

# Statement of Basis for the Air Operating Permit – Final

## **Puget Sound Energy Fredonia Generating Station**

Mount Vernon, Washington

January 26, 2021



*Serving Island, Skagit & Whatcom Counties*

**PERMIT INFORMATION**  
**PUGET SOUND ENERGY, FREDONIA GENERATING STATION**  
**13085 Ball Road, Mount Vernon, Washington 98273**

**SIC: 4911**

**NAICS: 221112**

**NWCAA ID: 1383-V-S**

**EPA AFS: 53-057-60040**

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003R3	March 28, 2022
<b>Application Received Date:</b>	<b>Renewal Application Due:</b>
January 25, 2021	March 28, 2021

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## 1 INTRODUCTION

Puget Sound Energy (PSE) Fredonia Generating Station (PSE Fredonia, 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 Fredonia has the potential-to-emit more than 100 tons per year of three regulated criteria air pollutants: sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), and carbon monoxide (CO). The facility is a minor source for HAPs, as facility-wide HAPs were restricted below major source levels by Regulatory Order 40. These air pollutants are created as products of combustion during turbine operation. In addition, PSE Fredonia is required to obtain an AOP because it is subject to the FCAA Title IV (the Acid Rain Program).

The purpose of this Statement of Basis (SOB) is to set forth the legal and factual evidence for the conditions in PSE Fredonia'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 Fredonia on May 1, 1998 and it expired on May 1, 2003. The first renewal was issued on March 7, 2005, and expired on March 7, 2010. The second renewal was issued on January 1, 2012 and modified on February 5, 2013. See SOB Appendix A for the changes made to the AOP during the previous renewals and modifications.

### 1.1 Changes Made During the Third Renewal

NWCAA received the application for the third renewal of the PSE Fredonia Generating Station AOP on December 22, 2015. The following changes have been made to the AOP during the third renewal:

- Regulatory citations in the permit were revised to reflect new or modified regulations and updated revision/promulgation dates.
- Formatting throughout the entire permit 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. Note that the renewal application is due a year in advance of the permit expiration date.
- 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.
- The provisions of Regulatory Order 40, issued by NWCAA on 2/14/2013, have been added in Section 5 of the AOP.

- The Acid Rain Permit and Certificate of Representation for Units 3 and 4 at PSE facility are included in AOP Section 6. Both documents have been updated since the last AOP renewal.
- 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.

## **1.2 Changes made in Modification 1 (Administrative Amendment)**

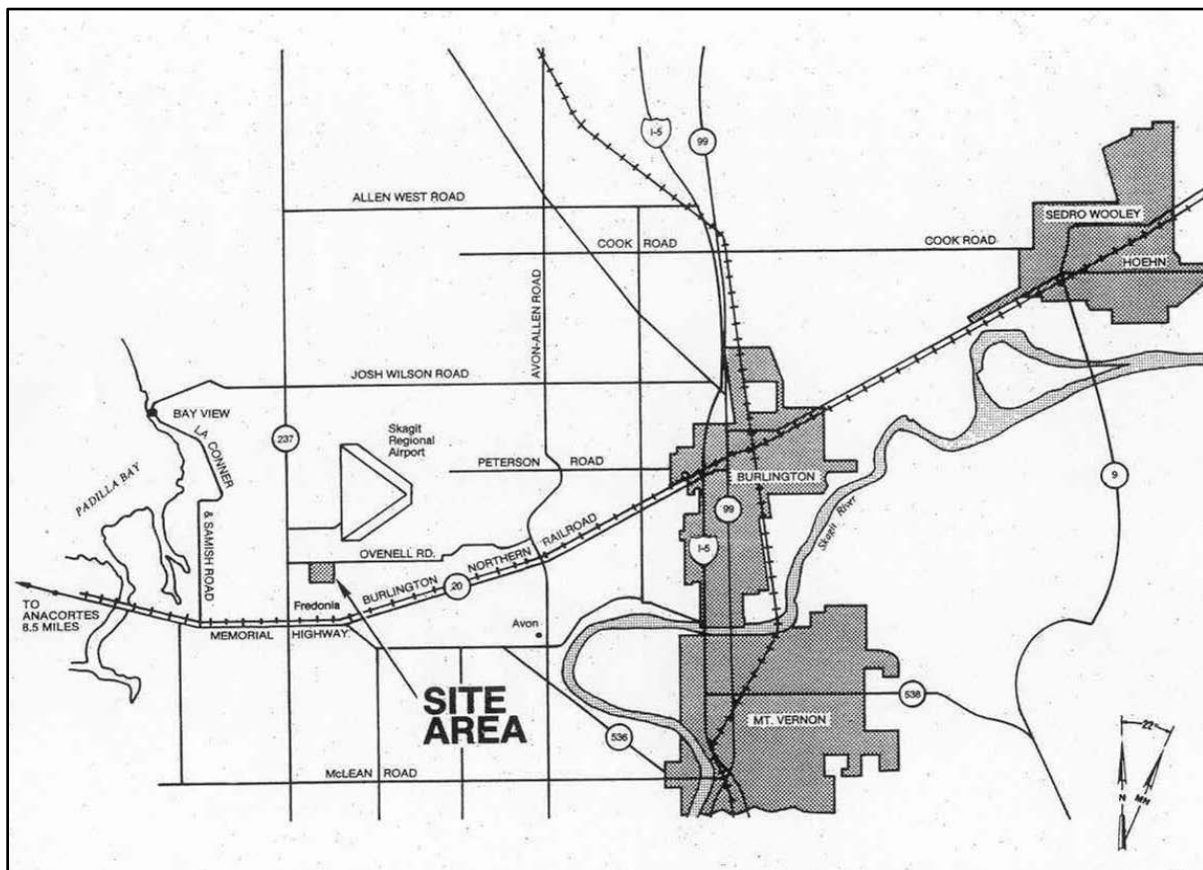
The responsible official was changed from Ron Roberts to Ryan Blood, and the inspection contact was changed from David Brown to Ray Rose. Permit information on page 2 of the AOP and SOB were changed to reflect issuance of this modification.

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

## 2 FACILITY DESCRIPTION

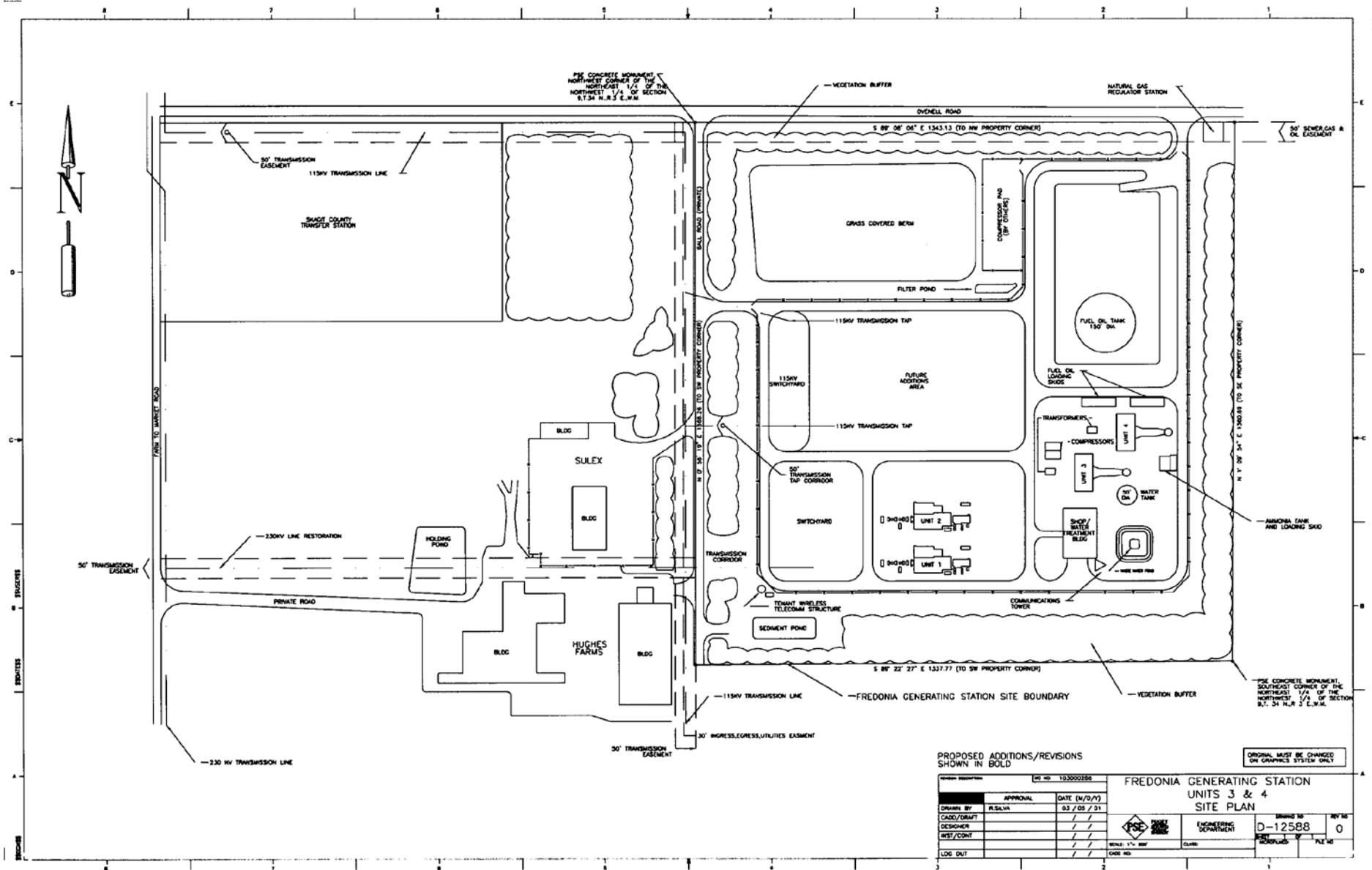
### 2.1 General Facility Description

PSE Fredonia 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 has run only intermittently as a peaking plant since its construction in 1982. The PSE Fredonia Generating Station is located just south of the Skagit Regional Airport in Skagit County, Burlington, Washington (see Figure 1).



**Figure 1 PSE Fredonia Location Map**

The facility consists of four combustion turbines, oil mist collection systems, one distillate fuel storage tank, a water purification system, an emergency generator, and an electrical substation. Figure 2 shows the facility plot plan.



