel which does not qualify as “petroleum liquid” as defined in 40 CFR 60.111(b); as such, 40 CFR 60 Subpart K does not apply.

**40 CFR 60 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:** Tank 3 (4,200,000-gallon which was constructed in 1979) is potentially subject to 40 CFR 60 Subpart Ka based on size and construction date. However, this tank currently stores No. 2 distillate fuel which does not qualify as “petroleum liquid” as defined in 40 CFR 60.111a(b); as such, 40 CFR 60 Subpart Ka does not apply.

**40 CFR 60 Subpart GG – Standards of Performance for Stationary Gas Turbines:** The provisions of 40 CFR 60 Subpart GG are applicable to stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired, for which construction, modification, or reconstruction is commenced after October 3, 1977. Units 2 and 3 were built after the adoption of 40 CFR 60 Subpart GG for turbine generators. Therefore, 40 CFR 60 Subpart GG, along with 40 CFR 60 Subpart A (General Provisions), apply to both turbines.

#### **3.2 National Emission Standards for Hazardous Air Pollutants (40 CFR 63)**

**40 CFR 63 Subpart YYYY—National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines:** 40 CFR 63 Subpart YYYY establishes national emission and operating limitations for hazardous air pollutants (HAP) emissions from stationary combustion turbines located at major sources of HAP emissions, and requirements to demonstrate initial and continuous compliance with the emission and operating limitations. A major source is one that has the potential to emit 10 tons or more per year of any single HAP or 25 tons per year or more of any combination of HAP. 40 CFR 63 Subpart YYYY does not apply to PSE Whitehorn because the facility is not a major HAP source because it does not have a potential-to-emit of 10 tons or more of a single HAP or 25 tons or more of a combination of HAPs.

A NESHAP standard that applies to stationary combustion turbines at area sources of HAP has not been promulgated.

**40 CFR 63 Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines:** 40 CFR 63 Subpart ZZZZ establishes national emission and operating limitations for HAP emissions from stationary reciprocating internal combustion engines (RICE)

located at major and area sources of HAP emissions. PSE Whitehorn is an area source of HAP emissions and, as such, is potentially subject to 40 CFR 63 Subpart ZZZZ. The two PSE Whitehorn generators are considered emergency stationary RICE located at an area source of HAP emissions under 40 CFR 63 Subpart ZZZZ.

**40 CFR 60 Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines** 40 CFR 60 Subpart IIII applies to stationary compression ignition internal combustion engines that commenced construction after July 11, 2005 and were manufactured after, for engines that are not fire pump engines, April 1, 2006 and, for fire pump engines, July 1, 2006. According to an email I received from Ron Milhomme on 11/1/2021, the 500 kW generator was manufactured on August 1994, and as such it is not subject to 40 CFR 60 Subpart IIII.

### **3.3 Acid Rain**

**40 CFR Parts 72, 73, 74, 75, 77, and 78 – The Acid Rain Program: Permits, Allowance System, Sulfur Dioxide Opt-Ins, Continuous Emission Monitoring, Excess Emissions, and Appeal Procedures:** Title IV of the Clean Air Act authorizes the EPA to establish the Acid Rain Program. The purpose of the Acid Rain Program is to significantly reduce emissions of sulfur dioxide and nitrogen oxides from utility electric generating plants in order to reduce the resultant adverse health and ecological impacts of acidic deposition (or acid rain). The EPA promulgated these rules on January 11 and March 23, 1993. PSE Whitehorn Units 2 and 3 are not subject to the Acid Rain Program because, as simple cycle turbines that were installed before November 15, 1990, they are not “affected units” (40 CFR §72.6(b)(1)).

### **3.4 40 CFR 64 - Compliance Assurance Monitoring (CAM)**

The CAM rule requires owners or operators of subject sources to conduct monitoring that satisfies specific criteria established in the rule to provide a reasonable assurance of compliance with applicable requirements. EPA established the CAM program to regulate emissions units that employ pollution control equipment to achieve compliance with an enforceable emission limit or standard. The CAM rule provides for additional monitoring if current monitoring fails to specify adequate detail. The CAM rule applies when all three criteria below apply:

- (1) The unit is subject to an emission limit other than an emission limit from a NSPS or NESHAP that was proposed after November 15, 1990;
- (2) The unit uses an add-on control device to meet the emission limit, and
- (3) The unit has potential pre-control device emissions of the applicable regulated pollutant that are equal to or greater than 100% of the amount, in tons per year, required for a source to be classified as a major source.

If all 3 of the above criteria apply, one further criterion is evaluated to determine whether a CAM plan is needed: if a unit is equipped with a continuous monitor (CEM or COM) and monitoring for compliance with a limit is done using the continuous monitor, then a CAM plan is not required for that unit for that specific limit or standard.



**CAM summary for Emission Units at PSE Whitehorn:**

<b>Emission Unit</b>	<b>Add-on Control:</b>	<b>Subject to emission limit or standard for pollutants controlled with add-on controls?</b>	<b>Pre-control emissions greater than 100% of major source for pollutants controlled with add-on controls?</b>	<b>Continuous monitor for pollutant with emission limit and add-on control which exceeds 100% of major source?</b>	<b>Is a CAM Plan Required?</b>
Turbines 2 and 3 and oil mist collector systems	SO <sub>2</sub> : <b>No</b> NO <sub>x</sub> : <b>Yes</b> <sup>1</sup> ; water injection PM: <b>No</b> CO: <b>No</b>	NO <sub>x</sub> : <b>Yes</b>	NO <sub>x</sub> : <b>Yes</b>	No CEM or COM at this facility	<b>Yes</b>
Distillate fuel storage tanks: 1, 2, and 3	<b>No</b>	Not applicable; no add-on control	Not applicable; no add-on control	Not applicable; no add-on control	<b>No</b>
Emergency Generator	<b>No</b>	Not applicable; no add-on control	Not applicable; no add-on control	Not applicable; no add-on control	<b>No</b>

<sup>1</sup> Water injection is not considered inherent process equipment because the turbines can operate with water injection offline; as such, water injection is deemed to be a control device under CAM.

Sources subject to CAM must submit CAM Plans, the requirements of which are to be included in the AOP. The combined CAM Plan for Units 2 and 3 for NO<sub>x</sub> are included in its entirety in SOB Appendix A; the CAM Plan requirements are incorporated in AOP Section 5.

### **3.5 Risk Management Plan (RMP)**

**40 CFR 68 – Chemical Accident Prevention Provisions:** The goal of 40 CFR Part 68 and the risk management program is to prevent accidental releases of substances that can cause serious harm to the public and the environment from short-term exposures and to mitigate the severity of releases that do occur. If a facility contains the hazardous or flammable substances listed in 40 CFR §68.130 in an amount above the “threshold quantity” specified for that substance, the facility operator is required to develop and implement a risk management program.