PROPOSED ADDITIONS/REVISIONS SHOWN IN BOLD		DATE (M/D/Y)	
DESIGNER	APPROVAL		
DRAWN BY	DATE	03 / 05 / 21	
CADD/DRAFT			
DESIGNER			
WST/CONT			
LOG OUT			

<b>FREDONIA GENERATING STATION</b> <b>UNITS 3 &amp; 4</b> <b>SITE PLAN</b>		DRAWN BY <b>D-12588</b>	REV IS <b>0</b>
PSE ENGINEERING DEPARTMENT		PROJECT NO. 10-30002288	FILE NO. 10-30002288

Figure 2 PSE Fredonia Site Plan



## 2.2 Emissions Unit Description

### 2.2.1 Turbine Units

The original facility consisted of two Westinghouse W501D simple cycle combustion turbines (Units 1 and 2) that began operation in 1983. The turbines can be fired on natural gas or distillate fuel oils with a sulfur content less than 0.5% by weight. The base-load rating for each Westinghouse turbine is approximately 104 megawatts (MW) with peak loads reaching approximately 113.5 MW. Units 1 and 2 are equipped with water injection to control NO<sub>x</sub>.

The Fredonia facility was expanded in 2001 with the addition of two combustion turbines (Units 3 and 4) to supplement the existing Units 1 and 2 in providing electrical power during peak power episodes. Units 3 and 4 are Pratt and Whitney Model FT-8 Twin Pac simple-cycle units with a rated capacity of approximately 54 MW and 516 MMBtu/hr each while firing natural gas and approximately 52 MW and 507 MMBtu/hr each while firing distillate. Each FT-8 Twin Pac unit comprises two engines coupled to a single electrical generator discharging exhaust gases through a single stack. The units can be fired on natural gas or low sulfur distillate fuel oil.

To control emissions and meet best available control technology (BACT) standards, Units 3 and 4 have been equipped with add-on controls. Selective catalytic reduction (SCR) with aqueous ammonia injection, along with water injection, control NO<sub>x</sub> emissions and an oxidation catalyst reduces CO and hydrocarbon emissions. Figure 3 shows a combustion turbine flow diagram for the turbines at PSE Fredonia.

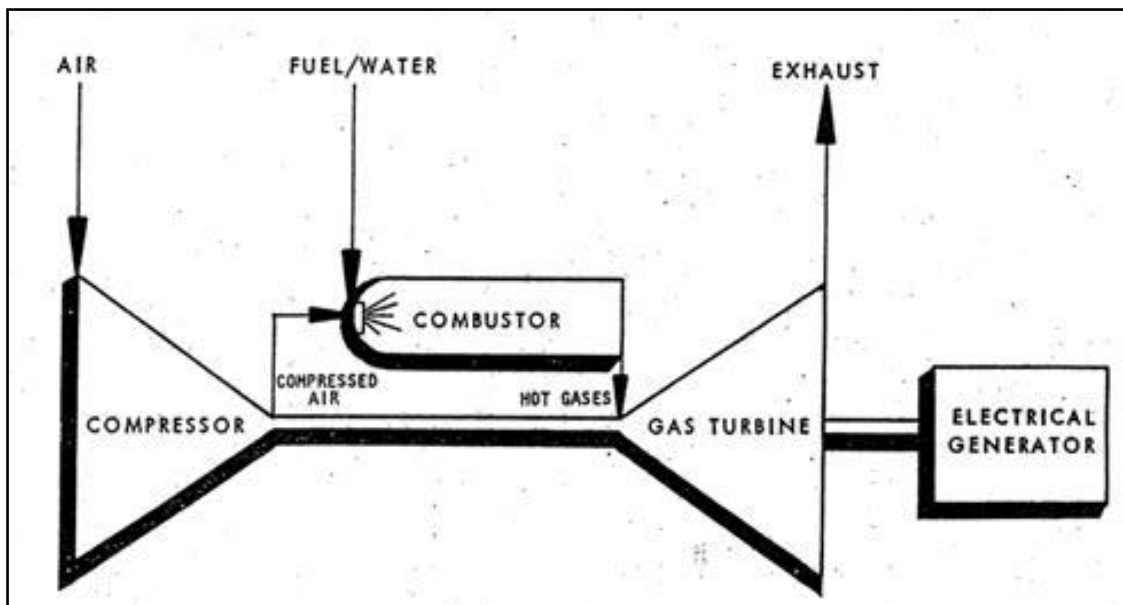


Figure 3 Combustion Turbine Flow Diagram

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

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

All four units are equipped with oil mist collection systems (also referred to as lube oil vapor extractors). These systems collect the oil mist generated from the lubricating oil (for the engines) and seal oil (for the generators) 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 at least two stacks; one for the generator side and one for each engine.

The primary emissions from these systems are particulate matter (PM). For Units 1 and 2, emissions are minimized by utilizing mechanical separators. For Units 3 and 4, the lubrication oil mist collection systems (one for each engine) include mist eliminator filters; the seal oil system (one for each generator) uses a small electrostatic precipitator. Emissions from the oil mist collection systems are also minimized by using good operation and maintenance practices.

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 Tank**

The facility has one distillate oil storage tank with a capacity of 4.2 million gallons. The 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). Distillate fuel oil is purchased periodically in batch quantities and stored in the facility storage tank. 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.

The storage tank was included in the original facility permitting in 1982 and was operational in 1983. This tank is currently used to store distillate fuel oil (No. 2).

### **2.2.4 Emergency Generator**

PSE Fredonia operates a 7.5 kW natural gas-fired spark-ignition emergency generator (Onan serial number B800482634). The emergency generator is used by the PSE Communications Group to keep the computer system backup batteries charged during a power outage. PSE Fredonia personnel estimate the emergency generator was installed prior to the late 1990s.

## **2.3 Emission Inventory**

### **2.3.1 Potential to Emit**

According to information provided by the facility, annual potential emissions have

been compiled and are presented in Table 2-1.

**Table 2-1 PTE for criteria pollutants (tpy)**

Pollutant	tpy
PM	479
SO <sub>2</sub>	246
NO <sub>x</sub>	2,851
VOC	71
CO	1,378

The PTE shown here is the sum of the PTE for the four individual turbine, and is based on most stringent permit limit (by unit). If no limit exists for a pollutant for an individual unit, PTE for that pollutant/unit are based on worst-case calculation of annual emissions assuming full operations (8,760 hrs/yr)<sup>1</sup>.

HAP emissions from PSE Fredonia are limited by RO 40, which limits emissions of total HAP to not equal or exceed 25 tpy, and formaldehyde emissions to not equal or exceed 10 tpy.

**2.3.2 Actual Emissions**

Tables 2-2 and 2-3 show the annual emissions inventory for PSE Fredonia 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. The facility, therefore, supplies power at a varying rate depending on market conditions. 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 Emissions Inventory, ton per year**

pollutant	2011	2012	2013	2014	2015
PM	5	3	6	4	7
PM <sub>10</sub>	5	3	6	4	7
PM <sub>2.5</sub>	5	3	6	4	7
SO <sub>2</sub>	0	0	2	1	2
NO <sub>x</sub>	64	42	217	132	260
VOC	3	0	2	1	5
CO	2	1	2	1	3

<sup>1</sup> There are no permit limits for VOC emissions from Units 1 and 2; these are the only PTE determined by this method.

<b>pollutant</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Ammonia	1	0	2	0	1
GHG (CO <sub>2</sub> e)	49917	21355	81423	28512	*

\* - not reported as of the time of writing

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

<b>pollutant</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Acetaldehyde	18	31	185	111	229
Acrolein	5	9	28	17	40
Benzene	12	9	22	17	29
Ethyl Benzene	27	9	26	16	38
Formaldehyde	318	239	1264	768	1566
Manganese Compounds	34	3	2	3	1
Naphthalene	1	3	4	5	4
Nickel Compounds	0	12	9	8	2
PAHs	3	1	4	4	5
Propylene Oxide	0	10	64	39	80
Sulfuric Acid	0	288	144	142	509
Toluene	110	33	105	65	150
Xylene	54	13	39	23	55

## 2.4 Permitting History

### 2.4.1 PSD-X82-09 issued August 23, 1982 & OAC issued October 19, 1982 (referred to as 1982 OAC)

PSE submitted a Notice of Construction (NOC) application on March 2, 1982 to the NWCAA and an application for a PSD permit on February 16, 1982 to U.S. EPA Region 10 to construct two simple cycle turbines (Units 1 and 2) and one 100,000 barrel fuel oil storage tank. Turbine blades on both units were found to be defective during their first year of operation and were replaced over the following three-year period.

On June 16, 1995, PSE petitioned EPA to modify the PSD permit (PSD-X82-09) to accurately reflect the particulate matter emissions from the turbines. EPA approved a modification to the PSD permit on October 24, 1995.

In the early 2000s, PSE requested and received several alternative monitoring plans (AMPs) from EPA regarding fuel sampling for sulfur and nitrogen content

pursuant to NSPS Subpart GG.<sup>2</sup> Since then, changes in the rule have resolved these AMP issues, making the AMPs no longer necessary.

The 1982 OAC copied the table of emission limits from the PSD permit into Condition 3, including the original particulate matter emission limits. According to the file, PSE requested that the particulate matter limits be corrected in the PSD permit but not the 1982 OAC. On December 15, 2010, PSE requested to modify the 1982 OAC to reflect the corrected particulate matter emission rates. Additionally, the 1982 OAC replicated many requirements that apply independently; the NWCAA removed the duplicative requirements and issued **OAC 1082**, superseding the 1982 OAC, on February 8, 2011.

#### **2.4.2 NWCAA Regulatory Order 27 issued March 14, 2002**

During late February 2001, the turbine blade in Unit 1 failed catastrophically resulting in extensive damage to the unit. The damaged turbine was repaired and the PSD permitting was resolved through issuance of Administrative Order on Consent CAA-10-2001-0136 entered into by EPA, PSE, Washington State Department of Ecology (Ecology), and the NWCAA on November 23, 2001. RO 27 was issued by the NWCAA on March 14, 2002 to memorialize some of the Order requirements.

PSE requested that Regulatory Order 27 be modified to better synchronize the reporting requirements with those required by the federal rules. The NWCAA issued Regulatory Order 27a on October 2, 2007.

#### **2.4.3 PSD-01-04 issued July 18, 2003 & OAC 761 issued July 22, 2003**

On February 16, 2001, PSE submitted an NOC to construct and operate two Pratt and Whitney Model FT-8 Twin Pac simple-cycle units at Fredonia for power production during peak use periods. PSE also submitted a PSD permit application on May 7, 2001. 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) 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 the latter part of 2001. Construction of the two units was completed in July 2001. Unit 3 was started up on July 22, 2001. Unit 4 was started up a week later on July 29, 2001.

Administrative Order CAA-10-2001-0107 was revised on October 21, 2002 to accommodate startup and shutdown NO<sub>x</sub> emissions. The NO<sub>x</sub> limit was revised from being on a 1-hour average to being a 3-hour average.

The provisions of the Administrative Order CAA-10-2001-0107 were terminated by Condition 26 upon issuance of the PSD permit. The PSD permit (PSD-01-04) was

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<sup>2</sup> Custom Fuel Monitoring Schedule 40 CFR 60, Subpart GG (Units 1 and 2), from EPA Region 10 to Mr. Robert S. Barnes, PSE, February 24, 2000. Alternative Monitoring Determinations for Gas Turbine Units 3 and 4 at the Fredonia Generating Station, from EPA Region 10 to Rachel Davis, PSE, February 23, 2004.

finalized on July 18, 2003. The OAC for Units 3 and 4 was granted by the NWCAA (OAC 761) on July 22, 2003.

On May 3, 2010, PSE requested to modify OAC 761 to remove the ammonia-to-fuel ratio standard and associated reporting and to also reduce the frequency of ammonia slip testing. The NWCAA issued OAC 761a on November 17, 2010.

#### **2.4.4 Air Operating Permit 003**

PSE submitted the facility AOP application on June 7, 1995. The original AOP for PSE Fredonia was issued by the NWCAA on May 1, 1998.

The first AOP renewal application for PSE Fredonia was submitted on October 30, 2002. The first AOP renewal (003R1) was issued by the NWCAA on March 7, 2005.

AOP 003R1 was issued with a typo in the date the renewal was due. The renewal application was submitted in a timely fashion on September 4, 2009 prior to the September 7, 2009 due date. AOP 003R2 was issued on January 1, 2012, and AOP 003R2M1 was issued on February 5, 2013, to change the responsible official's name.

#### **2.4.5 Regulatory Order No. 40 issued February 14, 2014**

During the permitting of the Fredonia Expansion Project, PSE reviewed whether the potential emissions at Fredonia, including the existing units, exceeded the major source threshold for hazardous air pollutants (HAPs) – that is, 10 tons per year of an individual HAP or 25 tons per year of total HAPs. In their review, they utilized both AP-42 and California Air Toxic Emission Factors (CATEF). Depending upon the emission factors used (particularly for formaldehyde), the potential emissions for the existing turbine Units 1 and 2 exceeded these thresholds making the facility subject to 40 CFR 63 Subpart Yyyy (National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines). To rectify this issue and avoid MACT applicability, PSE requested a Regulatory Order to impose a facility-wide limit on total hazardous air pollutants (HAPs) and on formaldehyde at the Fredonia Generating Station.

Regulatory Order 40 was issued on 2/14/13, and limits total HAP and formaldehyde to not equal or exceed 25 tons and 10 tons respectively.

#### **2.4.6 PSD-11-05 and OAC 1087 issued on October 24, 2013**

On 2/23/2011 PSE submitted a request to construct and operate additional simple cycle electric generating capacity at the existing Fredonia Generating Station site. The Project will consist of one or two additional gas combustion turbines totaling approximately 181-207 MW. PSE is proposing to install one of four different options:

- Option 1: One General Electric (GE) 7FA.05 frame turbine, approximately 207 MW;
- Option 2: One GE 7FA.04 frame turbine, approximately 181 MW;
- Option 3: One Siemens SGT6-5000F4 frame turbine, approximately 197 MW; or

- Option 4: Two 100 MW GE LMS100 high-efficiency aeroderivative turbines, totaling approximately 200 MW.

PSE requested permission to construct any one of these options and choose that option at a later date after permit issuance. Turbine selection will be made on the basis of a commercial and technical evaluation by PSE after further engineering and procurement efforts.

The purpose of the new generating unit(s) is to provide additional power generation capacity to help meet future PSE system needs. The plant's primary fuel will be natural gas. Ultra-low sulfur (0.0015% sulfur) No. 2 distillate (ULSD) is planned as backup fuel, stored onsite in the existing 100,000 barrel tank. Backup fuel oil will be necessary to continue serving PSE's electrical load when natural gas supply is curtailed by the pipeline supply company or not reasonably available to be received at the facility.

The Project also includes a 600 kW diesel standby generator for emergency use whenever connection to the regional power grid is lost. Its purpose is to supply power to the turbine battery bank which keeps turbine ancillaries (such as the lube oil pump) energized in order to protect equipment and electrical systems at the facility.

In addition, the Project's proposed new 230 kV switchyard will include eight new circuit breakers filled with sodium hexafluoride (SF<sub>6</sub>), a gaseous dielectric commonly used in breakers. In addition to these eight breakers accommodating the new equipment, there will also be two other new breakers installed to replace some existing units. A small amount of the GHG pollutant SF<sub>6</sub> may be emitted from switchyard breakers as a result of unavoidable leakage. Therefore, these 10 breakers were included in the permitting action due to their predicted potential GHG emissions.

The NWCAA has decided to handle permitting these four different options by creating four separate OAC, one for each option (numbered OAC 1087-1, 1087-2, 1087-3, and 1087-4). Each of the OAC are prefaced with language such that, once PSE begins operation of the final option, the other three OACs will become invalid.

Ecology has also prepared, along similar lines, PSD-11-05. A PSD analysis was performed for the project for all pollutants to determine if any increase was above the "significance" level. The project will result in a significant net emissions increase of PM, PM<sub>10</sub>, PM<sub>2.5</sub>, H<sub>2</sub>SO<sub>4</sub>, and greenhouse gases for all turbine options. The Siemens SGT6-5000F4 option (Option 3) will also result in a significant net increase in CO emissions.

As of the time of writing of this document, PSE has not begun construction, nor have they decided on which of the four options will be chosen. PSE intends to request to extend the time by which construction would begin. This would be the third and last extension granted by Ecology and NWCAA, according to WAC 173-400-730(5)(b)(ii)(B). Neither the PSD nor the OAC associated with this project have been added to the AOP. The AOP will be revised to include the PSD and one of the four above-mentioned OACs when it becomes clear that PSE intends to construct the equipment and PSE indicates which option they choose.

## 2.5 Compliance History

### 2.5.1 Notices of Violation

Table 3 presents a listing of Notices of Violation (NOV) issued to PSE Fredonia by the NWCAA since January 1, 1998. Violations are resolved through a combination of penalty assessments and corrective actions 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 2-4 PSE Fredonia Notices of Violation**

NOV	Date Issued	Description
NOV #3109	12/12/00	Unit 1 opacity violation (visual emissions in excess of 20%)
NOV #3201	10/5/01	Failure to perform monthly opacity monitoring in June 2001, as required by the facility Air Operating Permit visual emissions requirements.
NOV #3236	3/8/02	Unit 4 NO <sub>x</sub> emissions in excess of 5.0 ppmvd limit (1-hour average)
NOV #3240	5/14/02	Failure to submit continuous monitoring system report as required by the NWCAA
NOV #3260 Warning Issued	7/30/02	Unit 4 NO <sub>x</sub> emissions in excess of 5.0 ppmvd (1-hour limit) during startup and shutdown in violation of Administrative Order CAA 10-2001-0107*
NOV #3808	3/4/10	Failure to submit prompt deviation reports (fuel sulfur content and ammonia-to-fuel ratio)

\*Note – This order was later revised to allow PSE Fredonia more operational flexibility for NO<sub>x</sub> during startups and shutdowns.

### 2.5.2 Compliance Reports

The PSE Fredonia AOP requires periodic, quarterly, 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 quarterly (for Units 3 and 4) and semiannual (for Units 1 and 2) summary reports 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 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:** The storage tank (100,000-barrel capacity constructed in 1982) is potentially subject to NSPS Subpart Ka based on size and construction date. However, this tank currently stores No. 2 distillate fuel which does not qualify as “petroleum liquids” as defined in 40 CFR 60.111a(b); as such, NSPS Subpart Ka does not apply.

**40 CFR 60 Subpart GG – Standards of Performance for Stationary Gas Turbines:** The provisions of NSPS 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. All stationary gas turbines were installed at PSE Fredonia after the adoption of NSPS Subpart GG for turbines. Therefore, NSPS Subpart GG, along with NSPS Subpart A (General Provisions), apply to all four turbines.

#### **3.2 National Emission Standards for Hazardous Air Pollutants (NESHAP)**

**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 pollutant (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 HAPs. As such, because PSE Fredonia is not a major source of HAPs, 40 CFR 63 Subpart YYYY does not apply.

A NESHAP standard that applies to stationary combustion turbines at area sources of HAPs 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 Fredonia is an area source of HAP emissions and, as such, is potentially subject to 40 CFR 63 Subpart ZZZZ. As a RICE that was constructed prior to June 12, 2006 and is used exclusively for emergency situations, the PSE Fredonia generator is considered an existing emergency stationary RICE located at an area source of HAP emissions under 40 CFR 63 Subpart ZZZZ. The facility must be in compliance with these generator requirements on October 19, 2013.

### **3.3 Acid Rain Program**

#### **40 CFR 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 in 40 CFR 72, 73, 74, 75, 77 and 78 on January 11 and March 23, 1993. Ecology also incorporated the Acid Rain program into Chapter 173-406 WAC effective on December 24, 1994.

PSE Fredonia Units 1 and 2 are not “affected units” under the Acid Rain Program because they are simple cycle turbines installed before November 15, 1990 (40 CFR 72.6(b)(1)). Turbine Units 3 and 4 are “affected units” under the Acid Rain program at the PSE Fredonia facility because they are new utility units that began operation after November 15, 1990 (40 CFR 72.6(a)(3)(i)). Acid Rain program requirements are set forth in AOP Section 6.