PSE Whitehorn is exempt from this regulation because the facility does not have any of the listed substances in 40 CFR §68.130 in quantities above the threshold values.

### **3.6 New Source Review (NSR)**

#### **3.6.1 Basic Information**

New Source Review (NSR) requires stationary sources of air pollution to acquire permits before they begin construction. NSR is also referred to as construction permitting or preconstruction permitting.

There are three types of NSR permits. A source may have to acquire one or more of these permits:

- Prevention of Significant Deterioration (PSD) permits, which are required for new major sources or a major source making a major modification in an attainment<sup>1</sup> area;
- Nonattainment NSR permits, which are required for new major sources or major sources making a major modification in a nonattainment area; and
- Minor source permits, which are required for sources that emit pollutants below the major source threshold but above the minor source threshold. It is generally the case that a major new or modified source will also require minor NSR permitting that covers a different subset of pollutants.

PSE Whitehorn is located in an area that is in attainment for all pollutants. Therefore, only PSD permits and minor source permits are required for projects at the facility.

#### **3.6.2 What are permits?**

Permits are legal documents that the source must follow. Permits specify what emission limits must not be exceeded and how the source is to demonstrate

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<sup>1</sup> An attainment area means a geographic area designated by EPA at 40 CFR 81 as having attained the National Ambient Air Quality Standard for a given criteria pollutant (Reference: WAC 173-400-030 (9)).

compliance with the set limits. Permits may contain conditions to ensure that the source is built according to the permit application upon which the permitting agency relies for air impact analysis. For example, the permit may specify a stack height that was used by the permitting agency to determine compliance with air pollutant limits. Some limits in the permit may be specified at the request of the source to keep them from being subject to other requirements. For example, the source may take limits in a minor NSR permit to keep the source out of PSD. To assure that sources follow permit requirements, permits also contain monitoring, recordkeeping, and reporting (MR&R) requirements.

### **3.6.3 Who Issues the Permits?**

In Washington State most NSR permits are issued by the Washington State Department of Ecology ("Ecology") or local air pollution control agencies. The EPA issues the permit in some cases. Ecology and local air pollution control agencies have their own permit programs that are approved by EPA in the State Implementation Plan (SIP). In general, in the NWCAA jurisdiction, which encompasses Island, Skagit, and Whatcom Counties, Ecology issues major NSR permits (PSD permits) and NWCAA issues minor NSR permits (Orders of Approval to Construct, or OACs).

### **3.6.4 Prevention of Significant Deterioration (PSD)**

Before a major source can be constructed or modified in an area that meets all the ambient air requirements, the owner or operator must demonstrate that the project will not cause or contribute to violations of any ambient air quality standard or air quality increment pursuant to the PSD program under 40 CFR §52.21. Also, the owner or operator must demonstrate that the project will not cause significant deterioration in nearby Class I Areas (parks and wilderness areas).

PSE Whitehorn qualifies as a major source, and is therefore potentially a subject source under the PSD program. Prevention of Significant Deterioration permit PSD-X80-02 was issued on December 19, 1979 by EPA Region 10 prior to commencement of construction of Units 2 and 3 at the facility.

### **3.6.5 Minor NSR**

New or modified sources of air pollution are required to obtain a permit from the NWCAA before beginning construction. Permits are referred to as OAC and contain a wide range of local, state, and federal requirements to minimize air pollution impacts on the environment. The type of activity, the size of the operation, and the kinds of pollutants emitted determine permit conditions. Two minor NSR permits have been issued by NWCAA to PSE Whitehorn, as described in SOB Section 2.4.

## **3.7 Greenhouse Gas (GHG) Regulation**

Greenhouse gases are chemicals that contribute to climate change by trapping heat in the atmosphere. The greenhouse gases recognized by EPA and Ecology are: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF<sub>6</sub>). "Hydrofluorocarbons" or "HFC" means a class of greenhouse gases primarily used as refrigerants, consisting of hydrogen, fluorine, and carbon.

PSE Whitehorn is required to meet the following federal and state greenhouse gas emission requirements, as applicable.

### **3.7.1 40 CFR 98 – Federal Mandatory Greenhouse Gas Emission Inventory Regulation**

This regulation applies to PSE Whitehorn due to its GHG emission levels and type of facility. The rule requires annual GHG inventories and reporting beginning in calendar year 2010, with reports due to EPA by no later than March 31 of the following year.<sup>2</sup> This regulation is implemented in its entirety by the EPA. This regulation is excluded from appearing in a Title V air operating permit because it does not contain applicable requirements under the Title V program (WAC 173-401-200(4)).

### **3.7.2 Chapter 173-407 WAC – Carbon Dioxide Mitigation Program, Greenhouse Gases Emissions Performance Standard and Sequestration Plans and Programs for Thermal Electric Generating Facilities (Part I WAC 173-407-010 through -070, and Part II WAC 173-407-100 through -320)**

Chapter 173-407 WAC, “Carbon Dioxide Mitigation Program, Greenhouse Gases Emissions Performance Standard And Sequestration Plans And Programs For Thermal Electric Generating Facilities”, consists of two parts: Part I, WAC 173-407-010 through -070, and Part II, WAC 173-407-100 through -320. According to WAC 173-407-005, Part II, “Greenhouse Gases Emissions Performance Standard And Sequestration Plans And Programs For Baseload Electric Generation Facilities Implementing Chapter 80.80 RCW” is the emissions performance standard that must be met first. Then the requirements of Part I, “Carbon Dioxide Mitigation For Fossil-Fueled Thermal Electric Generating Facilities, Implementing Chapter 80.80 RCW”, are applied.

The Part II greenhouse gas emissions performance standard is applicable to all existing baseload electric generation facilities and units when a new baseload electric generating facility or unit at the existing facility is issued construction approval or site certification agreement (WAC 173-407-120(3)(a)), the existing facility or a unit is upgraded (WAC 173-407-120(3)(b)), or the existing facility or unit is subject to a new long-term financial commitment (WAC 173-407-120(3)(c)).

At this time, Part II performance standards do not apply to PSE Whitehorn because it is a peaking plant, and not a baseload electric generating facility. Should PSE Whitehorn become subject, these requirements do meet the definition of Title V “applicable requirements” and therefore will be incorporated into the AOP.

### **3.7.3 Chapter 173-441 WAC – Reporting of Emissions of Greenhouse Gases**

Chapter 173-441 WAC, “Reporting of Emissions of Greenhouse Gases”, adopts a mandatory greenhouse gas reporting rule for:

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<sup>2</sup> The deadline for reporting for emission year 2010 has been postponed to September 30, 2011.

- Suppliers that supply applicable fuels sold in Washington state of which the complete combustion or oxidation would result in at least 10,000 metric tons of carbon dioxide annually; or
- Any listed facility that emits at least 10,000 metric tons of carbon dioxide equivalents (CO<sub>2</sub>e) of greenhouse gases annually in the state.