### **3.4 Compliance Assurance Monitoring (CAM)**

**40 CFR 64 – Compliance Assurance Monitoring:** The CAM rule under 40 CFR Part 64 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. The CAM rule coordinates existing monitoring requirements with additional monitoring if current requirements fail to specify adequate detail. CAM applies to units that (1) are subject to an emission limit, (2) use an add-on control device to meet the emission limit, and (3) have potential pre-control device emissions classifying it as a major source (also referred to as an “uncontrolled major source”).

A control device is defined under CAM as “equipment, other than inherent process equipment, that is used to destroy or remove air pollutant(s) prior to discharge to the atmosphere” (40 CFR 64.1). All four turbines utilize water injection to reduce NO<sub>x</sub> emissions; two of the turbines (Units 3 and 4) utilize selective catalytic reduction (SCR) in addition to water injection. Units 3 and 4 also use a CO catalyst to reduce CO emissions.

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. SCR and the CO catalyst are also not inherent process equipment and considered control devices for the purposes of CAM.

All four turbines at PSE Fredonia are potentially subject to CAM: Units 1 and 2 are each subject to NO<sub>x</sub> limitations, each use add-on control technology (i.e., water injection for NO<sub>x</sub>), and each are an uncontrolled major source of NO<sub>x</sub>; Units 3 and 4 each are subject to NO<sub>x</sub> and CO limitations, each use add-on control technologies (i.e., water injection and SCR for NO<sub>x</sub>, CO catalyst for CO), and each are an uncontrolled major source for both NO<sub>x</sub> and CO.

The CAM rule specifies that sources that are subject to other programs that have presumably adequate continuous monitoring requirements for specific pollutants as listed in 40 CFR 64.2(b), such as the Acid Rain program, are exempt from CAM for the subject pollutant. In addition, CAM does not apply to sources that operate continuous emission monitors. NWCAA has determined that CEMS that are subject to NWCAA 367 and NWCAA Appendix A meet the exemption from CAM as a continuous compliance determination method for the monitored pollutant.

Units 3 and 4 are subject to the Acid Rain program for NO<sub>x</sub> and are monitored using CEMs, which exempts the NO<sub>x</sub> monitoring from CAM requirements. In addition, CO emissions from Units 3 and 4 are monitored using a CEMS that is also subject to NWCAA 367 and NWCAA Appendix A, which meets the exemption from CAM as a continuous compliance determination method. Therefore, Units 3 and 4 are exempt from CAM. Units 1 and 2 are not subject to the Acid Rain program and are not monitored using CEMs. Therefore, they are subject to CAM for NO<sub>x</sub>.

Sources subject to CAM must submit CAM Plans, the requirements of which are to be included in the AOP. CAM Plans provide information on the monitoring requirements, appropriateness of the control approach, details of the quality assurance/quality control measures, and rationale for selection of indicator range. The CAM Plans for Units 1 and 2 for NO<sub>x</sub> are included in their entirety in SOB Appendix B; 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 Fredonia has always utilized and is currently using aqueous ammonia with a concentration of less than 20% to support operation of the SCR. As such, the facility is exempt from this regulation because the facility does not have any of the listed substances in quantities above the threshold values.

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

#### **3.6.1 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 Fredonia qualifies as a major source and is therefore potentially a subject source under the PSD program. Prevention of Significant Deterioration permit PSD-X82-09 was issued on August 23, 1982 by EPA Region 10 prior to commencement

of construction of Units 1 and 2 at the facility. The PSD permit was amended on October 24, 1995. PSD permit PSD-01-04 was issued by Ecology on July 18, 2003 for Units 3 and 4. PSD-11-05 was issued on October 24, 2013 for new turbines that have yet to be constructed.

### **3.6.2 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 OACs 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 the NWCAA to PSE Fredonia, as described in SOB Section 2.4.

### **3.6.3 Regulatory Orders**

To create federally enforceable requirements, the NWCAA may issue a regulatory order in response to a number of situations, including to require corrective action to resolve an enforcement case, to memorialize conditions from settlement agreements (e.g., Consent Decrees, Administrative Orders on Consent), or to mandate voluntary limits on potential-to-emit of any air contaminant. A regulatory order must include monitoring, recordkeeping and reporting requirements sufficient to ensure that the source is demonstrating compliance. As described in SOB Section 2.4, PSE Fredonia was issued Regulatory Order 27 to memorialize certain requirements from the Administrative Order on Consent regarding the Unit 1 turbine failure. Regulatory Order 27 was modified to RO 27a on October 2, 2007.

## **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 "HFCs" means a class of greenhouse gases primarily used as refrigerants, consisting of hydrogen, fluorine, and carbon.

PSE Fredonia 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 Fredonia 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>3</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)).

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<sup>3</sup> The deadline for reporting for emission year 2010 has been postponed to September 30, 2011.

### **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 Fredonia. Should PSE Fredonia 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:

- 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 became effective on January 1, 2011. This regulation applies to PSE Fredonia 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. This regulation is considered an applicable requirement under the Title V program; 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:

- Upon construction and permitting in PSD-X82-09, the increases in potential emissions of any regulated pollutant, excluding NO<sub>x</sub>, CO, SO<sub>2</sub>, and particulate matter, for this project were required to be and are assumed to be less than the significant levels under 40 CFR 52.21(b)(23)(i). As such, Condition 2 has been completed and is not included in the AOP.
- PSD-X82-09 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-X82-09 approval was issued on August 23, 1982. Construction was commenced and Units 1 and 2 began operation during September 1983, within 18 months of approval. This requirement has been completed and is not included in the AOP.
- PSD-X82-09 Condition 5 states that any construction, modification or operation of the proposed generating 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-X82-09 Condition 6a required initial compliance demonstrations be completed. Due to problems with the turbine blades, the initial compliance demonstrations were postponed. PSE Fredonia submitted the initial compliance demonstration test plan to EPA and the NWCAA on October 22, 1987. The testing was performed for NO<sub>x</sub> on Unit 2 while firing distillate oil and natural gas at base (87%) and peak (100%) loads on November 4, 1987. The Unit 2 testing was applied to Unit 1 since the turbines are identical. However, NSPS requires testing be performed at 30, 50, 75 and 100 percent load ratings. Supplemental information submitted in PSE Fredonia's performance test report shows that testing on an identical Westinghouse turbine in 1982 demonstrated compliance at the 30, 50, and 75 percent loads. The 1987 performance test data were used by

Westinghouse to generate an NSPS compliance chart (see AOP Appendix). This chart is used to maintain water injection rates adequate to meet NO<sub>x</sub> emission limitations in accordance with 40 CFR Part 60 Subpart GG. As such, the initial testing requirements have been completed and are not included in the AOP.

- PSD X-82-09 Condition 7 and OAC 1082 Condition 1 states that the EPA and the NWCAA shall be notified in writing of the commencement of construction date and the start-up date of Units 1 and 2 within 30 days of their occurrence. PSE notified EPA and the NWCAA that the units started up in September 1983 (letter received August 26, 1983). This requirement has been completed and is not included in the AOP.
- Administrative Order CAA-10-2001-0136 Condition 23 states that Conditions 10 and 12 will survive the termination of the Order. The Order was terminated on November 23, 2002, which was one year after the Effective Date.
  - Condition 10: “PSE’s compliance with terms and conditions of this Order resolves PSE’s liability under the federal Clean Air Act, RCW ch 70.94, and applicable NWCAA regulations for beginning actual construction and operation of Turbine Unit 1 at Fredonia.” This condition does not contain substantive requirements and has no ongoing compliance demonstrations. As such, it is not listed in the AOP. Please note that it is still in effect.
  - Condition 12: “Nothing herein shall be construed to limit the power of EPA, Ecology, and NWCAA to undertake any action against Fredonia or any person in response to conditions that may present an imminent and substantial endangerment to the public health, welfare, or the environment.” This condition does not contain substantive requirements and has no ongoing compliance demonstrations. As such, it is not listed in the AOP. Please note that it is still in effect.
- Pursuant to Administrative Order CAA-10-2001-0107, in order to operate Units 3 and 4 prior to obtaining a PSD permit, PSE was required to provide offsets through mitigation projects at PSE Whitehorn Generating Station (another PSE generating station located in Blaine, WA) and in the local community within the airshed as follows:
  - Condition 9a: Reduce NO<sub>x</sub> emissions at PSE Whitehorn to less than 50 ppmvd generating a 244 ton reduction. PSE increased 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 with the interim 50 ppmvd limit (i.e., 36.7 ppmvd at 15% O<sub>2</sub>). The required period of reduced emissions covered the timeframe from April 6, 2001 to issuance of the PSD permit (July 18, 2003). This requirement has been completed and is not included in either PSE Fredonia’s or PSE Whitehorn’s AOPs.

- Condition 9b: Purchase 3,000,000 gallons of low sulfur distillate (sulfur content less than 0.05 wt%) in place of high sulfur distillate (sulfur content between 0.05 wt% and 0.5 wt%) to fuel the two existing combustion turbines at PSE Whitehorn in order to provide secondary PM<sub>10</sub> emissions reductions. This term has been incorporated into the PSE Whitehorn AOP and is not included in the Fredonia AOP.
- Condition 9c: Provide up to \$125,000 to the Whatcom County Opportunity Council and the Skagit County Housing Authority to be used for replacement of 40 old fireplaces and wood stoves with new clean burning fireplaces or certified wood stoves. PSE contributed \$125,000 to the Whatcom Opportunity Council which replaced 40 wood stoves (letter dated January 30, 2003). This requirement has been completed and is not included in the AOP.
- Condition 10: Donate \$25,000 to the Whatcom 1000 Solar Rooftop Project to be used to provide zero percent interest loans to residential and commercial property owners in both Whatcom and Skagit Counties towards the installation of renewable energy technologies, including solar systems. PSE donated \$25,000 to the Whatcom 1000 Solar Rooftop Project in May 2001. This requirement has been completed and is not included in the AOP.
- Administrative Order CAA-10-2001-0107 Condition 29 states that Conditions 9b, 9c, 15, and 18 will survive the termination of the Order. These conditions are listed in RO 27a. The Order was terminated with the issuance of the PSD permit on July 18, 2003. Conditions 9b and 9c were discussed above.
  - Condition 15: “PSE’s compliance with terms and conditions of this Order resolves PSE’s liability under the federal Clean Air Act, RCW ch 70.94, and applicable NWCAA regulations for the installation and operation of the two P&W FT8 turbines at Fredonia without first applying for and obtaining a valid PSD permit or new source approval order. Compliance with this Order will not resolve PSE’s liability for any violations unrelated to these particular PSD and new source review pre-construction requirements.” This condition does not contain substantive requirements and has no ongoing compliance demonstrations. As such, it is not listed in the AOP. Please note that it is still in effect.
  - Condition 18: “Nothing herein shall be construed to limit the power of EPA, Ecology, and NWCAA to undertake any action against Fredonia or any person in response to conditions that may present an imminent and substantial endangerment to the public health, welfare, or the environment.” This condition does not contain substantive requirements and has no ongoing compliance demonstrations. As such, it is not listed in the AOP. Please note that it is still in effect.