Chapter 173-441 WAC was adopted by Ecology on December 1, 2010 and was effective on January 1, 2011. This regulation applies to PSE Whitehorn due to the fact that it emits at least 10,000 metric tons of CO<sub>2</sub>e of greenhouse gases per year (see SOB Table 1). Similar to the federal reporting rule under 40 CFR 98, the rule requires annual GHG inventories due to Ecology by no later than March 31 of the following year beginning for calendar year 2012. This regulation is implemented in its entirety by Ecology. Because the statutory authority for chapter 173-441 WAC was the state Clean Air Act (chapter 70.94 RCW), it is considered an applicable requirement under the air operating permit program (WAC 173-401-200(4)); as such, it is included in the AOP.

## **4 GENERAL ASSUMPTIONS OF THE PERMIT**

### **4.1 Permit Content**

The permit contains (1) standard terms; (2) generally applicable conditions for the type of facility permitted; and (3) specifically applicable conditions originating from PSD permits, approvals to construct and any orders referencing the facility.

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 SOB. In addition, as discussed below, conditions that do not contain substantive requirements and have no ongoing compliance demonstrations are excluded from the AOP.

Regulations that require action by a regulatory agency, but not of the regulated source, are not included as applicable permit conditions.

### **4.2 Excluded Requirements**

The following requirements are excluded from the AOP:

- The NWCAA OAC issued November 14, 1973 for Unit 1 has no ongoing requirements and is not included in the AOP.
- The NWCAA issued an OAC on November 21, 1979, for Units 2 and 3 and for three 100,000 barrel fuel tanks. This OAC has no ongoing requirements and is not included in the AOP.
- PSD-X80-02 Condition 2: Upon construction and permitting in PSD-X80-02, the increases in potential emissions of any regulated pollutant, excluding NO<sub>x</sub>, SO<sub>2</sub>, and particulate matter, resulting from this modification were required to be and are assumed to be less than 250 tons per year. As such, PSD-X80-02 Condition 2 has been completed and is not included in the AOP.
- PSD-X80-02 Condition 4 states that the PSD approval “shall become void if on-site construction is not commenced within eighteen (18) months after receipt of the approval or if on-site construction once initially commenced is discontinued for a period of eighteen (18) months.” The PSD-X80-02 approval was issued on December 19, 1979. Construction was commenced and Units 2 and 3 began operation during April 1981, within 18 months of approval. This requirement has been completed and is not included in the AOP.
- PSD-X80-02 Condition 5 states that the construction, modification or operation of the proposed facility shall be in accordance with the permit application. This condition does not impose any new requirements that are not already in the generally applicable regulations. As such, it is not listed in the AOP.
- 40 CFR 60 Subpart GG and PSD X-80-02 Condition 6a require initial compliance demonstrations be completed for NO<sub>x</sub> in accordance with 40 CFR 60.335. The NO<sub>x</sub> tests were performed on November 5 through 12, 1981, while burning oil and natural gas. The results showed that Units 2 and 3 were operating within the emission limits established in 40 Part 60 Subpart

GG and PSD-X80-02. These requirements have been completed and are not included in the AOP.

In addition to NO<sub>x</sub>, the PSD permit mentions initial source testing for SO<sub>2</sub> “as required under Federal New Source Performance Standards (NSPS) (40 CFR 60.335)”. 40 CFR 60.335 does not require testing for SO<sub>2</sub>. As such, this requirement is excluded from the AOP.

- PSD X-80-02 Condition 7 states that the EPA and Ecology shall be notified in writing of the commencement of construction date and the startup date within 30 days of their occurrence. PSE Whitehorn notified EPA and the NWCAA that the facility started up in April 1981 (letter received April 10, 1981). This requirement has been completed and is not included in the AOP.
- Pursuant to the PSE Order (CAA-10-2001-0107) Condition 9a, PSE was required to provide NO<sub>x</sub> offsets for the operation of PSE Fredonia Units 3 and 4 by increasing the water injection for one of the turbines at PSE Whitehorn for a specific period of time. PSE turned up the water injection on Unit 2 at PSE Whitehorn from approximately 15 gpm to 55 gpm on June 18, 2001. Testing on July 26, 2001 confirmed compliance (i.e., 36.7 ppm<sub>vd</sub> at 15% oxygen) with the interim 50 ppm<sub>vd</sub> limit. The required period of reduced emissions ended with the issuance of the PSD permit (July 29, 2003). This requirement has been completed and is not included in the AOP.

### **4.3 Federal Enforceability**

Federally enforceable requirements are terms and conditions required under the Federal Clean Air Act or under any of its applicable requirements. Local and state regulations may 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 enforceable only by the state (i.e., labeled as “State Only”).

Most rules and requirements are followed by a date in parentheses. Two different versions (identified by the date) of the same regulatory citation may apply to the source if federal approval/delegation lags behind changes made to the WAC or the NWCAA Regulation. For WAC regulations, the date listed in parenthesis in the AOP represents the State Effective date. For the NWCAA regulations, the date represents the most recent Board of Directors adoption date, which is identified as the “Passed” or “Amended” date in the NWCAA Regulation. The date associated with an OAC or PSD permit represents the latest revision date of that order. For a federal rule, the date is the rule’s most recent promulgation date.

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.

#### **4.4 Gap-Filling and Sufficiency Monitoring**

Title V of the Federal Clean Air Act is the basis for the EPA's 40 CFR 70, which is the basis for the State of Washington air operating permit regulation, Chapter 173-401 WAC. Title V requires that all air pollution regulations applicable to the source be called out in the AOP for that source. Title V also requires that each applicable regulation be accompanied by a federally enforceable means of "reasonably assuring continuous compliance." Title V, 40 CFR 70, and WAC 173-401-615 all contain a "gap-filling" provision that enables NWCAA to add monitoring where no monitoring is present<sup>3</sup>. 40 CFR Part 70.6(c)(1) and WAC 173-401-630(1) contain authority to address situations where monitoring exists, but is deemed to be insufficient. NWCAA relied upon these authorities to add monitoring where needed to the AOP.

The majority of cases where monitoring needed to be added were older regulations and permits that contain no monitoring. For example, NWCAA used its gap-filling authority to add monitoring for the 20% visible emission standard, NWCAA 451.1. In any term where gap-filling has taken place, the regulatory citation for that term will contain the words "directly enforceable" and the introductory paragraphs for the AOP table include the reference to the citation of the gap-filling requirement.

While NWCAA has authority to add monitoring where existing monitoring was insufficient, this was not needed for the PSE Whitehorn AOP. All additional monitoring for PSE Whitehorn was done based on NWCAA's gap-filling authority, WAC 173-401-615.