- PSD-01-04 Condition 20 states that the PSD approval “shall become invalid if construction of the project is not commenced prior to eighteen (18) months after receipt of the final approval or if construction of the facility is discontinued for a period of eighteen (18) months.” PSE submitted a PSD application for Units 3 and 4 on May 4, 2001. The PSD-01-04 approval was issued on July 18, 2003. Construction was commenced and Units 3 and 4 began operation on June 22, 2001 and June 29, 2001, respectively, (letter dated July 2, 2001) within 18 month of approval. (Construction began prior to permit issuance in accordance with the Administrative Order CAA-10-2001-0107 dated April 6, 2001.) This requirement has been completed and is not included in the AOP.
- PSD-01-04 Condition 24 and 40 CFR 60.7(a)(3) requires that Ecology and the NWCAA shall be notified in writing at least 30 days prior to initial startup of Units 3 and 4. PSE notified Ecology and the NWCAA that Units 3 and 4 started up on June 22, 2001 and June 29, 2001, respectively, (letter dated July 2, 2001). This requirement has been completed and is not included in the AOP.
- PSD-01-04 Condition 5 (NO<sub>x</sub>), Condition 8 (SO<sub>2</sub>), Condition 11 (H<sub>2</sub>SO<sub>4</sub>), and Condition 14 (PM<sub>10</sub>) require initial compliance testing on Units 3 and 4. In addition, PSD-01-04 Condition 1.3 requires that the 60-day deadline for initial compliance demonstration using distillate fuel shall not include days in May, June, and July. Initial compliance demonstration testing under these requirements was completed in a timely fashion and demonstrated compliance with the individual emission limitations. These requirements have been completed and are not included in the AOP.
- PSD-01-04 Condition 23 states that “Any activity that is undertaken by the PSE Fredonia Power Generation Facility or others, in a manner which is inconsistent with the application and this determination, shall be subject to Ecology or the NWCAA enforcement under applicable regulations.” This condition does not contain substantive requirements and has no ongoing compliance demonstrations. As such, it is not listed 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 parentheses 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 become federally enforceable for the source.

#### **4.4 Gap-Filling**

Certain air pollution regulations and permit conditions do not specifically call out sufficient MR&R methods(s) to adequately demonstrate compliance with the applicable requirement. In these cases, the permitting agency may develop site-specific MR&R requirements that the source must follow pursuant to WAC 173-401-615(1)(b) & (c) (10/17/02). The inclusion of the customized MR&R requirements is called “gap-filling”. For instance, nuisance rules and opacity requirements have site-specific gap-filled obligations for the source. If gap-filling has been incorporated for a requirement of the AOP, the MR&R for that term will state “Directly Enforceable:” above the gap-filled text.

On August 19, 2008, the U.S. Court of Appeals vacated EPA’s 2006 interpretive rule that prohibited states from enhancing monitoring in Title V permits. As a result, permitting authorities again must ensure that monitoring in each permit is sufficient to assure compliance with the terms and conditions of the permit.

#### **4.5 Future Requirements**

Applicable requirements promulgated with future effective compliance dates may be included as applicable requirements in the permit.

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, AND CHANGES MADE DURING SECOND RENEWAL**

### **5.1 Permit Organization**

The PSE Fredonia 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
- Units 3 and 4 Acid Rain Permit
- Inapplicable Requirements
- Appendix – Water Injection Curves for Units 1 and 2

### **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 Fredonia. 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 Fredonia 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)). MR&R requirements noted as "CAM Plan:" are part of the Compliance Assurance Monitoring Plan for the specified unit(s) as required by 40 CFR 64.6(c). The CAM plans submitted by the facility per 40 CFR 64.4 are included in SOB Appendix B.

Other MR&R requirements not labeled "Directly Enforceable:" or "CAM Plan:" 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 of 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 and State rules along with OAC and PSD permits. PSE Fredonia 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% on a six-minute average (demonstrated using

40 CFR 60 Appendix A Method 9 – Visual determination of the opacity of emissions from stationary sources).

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 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 standard(s). 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. Both methods call for opacity readings to be taken at 15-second intervals.

**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 Fredonia. 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. As such, 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 the facility-wide in the Generally Applicable Requirements (AOP Section 4) and for Units 1 and 2 in the Specifically Applicable Requirements (AOP Section 5).

Several of the emission limits for Units 1 and 2 stem from PSD permit PSD-X82-09. Reviewing the background documentation for the PSD permit, the limits were intended for each turbine individually. However, PSE requested a modification to PSD-X82-09 in 1995 to adjust the particulate matter (PM) limits. When EPA issued the modification on October 24, 1995, the PM limits listed were for both turbines combined, which is reflected in the associated AOP terms.

**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 1 and 2 firing gas: 11.3 kJ/W-hr (10,711 Btu/kW-hr LHV)

= Units 1 and 2 firing oil: 11.6 kJ/W-hr (10,995 Btu/kW-hr LHV)

= Units 3 and 4 firing gas: 10.1 kJ/W-hr (9586 Btu/kW-hr LHV)

= Units 3 and 4 firing oil: 10.3 kJ/W-hr (9800 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 all four units are equipped with add-on control technology – Units 1&2 have water injection and Units 3&4 have both water injection and SCR. 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. 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. PSE has chosen to accept an F-value of zero. If PSE chooses to utilize an F-factor that is 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> concentrations are:

- Units 1 and 2 firing gas: 95.6 ppmvd at 15% oxygen
- Units 1 and 2 firing oil: 93.1 ppmvd at 15% oxygen
- Units 3 and 4 firing gas: 106.8 ppmvd at 15% oxygen
- Units 3 and 4 firing oil: 104.5 ppmvd at 15% oxygen

According to 40 CFR 60.334(j)(1)(i)(A), for units that monitor water to fuel ratio only (such as Units 1 and 2), excess emission events, and hence the emission limits, are based on one-hour averages. For units with CEMS (e.g., Units 3 and 4), excess emission events, and hence the emission limits, are based on four-hour averages (40 CFR 60.334(j)(1)(iii)(A)).

**Nitrogen Oxides Requirements – Turbine Operation:** For Units 1 and 2, water injection rates are determined by a compliance demonstration chart specific to Westinghouse W501D units (see AOP Appendix). This chart was generated following analysis of the initial 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 a permit deviation in accordance with AOP Term 2.4.7.

Pursuant to 40 CFR 334(g), PSE Fredonia 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).

Because Units 3 and 4 utilize water injection in addition to SCR to meet their mandated thresholds, the units are potentially subject to the water injection monitoring requirements in NSPS Subpart GG. Based on a PSE request, EPA Region 10 approved an Alternative Monitoring Method on November 14, 2002 where the NO<sub>x</sub> CEMS, certified in accordance with 40 CFR Part 75, may be used as an alternative monitoring system to the NSPS Subpart GG parametric monitoring system (i.e., water-to-fuel ratio). Because this approval has no ongoing requirements, it is not addressed in the AOP.

**Nitrogen Oxides Requirements – Excess Emissions Reporting:** As designed by the turbine manufacturer, during startup of Units 1 and 2, water injection is withheld until the turbines reach a specific power output (approximately 30 MW); if water is injected prior to reaching 30 MW, the water will quench the flame. PSE refers to operating at below 30 MW 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 (i.e., 20 MW). Because both of these situations have a power output of less than 30 MW, water is not being injected into the turbine. The turbines can operate at either of these thresholds for extended periods of time, not necessarily only 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 CAM Plans for Units 1 and 2 for NO<sub>x</sub> are included in SOB Appendix B. 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 Plan:”.

The information in the CAM Plans 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 Fredonia, excursions are defined as the same as exceedances and the permit terms are written as such.

As 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 NSPS Subpart GG, which meets the monitoring frequency requirement in CAM for the short-term concentration limit (i.e., ppmvd on a 1-hour average). The continuously-monitored water-to-fuel ratio data can be converted via stack test results to a mass emission rate both on a short-term (i.e., lb/hr) and long term (i.e., tons per rolling 12-month period).

PSE also proposes to stack test Units 1 and 2 once every 7,500 operating hours or once every five calendar years, whichever occurs sooner, for demonstrating compliance with the long-term tons per rolling 12-month period limits. This does not meet the monitoring once per 24-hour period requirement in CAM. However, because Fredonia is a peaking station where the units run infrequently (the most Units 1 and 2 operated in the past five years was in 2009: 425.9 hours and 298.5 hours, respectively). In combination with the continuous monitoring of the water-to-fuel ratio, NWCAA determines that the proposed monitoring is adequate to meet the CAM monitoring requirements.

In addition to the continuous water-to-fuel ratio monitoring, the periodic stack testing is also considered to meet the CAM requirements for both the concentration limit and the short-term pound per hour limit. While it is not on the same time basis as the 3-hour concentration limit and hourly mass 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.

There is one case where requirements unique to the CAM Plan were not included in the AOP. In the CAM Plan for Unit 1, PSE proposes that if operating hours exceed 3,000 hours per rolling 12 month period for more than 18 consecutive months, a NO<sub>x</sub> CEMS must be installed. This requirement is also part of Regulatory Order 27a, which is included in AOP Condition 5.2.4. Once the CEMS is installed, the CEMS will be subject to NWCAA 367 and NWCAA Appendix A; hence, the CEMS meets the criteria as a continuous compliance determination method and the unit is exempt from CAM. Should a CEMS be installed, the AOP will need to be revised to remove the CAM requirements and insert the CEMS requirements instead. Accordingly, no CAM Plan CEMS requirements are included in 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 ppmw, 0.068 wt%, 338 ppmv 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).