The type and frequency of monitoring added under the authority in WAC 173-401-615 were set based on the following factors:

1. **Historical Compliance:** NWCAA reviewed the facility's past compliance with the underlying requirement. This information helped inform the decision about monitoring frequency and stringency.
2. **Margin of Compliance:** The margin of compliance is a measure of whether the facility can easily achieve compliance with a requirement, or whether they operate close to the limit. NWCAA considered the facility's margin of

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<sup>3</sup> WAC 173-401-615(1) Monitoring. Each permit shall contain the following requirements with respect to monitoring:

(a) All emissions monitoring and analysis procedures or test methods required under the applicable requirements, including any procedures and methods promulgated pursuant to sections 504(b) or 114(a)(3) of the FCAA;

(b) Where the applicable requirement does not require periodic testing or instrumental or noninstrumental monitoring (which may consist of recordkeeping designed to serve as monitoring), periodic monitoring sufficient to yield reliable data from the relevant time period that are representative of the source's compliance with the permit, as reported pursuant to subsection (3) of this section. Such monitoring requirements shall assure use of terms, test methods, units, averaging periods, and other statistical conventions consistent with the applicable requirement. Recordkeeping provisions may be sufficient to meet the requirements of this paragraph; and

(c) As necessary, requirements concerning the use, maintenance, and, where appropriate, installation of monitoring equipment or methods.



compliance for each underlying requirement in setting monitoring for that requirement.

3. Variability of Process and Emissions: Processes that vary their production rates and/or emissions over time require different monitoring from steady-state processes. NWCAA considered process and emission variability in setting monitoring.
4. Environmental Impact of a Problem – Exceedances of some permit requirements have greater environmental consequences than others. For example, a problem that causes an exceedance of the ammonia emission limit in the SCR for a turbine could have a greater environmental impact than failing to use ultra-low sulfur diesel at an emergency generator. NWCAA considered the environmental impact of a problem in setting monitoring.
5. Clarity and Complexity – The requirements that apply to AOP facilities are numerous, varied, and can be complex. The greater the number, variety, and complexity of requirements, the harder it is for a facility to understand and comply. NWCAA’s goal is to write clear, concise permits the facilities can understand. To help achieve this goal, when possible, NWCAA aligned additional monitoring with monitoring that the facility is already performing. This approach required careful thought. NWCAA reviewed the monitoring the facility is already performing to see if it was adequate to stand-in as monitoring for the permit term, and only used it if deemed adequate.

The following table lists where NWCAA used its gap-filling monitoring authority. No Directly enforceable – sufficiency provisions exist in the AOP.

**Table 4-1 AOP terms with Directly Enforceable gapfill provisions**

<b>AOP Term</b>	<b>Description</b>	<b>Monitoring</b>
4.1	Required monitoring reports	Reporting periods identified
4.2	Operation and maintenance	Monitor, keep records and report
4.3-4.6, 4.22	Nuisance	Procedure followed when complaints are received
4.7-4.11	Fugitive PM	Procedure followed when complaints are received
4.12-4.17	Visible emissions	Visible emissions monitoring
4.18-4.23	Sulfur dioxide	Burn biomass or natural gas only
5.1.2 – 5.1.4	NOx	Calculation and recording of water-to-fuel ratio at all times of operation
5.1.7	PM	Action taken to monitor VE

AOP Term	Description	Monitoring
5.1.8	PM	Recordkeeping to demonstrate sulfur content of fuel

#### **4.5 Future Requirements**

Some requirements that are not applicable until triggered by an action, such as the requirement to file an application prior to constructing a new source, are addressed within the standard terms and conditions section of the permit. PSE certified in the permit application that the facility will meet any future applicable requirements on a timely basis.

#### **4.6 Compliance Options**

PSE did not request emissions trading provisions or specify more than one operating scenario in the air operating permit application; therefore, the permit does not address these options as allowed under WAC 173-401-650. This permit does not condense overlapping applicable requirements (i.e., streamlining) nor does it provide any alternative emission limitations.

## **5 PERMIT ELEMENTS, BASIS FOR TERMS AND CONDITIONS**

### **5.1 Permit Organization**

The PSE Whitehorn air operating permit is divided into the following sections:

- Permit Information
- Attest
- Table of Contents
- Emission Unit Identification
- Standard Terms and Conditions
- Standard Terms and Conditions for NSPS and NESHAP
- Generally Applicable Requirements
- Specifically Applicable Requirements
- Inapplicable Requirements
- Appendix – General Electric Water Injection Curves for NO<sub>x</sub> Control

### **5.2 Permit Information and Attest**

#### **5.2.1 Permit Information**

The Permit Information page of the permit identifies the source and provides general information about the permit, the responsible official, and the agency personnel responsible for permit preparation, review, and issuance.

#### **5.2.2 Attest**

The Attest page provides authorization for the source to operate under the terms and conditions contained in the permit.

### **5.3 AOP Section 1 Emission Unit Identification**

The Emission Unit Identification section lists emission units, equipment ratings, and control devices present at PSE Whitehorn. Additional information about the facility may be found in the operating permit application and in associated files.

### **5.4 AOP Section 2 Standard Terms and Conditions**

The Standard Terms and Conditions section contains administrative requirements and prohibitions, most of which do not have ongoing compliance monitoring requirements. The citations giving legal authority to the Standard Terms and Conditions are provided in the section. At times, requirements are paraphrased. In this case the language of the cited regulation takes precedence over the paraphrased summary. For clarity and readability, the terms and conditions have been grouped by function. Similar requirements from the State and the NWCAA regulations are grouped together where possible. There are several requirements included that are not applicable until triggered. An example of this would be the requirement to file an NOC application.

### **5.5 AOP Section 3 Standard Terms and Conditions for NSPS and NESHAP**

The Standard Terms and Conditions for NSPS and NESHAP section contains applicable requirements from Subpart A of 40 CFR 60 and Subpart A of 40 CFR 63.

### **5.6 AOP Sections 4 and 5 Generally and Specifically Applicable Requirements**

Requirements that limit emissions and broadly apply to all sources within the jurisdiction of the NWCAA are identified in AOP Section 4 - Generally Applicable Requirements. Requirements that limit emissions and apply specifically to emission units at PSE Whitehorn are identified in AOP Section 5 - Specifically Applicable Requirements.

The first column lists the condition number and identifies the pollutant. The second column identifies the regulatory citation. The third column provides a brief description of the applicable requirements for informational purposes and is not enforceable. The fourth column identifies the periodic or continuous MR&R obligations the source must perform as required by WAC 173-401-605(1), -615(1) & (2), or the underlying requirement. MR&R obligations do not apply to insignificant emission units pursuant to WAC 173-401-530(2)(c).