Unit 1 is subject to RO 27a which mandates that PSE track monthly operation and fuel use along with SO<sub>2</sub> emissions and report the information semi-annually. This information is necessary to demonstrate ongoing compliance with the long-term emission limitations. Because Unit 2 has similar limitations but does not have these monitoring and reporting requirements, the MR&R requirements were gap-filled as directly enforceable in AOP Term 5.3.4.

In addition, for Units 3 and 4, SO<sub>2</sub> emissions are limited by a requirement to burn low sulfur diesel (less than 0.01%wt S) pursuant to PSD-01-04. For a period, however, Units 3 and 4, along with all other fuel burning equipment at PSE Fredonia, may burn diesel with a sulfur content of 0.01%wt to 0.032%wt until the current inventory of diesel fuel stored at PSE Fredonia is consumed. This fuel may not be used by Units 3 and 4 during the months of May through July because those were the months with the highest modeled impacts.

Because PSE Fredonia has an aggregate heat input capacity greater than 500 MMBtu/hr, the facility is subject to NWCAA 460. As such, PSE Fredonia is not subject to the 412 ppm at standard conditions sulfur limit under 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 Fredonia burns for practical purposes only natural gas or ultra-low sulfur diesel satisfies this requirement.

**Carbon Monoxide:** For Units 1 and 2, the MR&R requirements were gap-filled for the CO limit that stemmed from PSD-X82-09. Because PSE is required to test for NO<sub>x</sub> at a specified frequency (i.e., every 7,500 hours or every five years for Unit 1 and every 10,000 hours or every five years for Unit 2), testing for CO at the same time as NO<sub>x</sub> is adequate to demonstrate compliance with the PSD limit.

**Hazardous Air Pollutants:** OAC 761a Condition 1 mandates that PSE Fredonia comply with PSD permit PSD-01-04 dated July 18, 2003 as toxics BACT (T-BACT) for specific toxic air pollutants. The sulfuric acid mist emission limit in the PSD permit is T-BACT for sulfuric acid mist. The PSD permit on NO<sub>x</sub> emissions is adopted by reference as T-BACT for nitrogen oxide. Restriction on fuel sulfur content in the PSD permit results in cleaner fuels (lower ash/metals contents) and is adopted by reference as T-BACT for metallic toxic air pollutants. As such, OAC 761a Condition 1 is cited concurrently with the PSD permit limits for sulfuric acid mist, NO<sub>x</sub>, and fuel sulfur content.

**Emergency Generator Requirements:** The generator is subject to the requirements in 40 CFR 63 Subpart ZZZZ for emergency spark-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 generator for more than 500 hours per year, an NSR permit may be required.

**5.7 AOP Section 6 Acid Rain**

The Acid Rain Permit and Certificate of Representation for Units 3 and 4 at PSE Fredonia are included in AOP Section 6.

**5.8 AOP Section 7 Inapplicable Requirements**

WAC 173-401-640 allows a determination regarding inapplicable requirements. AOP Section 7 contains a list of inapplicable requirements and the causal basis.

## 6 INSIGNIFICANT EMISSIONS UNITS

Table 4 below lists emission units present at PSE Fredonia 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 Fredonia 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
Aqueous ammonia storage tank	One 20,000 gallon tank	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)
Generator cooling system	Non-contact, antifreeze based cooling system for generator hydrogen blanket	Not in contact with process streams, not using chromium-based corrosion inhibitors	WAC 173-401-533 (2)(m)
Space and hot water heaters	Natural gas or propane fired space heaters and hot water 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	State Waste Discharge permitted, used for removing suspended solids and oil.	WAC 173-401-533 (3)(d)

## **7 PUBLIC DOCKET**

Copies of PSE Fredonia's air operating permit, permit application, and any technical support documents are available at the following locations:

Online:

[www.nwcleanair.org](http://www.nwcleanair.org)

Office:

Northwest Clean Air Agency  
1600 South Second Street  
Mount Vernon, WA 98273-5202  
(360) 428-1617 (call for an appointment to review)

## 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
ppmvd	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**

AOP Changes in Previous Renewals and Revisions

### **Changes made during the first renewal issued March 7, 2005**

The Northwest Clean Air Agency (NWCAA) issued the original AOP for the PSE Fredonia facility on May 1, 1998 and it expired on May 1, 2003. The first renewal was issued on March 7, 2005, and expired on March 7, 2010.

- Permit terms relating to the emissions from the two new Pratt & Whitney FT-8 Twin Pac combustion turbines were added.
- Regulatory citations in the permit have been updated to reflect more recent revision/promulgation dates.
- General provisions from Title 40 Code of Federal Regulations (CFR) Part 60 were added.
- Terms were added to reflect applicability of the federal “Compliance Assurance Monitoring Rule” (40 CFR Part 64) and requirements stemming from regulatory orders issued to PSE Fredonia. Three Compliance Assurance Monitoring (CAM) plans were incorporated into the permit to document how the permittee intends to meet the monitoring requirements for NO<sub>x</sub> and CO emissions. The CAM plans were included in the SOB.
- Factual information was revised to correct for current operation and some text was rephrased to add clarification.
- Section 2 - Standard Terms and Conditions was substantially revised to include recent regulatory changes and to allow standardization of permits issued by the Northwest Clean Air Agency.
- Section 4 – Specifically Applicable Requirements was substantially revised to include recent regulatory orders and permit conditions.
- The Acid Rain Permit was incorporated into the permit and is included as Section 5.
- The list of insignificant emission units at the facility has been relocated to the SOB Section 5.
- Appendix, Figure D was added to the permit to reflect the water injection rate compliance chart used to track NO<sub>x</sub> abatement for units 1 and 2.
- Terms have been revised and added to reflect the July 8, 2004 revisions to 40 CFR Part 60 Subpart GG.
- Northwest Air Pollution Authority has been replaced by new name; Northwest Clean Air Agency (NWCAA).
- Formatting has been aligned to current NWCAA standard.

### **Changes Made During the Second Renewal**

NWCAA received the application for the second renewal of the PSE Fredonia Generating Station AOP on September 4, 2009. The following changes have been made to the AOP during the second renewal:

- Regulatory citations in the permit were revised to reflect new or modified regulations and updated revision/promulgation dates.



- Formatting throughout the entire permit 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. Note that the renewal application is due a year in advance of the permit expiration date.
- AOP Section 1 (Emission Unit Identification) has been updated to properly reflect facility equipment. A natural-gas fired emergency generator was added as an Emission Unit.
- 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. The applicable requirement pertaining to the regulation of greenhouse gas (GHG) emissions is included as AOP Terms 2.4.5 and 2.9.
- 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. The NESHAP Standard Terms and Conditions have been added as a result of the applicability of 40 CFR 63 Subpart ZZZZ to the emergency generator.
- For clarity and simplicity and pursuant to PSE request, the opacity monitoring, recordkeeping, and reporting (MR&R) requirements in AOP Sections 4 and 5 have been consolidated into a single procedure to demonstrate compliance with the multiple standards.
- References and requirements are updated in AOP Section 5 to reflect the modified Regulatory Order (RO) 27a and OAC 761a. The OAC issued on October 13, 1982 was replaced with OAC 1082.
- Duplicate terms (e.g., listing NSPS Subpart A requirements in both AOP Section 3 and AOP Section 5) have been removed.
- The distillate inventory volume was clarified to reflect the 2,900,000 gallon value listed in the PSD permit.
- The NWCAA had excused PSE from the requirement to report full-speed no-load (FSNL) operation in advance under AOP Term 2.4.9. Because FSNL operation is not a function of startup or shutdown, it is not subject to AOP Term 2.4.9 and therefore does not require exemption from the advance reporting requirements.
- NSPS Subpart GG had not been shown as an applicable requirement in AOP Table 5 for Units 3 and 4 in the previous edition of the AOP. NSPS Subpart GG requirements are now included in AOP Table 5 for Units 3 and 4.
- Pursuant to PSE request and for simplicity, the turbine NO<sub>x</sub> limit from NSPS Subpart GG listed in the AOP was changed from the equation in the rule to the calculated concentration limit. The assumptions used in the equation are

discussed in SOB Section 5.6. In addition, because the NO<sub>x</sub> limits vary from unit to unit, the NO<sub>x</sub> limits were listed for each individual turbine.

- 40 CFR 63 Subpart ZZZZ (referred to as the Reciprocating Internal Combustion Engine [RICE] Maximum Achievable Control Technology [MACT]) requirements applicable to the natural gas fired emergency generator are now included in AOP Table 5.
- The previous edition of the AOP included three Compliance Assurance Monitoring (CAM) Plans –NO<sub>x</sub> for Unit 1, NO<sub>x</sub> for Unit 2, and CO for Units 3 and 4 combined. Units 3 and 4 are equipped with a CO catalyst and are required to operate a CO Continuous Emission Monitoring System (CEMS) pursuant to Order of Approval to Construct (OAC) 761a Condition 5. The CEMS must comply with NWCAA 367, NWCAA Appendix A, New Source Performance Standards (NSPS) Subpart A Appendices B and F as is stated in the OAC and the AOP. As such, the CEM system qualifies as a “continuous compliance determination method” (40 CFR 64.1) and is exempt from the CAM program pursuant to 40 CFR 64.2(b)(1)(vi). Therefore, a CAM Plan is not required for Units 3 and 4 for CO and is no longer included as part of the AOP package.
- As part of the renewal, PSE provided revised CAM Plans for NO<sub>x</sub> for Units 1 and 2 updated to make reporting timeframes and data averaging periods consistent with other mandated requirements and to reflect current operation. The updated CAM Plans for Units 1 and 2 are included in SOB Appendix B and the related requirements are included in AOP Table 5.
- The Acid Rain Permit and Certificate of Representation for Units 3 and 4 at PSE facility are included in AOP Section 6. Both documents have been updated since the last AOP renewal.
- The list of Inapplicable Requirements (AOP Section 7) has been reviewed and updated to reflect current regulations and applicability.
- To avoid confusion, the water-to-fuel operating charts are included in the AOP Appendix only and are eliminated from the SOB Appendix.
- 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.

#### **Changes made during Modification 1 (Administrative Amendment)**

The responsible official was changed from Wayne Gould to Ed Odom. Permit information on page 2 of the AOP and SOB were changed to reflect issuance of this modification.