The requirements in the MR&R column labeled "Directly Enforceable" are legally enforceable requirements added under the NWCAA's "gap-filling" authority (WAC 173-401-615(1)(b) & (c) (10/17/02)). MR&R requirements noted as "CAM" are part of the Compliance Assurance Monitoring Plan for the specified unit(s) as required by 40 CFR 64.6(c) (10/22/97). The CAM plans submitted by the facility per 40 CFR 64.4 are included in SOB Appendix A. Other MR&R requirements not labeled "Directly Enforceable" or "CAM" are brief descriptions of the regulatory requirements for informational purposes, and are not enforceable, unless they are identical to the cited requirement. Unless the text of the MR&R column is specifically identified to be directly enforceable or pursuant to CAM, the language of the cited regulation takes precedence over a paraphrased requirement.

The following paragraphs provide additional information describing the basis and provide clarifications for those MR&R requirements that do not stem directly from other regulations (i.e., those requirements that are directly enforceable or come from the CAM Plan).

**Opacity Requirements:** The Generally and Specifically Applicable Requirements sections of the permit list opacity limits stemming from NWCAA, State, and Federal rules. PSE Whitehorn is subject to two opacity limitations with two demonstration methods: shall not exceed 20% for any period aggregating more than three minutes in any one hour (demonstrated using Ecology Source Test Method 9A - Visual Determination of Opacity for a Three Minute Standard (7/12/90)) and shall not exceed 10% pursuant to PSD-X80-02 issued December 19, 1979. Because this PSD permit was issued by EPA using federally enforceable rules, the 10% opacity requirements is determined to be on a six-minute average basis demonstrated using 40 CFR 60 Appendix A Method 9 – Visual determination of the opacity of emissions from stationary sources. Both methods call for opacity readings to be taken at 15-second intervals.

For clarity and simplicity, the MR&R requirements for these two requirements have been consolidated and gap-filled as directly enforceable. Demonstration of compliance with the permit visible emission limits for the turbines and any other oil burning combustion unit (i.e., emergency generator) will be based on monthly qualitative visual opacity observations. Any observed visible emissions at any time will require either corrective action or an EPA Method 9 test. If EPA Method 9 shows an exceedance of the applicable six-minute standard(s), an Ecology Method 9A test shall be conducted to demonstrate compliance with applicable three-minute standards. With the lower opacity threshold, the EPA Method 9 reading is more conservative, but, if EPA Method 9 shows an exceedance, compliance will be determined using both methodologies.

All EPA Method 9 or Ecology Method 9A opacity readings must be taken by an individual holding a valid Certification of Completion for Plume Evaluation Training from the Washington State Department of Ecology or other authorized training facility.

**Particulate Matter Requirements:** The gas turbine exhaust stacks and the oil mist collection system stacks are the only process stacks and likely sources of particulate emissions at PSE Whitehorn. Modern gas turbines, when fueled by natural gas or low-sulfur oil, are extremely unlikely to exceed particulate matter emission standards if the units are properly operated and maintained. Therefore, Opacity is being used as a surrogate for particulate matter.

The opacity MR&R has been gap-filled to demonstrate compliance with the particulate matter limits, both facility-wide in the Generally Applicable Requirements (AOP Section 4) and for Units 2 and 3 in the Specifically Applicable Requirements (AOP Section 5).

Pursuant to Administrative Order CAA-10-2001-0107 Condition 9b for PSE Fredonia (see SOB Section 2.4 for further discussion), to offset secondary particulate emissions (potentially consisting of sulfuric acid), PSE Whitehorn must use 3,000,000 gallons of low sulfur distillate (less than 0.05 wt% sulfur) in place of high sulfur distillate (sulfur content between 0.05 wt% and 0.5 wt%). To track the progress of this requirement and because there were no MR&R requirements in the Administrative Order, requirements were gap-filled to monitor the sulfur content of the distillate along with the volume of low sulfur distillate fuel purchased for PSE Whitehorn.

**Nitrogen Oxides Requirements – Emission Limit:** The turbines are subject to NSPS Subpart GG. NSPS Subpart GG contains a NO<sub>x</sub> limit for subject turbines based on the following equation (40 CFR 60.332(a)(1)):

$$STD = 0.0075 \times \frac{14.4}{Y} + F$$

where:

STD = allowable ISO corrected (if required under 60.335(b)(1)) NO<sub>x</sub> emission in percent by volume dry at 15% oxygen

Y = manufacturer's rated heat rate at manufacturer's rated load in kJ/W-hr

= Units 2 and 3 firing gas: 11.1 kJ/W-hr (10,551 Btu/kW-hr LHV)

= Units 2 and 3 firing oil: 11.2 kJ/W-hr (10,661 Btu/kW-hr LHV)

$F$  = NO<sub>x</sub> emission allowance for fuel-bound nitrogen (referred to as an F-factor)

ISO conversion under 60.335(b)(1) is optional because both units are equipped with add-on control technology (i.e., water injection). PSE generally chooses not to correct for ISO standard conditions to determine compliance with the NO<sub>x</sub> limit.

According to 40 CFR 60.332(a)(3), sources may accept an F-factor of zero or may determine an appropriate F-factor through fuel sampling or manufacturer's analysis. PSE has chosen to accept an F-value of zero. EPA developed a National Policy, dated August 14, 1987 that waives the nitrogen monitoring requirement for natural gas because there is no fuel-bound nitrogen and the free nitrogen does not contribute appreciably to NO<sub>x</sub> emissions. If PSE chose to utilize an F-factor that was greater than zero, sampling would be required in accordance with 40 CFR 60 Subpart GG.

Assuming an F-factor of 0, the allowable NO<sub>x</sub> concentration for Units 2 and 3 are 97.0 ppm<sub>vd</sub> for gas and 96.0 ppm<sub>vd</sub> for oil. According to 40 CFR 60.334(j)(1)(i)(A), for units that monitor water to fuel ratio only (such as Units 2 and 3), excess emission events, and hence the emission limits, are based on one-hour averages.

**Nitrogen Oxides Requirements – Turbine Operation:** Injecting water into the turbine combustion chambers in Units 2 and 3 during operation reduces nitrogen oxide emissions. Water injection rates are determined by compliance demonstration charts specific to GE Frame 7 units (AOP Appendix). These charts were generated utilizing the 1981 performance test data.

Automated alarm systems are configured to activate when the water injection rate falls a specified amount from the compliance demonstration level. If water injection rates fall below the compliance demonstration level, PSE is required to take immediate corrective action and notify the NWCAA of an upset condition as soon as possible, but no later than 12 hours after the incident occurs (pursuant to AOP Term 2.4.8).

Pursuant to 40 CFR 334(g), PSE Whitehorn is required to develop a parameter monitoring plan that describes the proper operation of the NO<sub>x</sub> emission controls. The NWCAA has determined that operation according to the curves developed from the initial testing along with monitoring and reporting as required in the AOP satisfies the requirement to develop a parameter monitoring plan under 40 CFR 60.334(g).