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

## **Appendix B**

CAM Plans for NO<sub>x</sub> for Units 1 and 2

**Compliance Assurance Monitoring  
Water Injection for Nitrogen Oxides (NO<sub>x</sub>) Control  
Puget Sound Energy Fredonia Generating Station**

**BACKGROUND**

**I. EMISSIONS UNIT**

Description: Westinghouse W501D Simple Cycle Combustion Turbine  
Identification: Unit 1  
Facility: Puget Sound Energy – Fredonia Generating Station  
Mount Vernon, WA

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

Requirement: Regulatory Order Number 27a  
Emission Limit: NO<sub>x</sub> emissions from Unit 1 shall not exceed 688.3 tons per year on a rolling 12-month total.

Requirement: PSD Permit PSD-X82-09  
Emission Limit: NO<sub>x</sub> emissions limited to:

- 480.0 lb/hr
- 2061.0 tons per year on a rolling 12-month basis.

Requirement: NSPS Subpart GG  
Emission Limit: NO<sub>x</sub> emissions limited to:

- Firing natural gas: 95.6 ppm<sub>dv</sub> @ 15% oxygen, 1-hour average
- Firing fuel oil: 93.1 ppm<sub>dv</sub> @ 15% oxygen, 1-hour average.

Monitoring Requirements: NO<sub>x</sub> emissions from Unit 1 shall be measured every 7,500 hours of Unit 1's operation or once every five calendar years, whichever occurs sooner. Emission testing shall be done at the most frequent load level and shall follow Title 40 (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

If operating hours exceed 3,000 hours per rolling 12-month period for more than 18 consecutive months then periodic NO<sub>x</sub> testing (other than quality assurance testing) is not required and Puget Sound Energy (PSE) shall install and operate a continuous NO<sub>x</sub> emissions monitoring system (CEMS) that is compliant

with 40 CFR Part 60 Appendix B Performance Specification 2 and Appendix F. The CEMS may be removed if Unit 1's operating hours are subsequently less than 3,000 hours per rolling 12-month period for more than 24 consecutive months. If the CEMS is removed then the periodic testing schedule shall resume.

PSE shall calculate and record monthly hours of operation on natural gas and distillate oil and rolling 12-month NO<sub>x</sub> emissions totals within 30 days after the end of each calendar month. PSE shall report semiannually the results for the preceding 6 calendar months to the Northwest Clean Air Agency (NWCAA) within 30 days after the end of each 6 month period. Emission calculations shall be based on fuel consumption, NO<sub>x</sub> emissions testing or CEMS data, and water injection/turbine load relationships.

PSE shall record water injection, fuel use and MW output on 15 minute intervals and determine and record one-hour average water-to-fuel ratios.

### **III. Control Technology**

Water injection shall be used to control NO<sub>x</sub> from the Unit 1 W501D turbine during combustion of natural gas or fuel oil. The key elements of the monitoring approach are presented in Table 1.

**TABLE 1. UNIT 1 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

REQUIREMENT	PARAMETER
<b>I Indicator: Operation hours &lt; 3,000 hrs per rolling 12-month period</b>	
A. Measurement Approach	Emissions Stack Testing
	NO <sub>x</sub> emissions from Unit 1 shall be measured every 7,500 hours of Unit 1 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.
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>I Indicator: Operation hours &gt; 3,000 hrs per rolling 12-month period</b>	
A. Measurement Approach	Continuous Emissions Monitoring System CEMS
	A NO <sub>x</sub> CEMS shall be installed on the gas turbine's exhaust stack.

**TABLE 1 CONTINUED. UNIT 1 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>II. Indicator Range: Operation hours &lt; 3,000 hrs per rolling 12-month period</b>	
<p>A. Indicator Range Emissions Stack Testing</p>	<p>An acceptable range of NO<sub>x</sub> emissions includes less than 688.3 tons per year and 2061.0 tons per year based on a rolling 12 month period, less than 480.0 pounds per hour, and a total concentration of no more than 95.6 ppmvd @ 15% O<sub>2</sub> while combusting natural gas and 93.1 ppmvd @ 15% O<sub>2</sub> while combusting distillate, in any one hour period.</p> <p>Any one hour period during which NO<sub>x</sub> emissions exceed 95.6 ppmvd @ 15% O<sub>2</sub> while combusting natural gas and 93.1 ppmvd @ 15% O<sub>2</sub> while combusting distillate, any 12 consecutive month period that NO<sub>x</sub> emissions exceed 688.3 tons or 2061.0 tons per year, or an exceedance of 480.0 pounds per hour shall be reported to NWCAA within 30 days following month's end of the exceedance. If necessary, corrective actions shall be taken immediately.</p>
<p>B. Indicator Range Water-To-Fuel Ratio Monitoring</p>	<p>An acceptable water-to-fuel ratio shall be in compliance with 40 CFR 60.322(a).</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 Westinghouse NSPS compliance chart No. 21T2294 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 Westinghouse compliance chart shall be reported to NWCAA within 30 days following month's end after the event. If necessary, corrective actions shall be taken immediately.</p>

**TABLE 1 CONTINUED. UNIT 1 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>II. Indicator Range: Operation hours &gt; 3,000 hrs per rolling 12-month period</b>	
<p>A. Indicator Range                      Continuous Emission Monitoring System (CEMS)</p>	<p>An acceptable range of NO<sub>x</sub> emissions includes less than 688.3 tons per year and 2061.0 tons per year based on a rolling 12 month period, less than 480.0 pounds per hour, and a total concentration of no more than 95.6 ppmvd @ 15% O<sub>2</sub> while combusting natural gas and 93.1 ppmvd @15% O<sub>2</sub> while combusting distillate, in any one hour period.</p> <p>Any one hour period during which NO<sub>x</sub> emissions exceed 95.6 ppmvd @ 15% O<sub>2</sub> while combusting natural gas and 93.1 ppmvd @15% O<sub>2</sub> while combusting distillate, or any 12 consecutive month period that NO<sub>x</sub> emissions exceed 688.3 tons or 2061.0 tons per year, or an exceedance of 480.0 pounds per hour shall be reported to NWCAA within 30 days following month's end of the exceedance. If necessary, corrective actions shall be taken immediately.</p>



**TABLE 1 CONTINUED. UNIT 1 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>III. Performance Criteria: Operation hours &lt; 3,000 hrs per rolling 12-month period</b>	
A. Data Representativeness	<p>NO<sub>x</sub> emissions testing shall be measured from the Unit 1'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>

**TABLE 1 CONTINUED. UNIT 1 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>III. Performance Criteria: Operation hours &lt; 3,000 hrs per rolling 12-month period</b>	
D. Monitoring Frequency and Data Collection Procedures	<p>Record water injection, fuel use and MW power output on 15-minute intervals.</p> <p>PSE shall calculate and record monthly hours of operation on natural gas and distillate oil and rolling 12-month NO<sub>x</sub> emissions totals within 30 days after the end of each calendar month. PSE shall report semiannually the results for the preceding 6 calendar months to the Northwest Clean Air Agency (NWCAA) within 30 days after the end of each 6 month period. Emission calculations shall be based on fuel consumption, NO<sub>x</sub> emissions testing or CEMS data, and water injection/turbine load relationships.</p> <p>In the case of an exceedance, a 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 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:</p> <ul style="list-style-type: none"> <li>a) exceedance of an emission or ambient standard;</li> <li>b) a potential threat to human health or safety.</li> </ul>

**TABLE 1 CONTINUED. UNIT 1 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>III. Performance Criteria: Operation hours &gt; 3,000 hrs per rolling 12-month period</b>	
A. Data Representativeness	The continuous emissions monitoring system shall be installed and operated on the Unit 1's exhaust stack.
B. Verification of Operational Status	The monitoring system shall be operated according to manufacturer specifications, and PSE shall maintain and check CEMS operation daily.
C. QA/QC Practices and Criteria	The CEMS shall, at a minimum, meet the requirements contained in 40 CFR, Part 60, Appendix B, Performance Specifications and 40 CFR, Part 60, Appendix F, Quality Assurance Procedures.

**TABLE 1 CONTINUED. UNIT 1 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>III. Performance Criteria: Operation hours &gt; 3,000 hrs per rolling 12-month period</b>	
D. Monitoring Frequency and Data Collection Procedures	<p>NOX CEMS shall comply with 40 CFR §60.334(b). Record, at a minimum, 15-minute NOX emissions data from the CEMS and calculate one-hour average NOX emissions. Report within 30 days of the end of each calendar quarter period NOX emissions to NWCAA.</p> <p>Reports shall include water-to-fuel ratio data, hourly maximum and average NOX emissions data in the units of the standard, duration and nature of CEMS downtime, results of CEMS audits or accuracy checks, and any stack test results. Emissions calculations shall be based on CEMS data.</p> <p>Corrective actions shall be taken immediately upon an exceedance of a NO<sub>x</sub> permit limit or the instrument is not operating in accordance with NWCAA 367 and NWCAA Appendix A.</p> <p>In the case of an exceedance, a report shall document the date and time of the occurrence, magnitude of the emission or process parameters excess, duration of the excess, the probable cause of the occurrence, correction actions taken or planned, and the name of any other agency contacted. The 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 Westinghouse W501D simple cycle dual-fueled combustion turbine (Unit 1) is located at the Fredonia Generating Station. The turbine has the capability to supply a gross power output of approximately 104 MW. NO<sub>x</sub> emissions from Unit 1 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 NWCAA Regulatory Order No. 27a, PSD permit PSD-X82-09, NSPS Subpart GG, and the Fredonia Generating Station's Air Operating Permit No. 003.

#### A. Operation Hours Are Less than 3,000 Hours per Rolling 12-month Period

If the unit is operating less than 3,000 hours per a 12-month rolling period, stack testing every 7,500 hours of Unit 1'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 95.6 ppmvd @ 15% O<sub>2</sub> while combusting natural gas and 93.1 ppmvd @ 15% O<sub>2</sub> while combusting distillate, by comparing the recorded water-to-fuel ratios against the Westinghouse NSPS compliance chart No. 21T2294. In addition, the water-to-fuel ratio indicates compliance with the pound per hour and tons per year emission limits. Compliance with these conditions 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 that "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." Unit 1 is 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.

#### B. Operation Hours Are Greater than 3,000 Hours per Rolling 12-month Period

If the unit is operating greater than 3,000 hours per a 12-month rolling period for more than 18 consecutive months, CEMS is considered a reasonable option for ensuring compliance of all appropriate regulatory limits.

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

#### **A. Operation Hours Are Less than 3,000 Hours per Rolling 12-month Period**

The indicator range is selected to show compliance with the conditions of the NWCAA Regulatory Order No. 27a, PSD permit PSD-X82-09, NSPS Subpart GG, and the Fredonia Station's Air Operating Permit No 003. Stack testing and fuel monitoring shall provide data to calculate NO<sub>x</sub> emissions on an annual basis and provide an accurate estimate of emission concentration within the exhaust stack of Unit 1. Water-to-fuel monitoring shall provide information to determine compliance with 40 CFR 60.335.

#### **B. Operation Hours Are Greater than 3,000 Hours per Rolling 12-month Period**

When operating hours for Unit 1 are greater than 3,000 hours per rolling 12 month period, a CEMS shall provide a more accurate representation of NO<sub>x</sub> emissions. The CEMS indicator range is set according to the NO<sub>x</sub> emission indicator range stipulated in the Regulatory Order No. 27a from the NWCAA.

## **TEST AND IMPLEMENTATION PLAN**

### **I. TEST PLAN**

#### **A. Operation Hours Are Less than 3,000 Hours per Rolling 12-month Period**

NO<sub>x</sub> emissions from Unit 1 shall be measured every 7,500 hours of Unit 1 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 calculate and record monthly hours of operation on natural gas and distillate oil and rolling 12-month NO<sub>x</sub> emissions totals within 30 days after the end of each calendar month. PSE shall report the results semiannually for the preceding 6 calendar months to the Northwest Clean Air Agency (NWCAA) within 30 days after the end of each 6 month period (unless a different testing and reporting schedule has been approved by NWCAA).

In the case of an exceedance, a 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 within 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.

#### **B. Operation Hours Are Greater than 3,000 Hours per Rolling 12-month Period**

PSE shall install and operate the CEMS on Unit 1's exhaust stack to determine compliance with the NO<sub>x</sub> requirement. The CEMS shall operate in conformance with 40 CFR 60, Appendix B, Performance Specifications 2 and 40 CFR, Part 60, Appendix F, Quality Assurance Procedures.

PSE shall submit the CEMS and process data reports, including information on any exceedances, in written (or electronic if permitted by NWCAA) form to NWCAA within 30 days of the end of each calendar quarter period (unless a different testing and reporting schedule has been approved by NWCAA)

This report shall include at a minimum, the process or control equipment operation parameters; the hourly maximum and average concentration, in units of the standard, for the monitored pollutant; the duration and nature of any CEMS downtime; the results of any CEMS audits or accuracy checks; and the results of any stack tests.

In the case of an exceedance, a report shall document the date and time of the occurrence, magnitude of the emission or process parameters excess, duration of the excess, the probable cause of the occurrence, correction actions taken or planned, and the name of any other agency contacted. The report shall be submitted to NWCAA within 30 days following month's end of the exceedance.

All exceedances of any sort shall be documented and reported.

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

### A. Operation Hours Are Less than 3,000 Hours per Rolling 12-month Period

No implementation plan is necessary for stack testing and water-to-fuel ratio monitoring, because these monitoring techniques are already in operation for Unit 1.

### B. Operation Hours Are Greater than 3,000 Hours per Rolling 12-month Period

Unit one does not currently have CEMS installed. If the CEMS requirements are triggered, PSE's implementation timeline for installing, starting up, and operating the CEMS is contained in Table 2.

**TABLE 2. IMPLEMENTATION PLAN SCHEDULE**

<b>Date</b>	<b>Action Completed</b>
No later than the shorter of either 90 operating days or 180 calendar days after applicability (when operation exceeds 3,000 hours of operation per 12 month period for more than 18 consecutive months).	CEMS installed
No later than the shorter of either 90 operating days or 180 calendar days after applicability (when operation exceeds 3,000 hours of operation per 12 month period for more than 18 consecutive months).	Conduct performance test according to the standards of 40 CFR 60 Appendix B, Specification 2 and QAQC procedures of 40 CFR 60 Appendix F.

**Compliance Assurance Monitoring  
Water Injection for Nitrogen Oxides (NO<sub>x</sub>) Control  
Puget Sound Energy Fredonia Generating Station**

**BACKGROUND**

**I. EMISSIONS UNIT**

Description: Westinghouse W501D Simple Cycle Combustion Turbine  
Identification: Unit 2  
Facility: Puget Sound Energy – Fredonia Generating Station  
Mount Vernon, WA

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

Requirement: PSD Permit PSD-X82-09  
Emission Limit: NO<sub>x</sub> emissions limited to:

- 480.0 lb/hr
- 2061.0 tons per year on a rolling 12-month basis.

Requirement: NSPS Subpart GG  
Emission Limit: NO<sub>x</sub> emissions limited to:

- Firing natural gas: 95.6 ppmdv @ 15% oxygen, 1-hour average
- Firing fuel oil: 93.1 ppmdv @ 15% oxygen, 1-hour average.

Monitoring Requirements: NO<sub>x</sub> emissions from Unit 2 shall be measured every 10,000 hours of Unit 2's operation or once every five calendar years, whichever occurs sooner. Emission testing shall be done at the most frequent load level and shall follow Title 40 (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.

Puget Sound Energy (PSE) shall calculate and record hours of operation on natural gas and distillate oil and rolling 12-month NO<sub>x</sub> emissions totals at the end of each calendar month and semi-annually PSE shall report the results for the preceding 6 calendar months to the Northwest Clean Air Agency (NWCAA) within 30 days after the end of each six-month period. Emission calculations shall be based on fuel consumption, NO<sub>x</sub> emissions testing, and water injection/turbine load relationships.



PSE shall record water injection, fuel use and MW output on 15 minute intervals and determine and record one-hour average water-to-fuel ratios

**III. Control Technology**

Water injection shall be used to control NO<sub>x</sub> from the Unit 2 W501D turbine during combustion of natural gas or fuel oil. The key elements of the monitoring approach are presented in Table 1.

**TABLE 1. UNIT 2 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>REQUIREMENT</b>	<b>PARAMETER</b>
<b>I Indicator:</b>	
A. Measurement Approach	Emissions Stack Testing NO <sub>x</sub> emissions from Unit 2 shall be measured every 10,000 hours of Unit 2's 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.
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).

**TABLE 1 CONTINUED. UNIT 2 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>II. Indicator Range:</b>	
<p>A. Indicator Range Emissions Stack Testing</p>	<p>An acceptable range of NO<sub>x</sub> emissions includes less than 2,061.0 tons per year based on a rolling 12 month period, less than 480.0 pounds per hour, and a total concentration of no more than 95.6 ppmvd @ 15% O<sub>2</sub> while combusting natural gas and 93.1 ppmvd @ 15% O<sub>2</sub> while combusting distillate, in any one hour period.</p> <p>Any one hour period during which NO<sub>x</sub> emissions exceed 95.6 ppmvd @ 15% O<sub>2</sub> while combusting natural gas and 93.1 ppmvd @ 15% O<sub>2</sub> while combusting distillate, any 12 consecutive month period that NO<sub>x</sub> emissions exceed 2,061.0 tons, or an exceedance of 480.0 pounds per hour shall be reported to NWCAA within 30 days following months end of the exceedance. If necessary, corrective actions shall be taken immediately.</p>
<p>B. Indicator Range Water-To-Fuel Ratio Monitoring</p>	<p>An acceptable water-to-fuel ratio shall be in compliance with 40 CFR 60.322(a).</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 60.322(a) and determined by the Westinghouse NSPS compliance chart No. 21T2294 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 Westinghouse 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>

**TABLE 1 CONTINUED. UNIT 2 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>III. Performance Criteria:</b>	
A. Data Representativeness	<p>NO<sub>x</sub> emissions testing shall be measured from the Unit 2'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>

**TABLE 1 CONTINUED. UNIT 2 MONITORING APPROACH AT PUGET SOUND ENERGY - FREDONIA**

<b>III. Performance Criteria:</b>	
D. Monitoring Frequency and Data Collection Procedures	<p>Record water injection, fuel use and MW power output on 15-minute intervals.</p> <p>PSE shall calculate and record monthly hours of operation on natural gas and distillate oil and rolling 12-month NO<sub>x</sub> emissions totals within 30 days after the end of each calendar month. On a semi-annual basis, PSE shall report the results for the preceding 6 months in written (or electronic if permitted by NWCAA) form to NWCAA within 30 days of the end of each six-month period (unless a different testing and reporting schedule has been approved by NWCAA).</p> <p>In the case of an exceedance, a 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 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:</p> <ul style="list-style-type: none"> <li>a) exceedance of an emission or ambient standard;</li> <li>b) a potential threat to human health or safety.</li> </ul>

## **JUSTIFICATION**

### **I. BACKGROUND**

The Westinghouse W501D simple cycle dual-fueled combustion turbine (Unit 2) is located at the Fredonia Generating Station. The turbine has the capability to supply a gross power output of approximately 104 MW. NO<sub>x</sub> emissions from Unit 2 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 PSD permit PSD-X82-09, NSPS Subpart GG, and the Fredonia Generating Station's Air Operating Permit No. 003.

Stack testing every 10,000 hours of Unit 2'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 95.6 ppmvd @ 15% O<sub>2</sub> while combusting natural gas and 93.1 ppmvd @ 15% O<sub>2</sub> while combusting distillate, by comparing the recorded water-to-fuel ratios against the Westinghouse NSPS compliance chart No. 21T2294. 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 that "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." Unit 2 is 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-X82-09, NSPS Subpart GG, and Fredonia Station's Air Operating Permit No 003. Stack testing and fuel monitoring shall provide data to calculate NO<sub>x</sub> emissions on an annual basis and provide an accurate estimate of emission concentration within the exhaust stack of Unit 2. 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 Unit 2 shall be measured every 10,000 hours of Unit 2 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 calculate and record monthly hours of operation on natural gas and distillate oil and rolling 12-month NO<sub>x</sub> emissions totals within 30 days after the end of each calendar month. On a semi-annual basis, PSE shall report to NWCAA the results for the preceding 6 months in written (or electronic if permitted by NWCAA) form to NWCAA within 30 days of the end of each six-month period (unless a different testing and reporting schedule has been approved by NWCAA).

In the case of an exceedance, a 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 within 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.