**Nitrogen Oxides Requirements – Excess Emissions Reporting:** As designed by the turbine manufacturer, during startup of Units 2 and 3, water injection is withheld until the turbines reach a specified fuel input, which correlates to a power output of approximately 42 MW while burning gaseous fuel and 20 MW while burning fuel oil. If water is injected prior to reaching these thresholds, the water will quench the flame. PSE refers to operating at below these thresholds as "operating below the point of water injection." During certain market and power conditions, PSE operates the turbines below the point of water injection at what

they call “full speed no load” (FSNL) or “full speed low load” (also called “spinning reserve”).

FSNL is when the engine is running at full and is turning the generator but is not generating power (i.e., the breaker is not shut). Spinning reserve is when the engine is running at full, the generator is turning and is energized and synchronized to the grid (i.e., the breaker is shut) but is generating a minimal amount of power. Because both of these situations have a power output of less than the minimum water injection thresholds, water is not being injected into the turbine. The turbines can operate at either of these thresholds for extended periods of time, not necessarily as part of startup.

Pursuant to 40 CFR 60.334(j)(1)(i)(A), as operating hours without water injection, these periods of FSNL and spinning reserve shall be included as excess emissions in the reporting in accordance with 40 CFR 60.7(c).

**Nitrogen Oxides Requirements – CAM Plan:** The combined CAM Plan for Units 2 and 3 for NO<sub>x</sub> are included in SOB Appendix A. Those requirements stemming from the CAM Plan that are unique to the CAM Plan (i.e., not repeated elsewhere) are included in the MR&R column under “CAM”.

The information in the CAM Plan was incorporated into the permit terms in the MR&R column including descriptions of “excursion” and “exceedance” events, as appropriate. An excursion is a departure from an indicator range established for monitoring consistent with the averaging period specified for the monitoring. An excursion does not necessarily indicate that a permit limit has been exceeded and includes periods when significant periods of data collection are missed. An exceedance is an incident when emissions limits have been surpassed. In the case of the nature of the monitoring and averaging periods at PSE Whitehorn, excursions are defined as the same as exceedances and the permit terms are written as such.

At units with potential post-control major source emissions, CAM mandates that the required monitoring collect at least four data points each hour (one in each 15-minute quadrant). Based on site-specific considerations, this monitoring frequency can be reduced to no less than once per 24-hour period. PSE is proposing that the water-to-fuel ratio be monitored continuously (i.e., at least one reading in each 15-minute quadrant) in accordance with 40 CFR 60 Subpart GG, which meets the monitoring frequency requirement in CAM for the short-term concentration limit (i.e., ppm<sub>vd</sub> on a 1-hour average). The continuously-monitored water-to-fuel ratio data can be converted via a stack test to a mass emission rate on a short-term (i.e., lb/hr) basis.

In addition to the continuous water-to-fuel ratio monitoring, PSE also proposes to stack test each turbine once every 10,000 operating hours or once every five calendar years, whichever occurs sooner, for demonstrating compliance with the concentration limit and the pound per hour limit. The testing will provide additional data to “spot-check” compliance and correlate actual emissions against the water-to-fuel operation curve. This monitoring scheme is determined to be adequate to satisfy the CAM requirements.

One case where requirements unique to the CAM Plan were not included in the AOP was the requirement to monitor and record megawatt output on 15-minute intervals. Because the water injection rate is based on fuel flow, as can be seen in the compliance chart, there is no need for the power output to be monitored and recorded to demonstrate compliance with the NO<sub>x</sub> requirements.

Also, in the CAM Plan, PSE proposes to report semiannually the recorded monthly hours of operation on natural gas and distillate oil and calculated rolling 12-month NO<sub>x</sub> emissions totals. Because PSE Whitehorn Units 2 and 3 do not have an annual NO<sub>x</sub> emission limit, reporting the monthly hours of operation on natural gas and distillate oil and the calculated 12-month NO<sub>x</sub> emission totals is unnecessary. As such, any reference to demonstrating compliance with an annual NO<sub>x</sub> limit in the CAM Plan is excluded from the AOP.

**Sulfur Dioxide Requirements:** Sulfur dioxide emissions are controlled by limiting the sulfur content of the fuel burned in the turbines. Fuel sulfur testing is required under 40 CFR 60.334(h)(1). However, if the gaseous fuel burned meets the definition of natural gas (i.e., with a sulfur content of 20.0 grains or less of total sulfur per 100 scf [680 ppm<sub>w</sub>, 0.068 wt%, 338 ppm<sub>v</sub> total sulfur at 20° C]), a current, valid purchase contract, tariff sheet or transportation contract that specifies that the maximum total sulfur content of the fuel is 20.0 grains/100 scf or less is adequate to meet the fuel sulfur monitoring requirement.

For distillate fuel, fuel sampling and sulfur testing must be performed in accordance with the Acid Rain provisions in 40 CFR 75 Appendix D. 40 CFR 75 Appendix D Section 2.2.1 lists four ways the sampling can take place: sample from the storage tank for the unit after each addition of oil to the storage tank; sample from the fuel lot in the shipment tank or container upon receipt of each oil delivery or from the fuel lot in the oil supplier's storage container; use the flow proportional sampling methodology; or use the daily manual sampling methodology. The sulfur analysis must be performed using the methods listed in 40 CFR 60.335(b)(10).

Because PSE Whitehorn has an aggregate heat input capacity greater than 500 MMBtu/hr, the facility is subject to NWCAA 460. As such, PSE Whitehorn is not subject to the 412 ppm at standard conditions sulfur limit under to NWCAA 520.14. Additionally, NWCAA Regulation Section 460.2 requires a sulfur dioxide ambient monitoring plan. The NWCAA has determined that the fact that PSE Whitehorn burns for practical purposes only natural gas or ultra-low sulfur diesel satisfies this requirement.

**Emergency Generator Requirements:** The two generators are subject to the requirements in 40 CFR 63 Subpart ZZZZ for emergency compression-ignition RICE at area sources. According to 40 63.6640(f), emergency generator operation is limited to 100 hours per year for maintenance checks and readiness testing. The 100 hours per year of operation may include up to 50 hours per year operation in non-emergency situations (which may include up to 15 hours per year as part of a demand response program). There is no time limit on the use of emergency stationary RICE in emergency situations.

Note that NWCAA 300.4 i) exempts emergency generators that operate less than 500 hours per year for maintenance, testing, or emergency situations from the



requirement to obtain a new source review (NSR) permit. Should it become necessary to operate the generators for more than 500 hours per year, an NSR permit may be required.

### **5.7 AOP Section 6 Inapplicable Requirements**

WAC 173-401-640 allows a determination regarding inapplicable requirements. AOP Section 6 contains a list of inapplicable requirements and the causal basis.

## 6 INSIGNIFICANT EMISSIONS UNITS

Table 6-1 below lists emission units present at PSE Whitehorn that are insignificant based their size or production rates in accordance with WAC 173-401-533. Column three of the table provides a justification for the exemption based on operational characteristics for each unit.

Some categorically exempt insignificant emission units as defined in WAC 173-401-532 are present at PSE Whitehorn but are not required to be listed herein.

**Table 6-1 Insignificant Emission Units**

EMISSION UNIT	DESCRIPTION	LIMIT	CITATION
Facility operation and maintenance	Normal operation and maintenance, exclusive of fuel, associated with the operation of a combustion turbine	Less than threshold quantities	WAC 173-401-530
Natural gas piping	Fuel supply line	Less than threshold quantities	WAC 173-401-530
General welding	Welding for general maintenance and construction	Less than one ton of welding rod/day	WAC 173-401-533 (2)(i)
Space and hot water heaters	Natural gas or propane fired space heaters	Less than 5 MMBtu/hour heat input	WAC 173-401-533 (2)(r)
Storage, loading and unloading of distillate fuels	Distillate fuels have very low vapor pressures.	Vapor pressure less than 5 mm Hg @ 21°C (0.1 psia )	WAC 173-401-533 (2)(t)
Site drainage retention pond	Storm water and oily water collection system	NPDES permitted, used for removing suspended solids and oil.	WAC 173-401-533 (3)(d)

## **7 PUBLIC DOCKET**

During the public review period, copies of PSE Whitehorn's draft air operating permit, permit application, and any draft technical support documents are available at the following locations:

Online:

[www.nwcleanairwa.gov](http://www.nwcleanairwa.gov)

Office:

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

(360) 428-1617 (call for an appointment to review)

After the conclusion of the public review period, both the AOP and the Statement of Basis will continue to be available for review online and at NWCAA's office. After the conclusion of the public review period, the AOP application will be available only by contacting NWCAA.

## 8 DEFINITIONS AND 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, or requirement in any of the listed regulations or statutes as it applies to an emission unit at a stationary source.

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

"Permit" means for the purposes of the air operating permit program an air operating permit issued pursuant to Title V 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 Acronyms and definitions used in the Air Operating Permit and/or Statement of Basis:

AOP	Air Operating Permit
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
Btu	British thermal units
CFR	Code of Federal Regulations
CO	carbon monoxide
dscf	standard cubic feet (dry basis)
EPA	Environmental Protection Agency
FCAA	Federal Clean Air Act
GHG	Greenhouse Gas
ISO	International Organization for Standardization
kW	kilowatt
MMBtu	Million British thermal units
MR&R	monitoring, recordkeeping and reporting requirements
MW	Megawatt
NH <sub>3</sub>	Ammonia
NO <sub>x</sub>	nitrogen oxides
NOC	Notice of Construction
NSPS	New Source Performance Standard

NSR	New Source Review
NWCAA	Northwest Clean Air Agency
OAC	Order of Approval to Construct
PS	Performance Specification
PSE	Puget Sound Energy
ppm <sub>vd</sub>	parts per million by volume (dry basis)
PM	particulate matter
PM <sub>10</sub>	particulate matter with an aerodynamic diameter of less than 10 microns
PM <sub>2.5</sub>	particulate matter with an aerodynamic diameter of less than 2.5 microns
RCW	Revised Code of Washington
scf	standard cubic foot
SIP	State Implementation Plan
STP	standard pressure and temperature (14.7 psia and 60°F)
SO <sub>2</sub>	sulfur dioxide
VOC	volatile organic compounds
WAC	Washington Administration Code

## Appendix A

### Compliance Assurance Monitoring Water Injection for Nitrogen Oxides (NO<sub>x</sub>) Control Whitehorn Generating Facility

#### BACKGROUND

##### I. EMISSIONS UNIT

Description: General Electric (GE) Frame 7, Type 7101E Simple Cycle Combustion Turbine  
Identification: Units 2 & 3  
Facility: Puget Sound Energy – Whitehorn Generating Station, Blaine, WA

##### II. APPLICABLE REGULATIONS, EMISSION LIMIT, AND MONITORING REQUIREMENTS

Requirement:	PSD-X80-02
Emission Limit:	NO <sub>x</sub> emissions from Units 2 & 3 shall not exceed 500 lb/hr per unit.
Requirement:	NSPS Subpart GG
Emission Limit:	NO <sub>x</sub> emissions limited to: <ul style="list-style-type: none"><li>• Firing natural gas: 97.0 ppm<sub>d</sub>v @ 15% oxygen, 1-hour average.</li><li>• Firing fuel oil: 96.0 ppm<sub>d</sub>v @ 15% oxygen, 1-hour average.</li></ul>
Monitoring Requirements:	NO <sub>x</sub> emissions from Unit 2 & 3 shall be measured every 10,000 hours of Unit 2 & 3's operation or once every five years, whichever occurs sooner. Emission testing shall be done at the most frequent load level and shall follow Title 40 Code of federal Regulations (CFR) Part 60 Subpart A, Appendix A method 20 or 7E, and the relevant parts of 40 CFR 60.335.
Monitoring Requirements:	Puget Sound Energy (PSE) shall record water injection, fuel use, and MW output in 15-minute intervals and determine and record one-hour average water-to-fuel ratios. PSE shall report semiannually to NWCAA (within 30 days after the end of each six-month period): recorded monthly hours of operation on natural gas and distillate oil and calculated rolling 12-month

NO<sub>x</sub> emissions totals. Emission calculations shall be based on fuel consumption, and water injection/turbine load relationships.

### III. Control Technology

Water injection shall be used to control NO<sub>x</sub> from Units 2 & 3 during fuel combustion. The key elements of the monitoring approach are presented in Table 1.

**TABLE 1. UNITS 2&3 MONITORING APPROACH AT PUGET SOUND ENERGY - WHITEHORN**

REQUIREMENT	PARAMETER
<b>I Indicator:</b>	
A. Measurement Approach	Emissions Stack Testing NO <sub>x</sub> emissions from Unit 2 & 3 shall be measured every 10,000 hours of Unit’s operation or once every five years, whichever occurs sooner. Emission testing shall be done at the most frequent load level and shall follow 40 CFR Part 60 Subpart A, Appendix A Method 20 or 7E, and the relevant parts of 40 CFR 60.335.
B. Measurement Approach	Water-to-fuel Ratio Monitoring Hourly water-to-fuel ratios shall be monitored to determine compliance with 40 CFR 60.332(a).
<b>II. Indicator Range:</b>	
A. Indicator Range Emissions Stack Testing	An acceptable range of NO <sub>x</sub> emissions includes a total concentration of no more than 97.0 ppm <sub>dv</sub> @ 15% O <sub>2</sub> while combusting natural gas and 96.0 ppm <sub>dv</sub> @15% O <sub>2</sub> while combusting distillate, in any one hour period and no more than 500 lb per unit in any one-hour period. Any one hour period during which NO <sub>x</sub> emissions exceed 97.0 ppm <sub>dv</sub> @ 15% O <sub>2</sub> while combusting natural gas, 96.0 ppm <sub>dv</sub> @15% O <sub>2</sub> while combusting distillate, or 500 lb/hr per unit shall be reported to NWCAA within 30 days following months end of the exceedance. If necessary, corrective actions shall be taken immediately.
B. Indicator Range	An acceptable water-to-fuel ratio shall be in compliance with 40 CFR 60.322(a).

<p>Water-To-Fuel Ratio Monitoring</p>	<p>For any one hour period during which the average water-to-fuel ratio falls below the NO<sub>x</sub> compliance limit as calculated in 40 CFR 60.332(a) and determined by the GE compliance chart, activate alarm and notify NWCAA within 12 hours.</p> <p>For any one-hour period the average water-to-fuel ratio falls below the minimums established in the GE compliance chart shall be reported to NWCAA within 30 days following months end after the event. If necessary, corrective actions shall be taken immediately.</p>
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**TABLE 1 CONTINUED. UNITS 2&3 MONITORING APPROACH AT PUGET SOUND ENERGY - WHITEHORN**

<b>III. Performance Criteria:</b>	
A. Data Representativeness	<p>NO<sub>x</sub> emissions testing shall be measured from the Unit’s exhaust stack by source testing. Emission test results shall meet the data quality requirements of the test methodology.</p> <p>The water flow and fuel flow measuring devices shall be calibrated, maintained, and operated in accordance with manufacturer’s specifications.</p>
B. Verification of Operational Status	<p>Emissions tests shall be performed as specified.</p> <p>The monitoring system shall be operated according to manufacturer specifications.</p>
C. QA/QC Practices and Criteria	<p>Emissions testing shall be done at the most frequent load level and shall follow 40 CFR Part 60 Subpart A, Appendix A Method 20 or 7E, and the relevant parts of 40 CFR 60.335. Emission test results shall meet the data quality requirements of the test methodology.</p>
<b>III. Performance Criteria:</b>	
D. Monitoring Frequency and Data Collection Procedures	<p>Puget Sound Energy (PSE) shall record water injection, fuel use, and MW output in 15-minute intervals and determine and record one-hour average water-to-fuel ratios. PSE shall report semiannually to NWCAA (within 30 days after the end of each six-month period): recorded monthly hours of operation on natural gas and distillate oil and calculated rolling 12-month NO<sub>x</sub> emissions totals. Emission calculations shall be based on fuel consumption, and water injection/turbine load relationships.</p> <p>In the case of an exceedance, the report shall document the month of the exceedance occurred, the duration and magnitude of the exceedance, the probable cause of the occurrence, corrective actions taken or planned, and the name of any other agency contacted. This report shall be submitted to NWCAA within 30-days following month’s end of the exceedance.</p> <p>NWCAA shall be notified as soon as possible and in no case later than twelve hours after a breakdown, upset, startup or shutdown conditions occurs which results in or may have resulted in: a) exceedance of an emission or ambient standard; b) a potential threat to human health or safety.</p>

## **JUSTIFICATION**

### **I. BACKGROUND**

The General Electric (GE) Frame 7, Type 7101E simple cycle dual-fueled combustion turbine (Unit 2 & 3) are located at the Whitehorn Generating Station. Each turbine has the capability to supply a gross power output of approximately 75 MW. NO<sub>x</sub> emissions from Units 2 & 3 are controlled using water injection.

### **II. RATIONALE FOR SELECTION OF PERFORMANCE INDICATORS**

The NO<sub>x</sub> performance indicators were selected based on the approval conditions outlined in the PSD permit PSD-X80-02 and NSPS Subpart GG and the Whitehorn Generating Station's Air Operation Permit No. 012R1.

Stack testing every 10,000 hours of Unit's operation or once every five calendar years, whichever occurs sooner, and fuel monitoring shall be considered satisfactory to determine performance regarding NO<sub>x</sub> emissions on a concentration or mass basis.

The water-to-fuel ratio system indicates compliance with requirements to maintain NO<sub>x</sub> emissions at or below 97.0 ppm<sub>dv</sub> @ 15% O<sub>2</sub> while combusting natural gas, 96.0 ppm<sub>dv</sub> @15% O<sub>2</sub> while combusting distillate and less than 500 lb/hr, by comparing the recorded water-to fuel ratios against the GE compliance chart. Compliance with this condition is further confirmed with the periodic stack testing.

The annual emissions shall be calculated by using emission factors determined through stack testing and fuel use records.

These indicators are justified by 40 CFR 64.4, which states, "If an owner or operator relies on presumptively acceptable monitoring, no further justification for the appropriateness of that monitoring should be necessary other than an explanation of the applicability of such monitoring to the unit in question." Units 2 & 3 are already performing these monitoring methods required by the New Source Performance Standards (NSPS) subpart GG and therefore may use them to satisfy the monitoring requirements of this CAM plan.

### **III. RATIONALE FOR SELECTION OF INDICATOR RANGES**

The indicator range is selected to show compliance with the conditions of the PSD permit PSD-X80-02, NSPS Subpart GG, and Whitehorn Generating Station's Air Operating Permit No 004. Stack testing and fuel monitoring shall provide data to calculate NO<sub>x</sub> emissions on an hourly basis and provide an accurate estimate of emission concentration within the exhaust stack of Units 2 & 3. Water-to-fuel monitoring shall provide information to determine compliance with 40 CFR 60.335.

## **TEST AND IMPLEMENTATION PLAN**

### **I. TEST PLAN**

NO<sub>x</sub> emissions from Units 2 & 3 shall be measured every 10,000 hours of Units 2 & 3 operation or once every five calendar years, whichever occurs sooner. Emission testing shall be done at the most frequent load level and shall follow 40 CFR Part 60 Subpart A Appendix A method 20 or 7E and the relevant parts of 40 CFR 60.335.

PSE shall report semiannually to NWCAA (within 30 days after the end of each six-month period): recorded monthly hours of operation on natural gas and distillate oil and calculated rolling 12-month NO<sub>x</sub> emissions totals (unless a different testing and reporting schedule has been approved by NWCAA).

In the case of an exceedance, the report shall document the month of the exceedance occurred, the duration and magnitude of the exceedance, the probable cause of the occurrence, correction actions taken or planned, and the name of any other agency contacted. This report shall be submitted to NWCAA with 30-days following month's end of the exceedance.

NWCAA shall be notified as soon as possible and in no case later than twelve hours after a breakdown, upset, startup or shutdown conditions occurs which results in or may have resulted in: a) exceedance of an emission or ambient standard; b) a potential threat to human health or safety.

### **II. IMPLEMENTATION PLAN**

No implementation plan is necessary for stack testing and water-to-fuel ratio monitoring, because these monitoring techniques are already in operation for Unit 2 & 3.